

# Industrial<sup>IT</sup> Compact HMI 800 System Version 4.1

## Getting Started





**Industrial<sup>IT</sup>**  
**Compact HMI 800**  
**System Version 4.1**

**Getting Started**

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# About This Book

## General

This instruction describes the Industrial<sup>IT</sup> Compact HMI 800 product, version 4.1. The product includes a user interface and functionality to operate, configure and administrate your plant.

The Compact HMI 800 is based on the Industrial<sup>IT</sup> Base System 4.1, which provides easy installation, configuration and operation suited for the PLC market.

To fully understand and use this product, information in standard Base System instructions is referred. These documents can be accessed from the **Start** menu (**Start > All Programs > ABB Industrial IT Base > System > Documentation**). See [Related Documentation on page 13](#) for a complete list of referred instructions. Among these instructions there might be chapters describing functionality that is not a part of this product and hence obsolete.

## Intended User

This instruction is intended for several users:

- Process operators with experience of process control systems or PLC products.
- System engineers with experience of installation, configuration and set-up of process control systems or PLC products.
- System administrators with experience of process control systems or PLC products and Microsoft® Windows® operating systems.

In general, Microsoft Windows functions are not described in this instruction.

## Use of Warning, Caution, Information, and Tip Icons

This publication includes **Warning**, **Caution**, and **Information** where appropriate to point out safety related or other important information. It also includes **Tip** to point out useful hints to the reader. The corresponding symbols should be interpreted as follows:



Electrical warning icon indicates the presence of a hazard which could result in *electrical shock*.



Warning icon indicates the presence of a hazard which could result in *personal injury*.



Caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard which could result in *corruption of software or damage to equipment/property*.



Information icon alerts the reader to pertinent facts and conditions.



Tip icon indicates advice on, for example, how to design your project or how to use a certain function

Although **Warning** hazards are related to personal injury, and **Caution** hazards are associated with equipment or property damage, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all **Warning** and **Caution** notices.

## Applicable Specifications

This product meets the requirements specified in EMC Directive 89/336/EEC and in Low Voltage Directive 72/23/EEC.

## Related Documentation

The following is a listing of documentation related to *Industrial<sup>IT</sup> Compact HMI 800, System Version 4.1*.

*Table 1. Related Documentation*

Category	Title	Description
System Administration	System, Post Installation Setup	Contains post installation procedures.
	System, Administration and Security	Contains instructions about how to administrate and set security in your System.
Software	System, Extended Operation	Describes operation of the Operator Workplace.
	System, Operator Workplace, Configuration	Describes configuration of the Operator Workplace and Plant Explorer.
	Engineering, Graphics	This instruction describes how to use Graphics.
	Industrial <sup>IT</sup> PLC Operation	Describes operation details of PLC Connect.
	Industrial <sup>IT</sup> PLC Configuration	Describes configuration details of PLC Connect.
Other	System, Automation System Network - Design and Configuration.	Describes configuration details.

These documents can be accessed via the start menu: **Start > All Programs > ABB Industrial IT Base > System > Documentation**.

## Terminology

This list contains descriptions for terms and abbreviations that are used in this document.

*Table 2. Terms and Definitions*

<b>Term</b>	<b>Description</b>
ActiveX	Microsoft standard for user interface components, based on definition of software interfaces.
AS	Aspect Server. The “central” intelligence in the system, including the aspect directory and other services related to object management, names, security, etc.
Aspect	See <a href="#">Aspects on page 21</a>
Aspect Objects	See <a href="#">Aspect Objects on page 21</a>
BDM	Bulk Data Manager
CEXbus	Communication module expansion bus used in the AC 800M Controller.
CNCP	Control Network Clock Synchronization Protocol
COM	(Microsoft) Common Object Model.
CS	Connectivity Servers provide access to controllers and other data sources.
CTK	Configuration Tool Kit
DCS	Distributed Control System. A generic term for control systems for Process Automation, normally with a distributed database and real time data access.
DCU	Distributed Control Unit
DMZ	Demilitarized Zone

Table 2. Terms and Definitions (Continued)

<b>Term</b>	<b>Description</b>
DTM	The Device Type Manager - DTM - is a software module delivered by the manufacturer together with a device. As an “FDT device driver” the DTM contains all device-specific data, functions, and graphical user interfaces and provides uniform access to these device-specific internals via the standardized FDT interfaces.
ECCP	Ethernet Communications Controller for the PCI bus
EPA	Environmental Protection Agency
ERP	Enterprise Resource Planning.
ES	Engineering System, which is used for engineering and potential test of applications intended for Production System
FDA	Food and Drug Administration
FDT	Field Device Tool. It is an open standardized communication interface for integrating field devices and their application into control systems or device management tools, e.g. Engineering Tools and Asset Management Tools.
FF	FOUNDATION Fieldbus.
GSM	Global System for Mobile communication
HSE	High Speed Ethernet (FOUNDATION Fieldbus)
HSI	Human System Interface
HMI	Human Machine Interface
Industrial <sup>IT</sup>	Industrial <sup>IT</sup> is ABB's solution that creates a business enterprise where your plant automation, Asset Optimization, and collaborative business systems are seamlessly linked in real time.
MES	Manufacturing Execution System
NIC	Network Interface Card

Table 2. Terms and Definitions (Continued)

<b>Term</b>	<b>Description</b>
NLS	National Language Support
Node	A computer communicating on a network, e.g. the Internet, Plant, Control or I/O network. Each node typically has a unique node address with a format depending on the network to which it is connected.
ODBC	Open Data Base Connectivity
OCS	Open Control System. Similar meaning as DCS
OLE	Object Linking and Embedding
OPC	<u>O</u> LE for <u>P</u> rocess <u>C</u> ontrol, a standard interface for data, event and history access based on COM.
PA	Process Automation
PCA	Process Control Aspect
Plant Explorer	An application that is used to create, delete and organize Aspect Objects and Aspects in the Compact HMI 800. The plant explorer organizes the Aspect Objects in structures according to functionality, location, etc. You can also use it to browse and search the structures of the plant.
PLC	Programmable Logic Controller. Controller for primarily discrete logic control.
PNSM	PC, Network and Software Monitoring
PS	Production System which is used for controlling a real process
RNRP	Redundant Network Routing Protocol
SIL	Safety Integrity Level
SIS	Safety Instrumented System
SMS	Short Messaging Service
SNMP	Simple Network Management Protocol

*Table 2. Terms and Definitions (Continued)*

<b>Term</b>	<b>Description</b>
SNTP	Simple Network Time Protocol
SOE	Sequence of Events
SQL	Standard Query Language
UTC	Coordinated Universal Time
VPN	Virtual Private Network
WMI	Windows Management Instrumentation



# Section 1 Compact HMI 800 Overview

## System Overview

The Industrial<sup>IT</sup> Compact HMI 800 is designed to be an HMI to any kind of automation solution. It interfaces to AC 800M and most other PLCs found on the market. It is based on the Industrial<sup>IT</sup> Base standard system. To make it easy to set up and install the product, some configurations are pre-set at delivery.

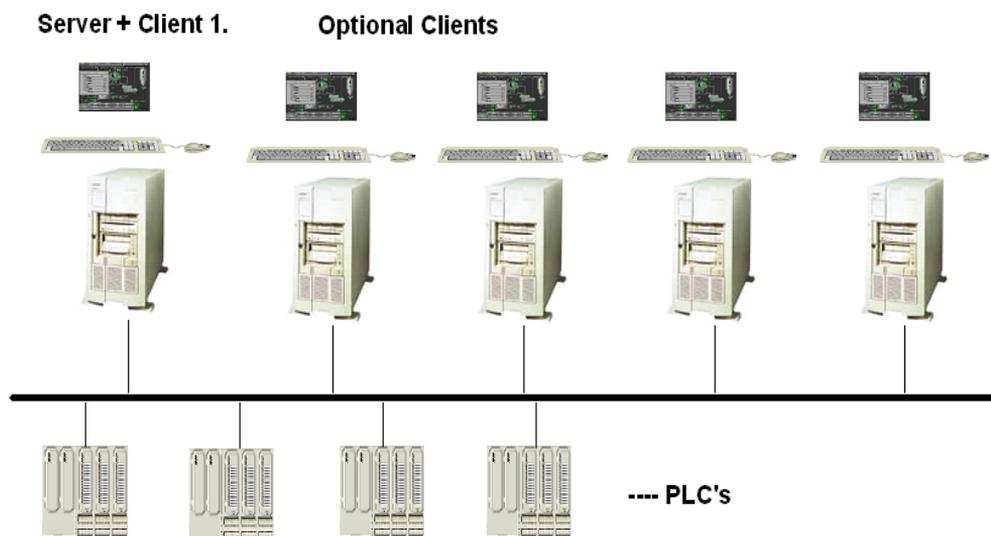


Figure 1. System Overview



## Section 2 Terms and Common Principles

This section describes common terms and principles. Refer to *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration* and *Industrial<sup>IT</sup> Base System, Extended Operation*.

### Aspect Objects

A plant consists of real entities, such as pipes, tanks, valves motors etc. In the Aspect Object solution these entities or objects are modeled in the control system. A modeled object is called an Aspect Object and can be a simple lowest level object or contain other objects. Objects containing other objects are called composite objects. The Aspect Object system can also handle computer related objects the same way as real entity objects. Example of such objects are user object, node object, workplace object etc.

### Aspects

There are a number of different types of information connected to each object. These types of information are called Aspects in the Aspect Object solution. For example a valve may have a mechanical drawing, a faceplate (for control purposes), a graphical representation in a graphical display and so on. Aspect Objects have a number of default aspects, for example its Name.

Aspect Objects are visualized with different tools, like process graphics, alarm lists, Plant Explorer etc. The aspect context menu for an object is displayed by right-clicking it. This will display a list of present aspects from which a desired aspect can be selected. Depending on the aspect and the environment, the information will be presented on the screen in the appropriate tool.

### What is an Aspect View?

A view is a visual representation of an aspect on the screen. Some aspects have more than one view. The Faceplate for example, can have up to three views.

### How Does it fit Together?

Figure 2 shows how the concepts fit together. The physical valve is modeled and represented in a graphical display. This valve that is now an Aspect Object, has a number of Aspects, of which four are presented here. Each aspect has at least one view.

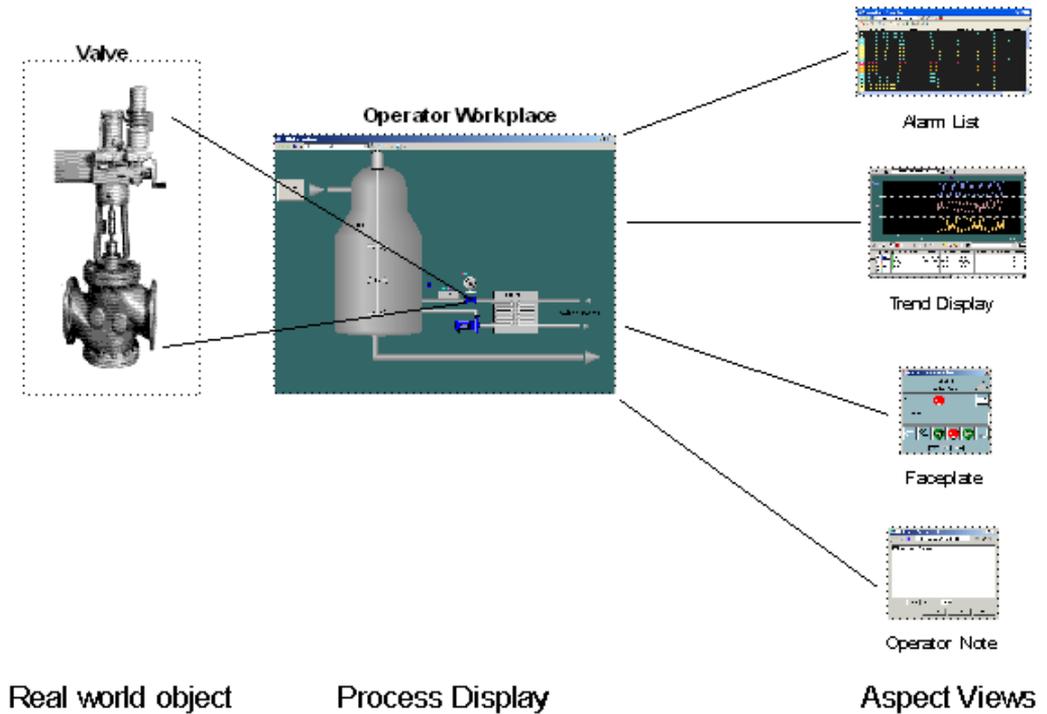


Figure 2. Aspects with Aspect Views

## Structures

The Aspect Object™ concept allows organization of objects and aspects into different structures, depending on which context is to be viewed.

Structures are the graphical representations of the relations that exist between different aspect objects. Since there are usually a number of different types of relations between objects, an aspect object can be part of more than one structure.

The difference between the structures of Plant Explorer and Windows Explorer, is that in Plant Explorer there are a number of structures representing the same plant.

Structures can be built and improved at any time. Examples of the most common structures are Object Type Structure, Control Structure and Functional Structure.

## The Operator Workplace and Plant Explorer Workplace

### The Operator Workplace

The Operator Workplace is the environment from which the operator views and controls the process in the plant. By logging in as an Operator, the Operator Workplace will be started.

After logging in, the start screen is displayed.

It is usually configured by the Application Engineer and intended as a starting point for an Operator controlling the plant.

In Compact HMI 800 a number of different types of displays are available.

The most important are process displays for supervision, faceplates to control real process objects, trend displays and alarm displays to monitor process anomalies. These displays are presented in the Display Area (see [Figure 3](#) below) and may appear as base displays or overlap displays. Base displays cover the entire display area while one or more overlap displays normally cover a smaller portion of the display area (and the base display).

At the top and the bottom of the Operator Workplace there are tool bars to control the system and the process.

These areas contain important information and are never covered by displays. The tools in these toolbars represented by Icons, are used to interact with the process and the Compact HMI 800.

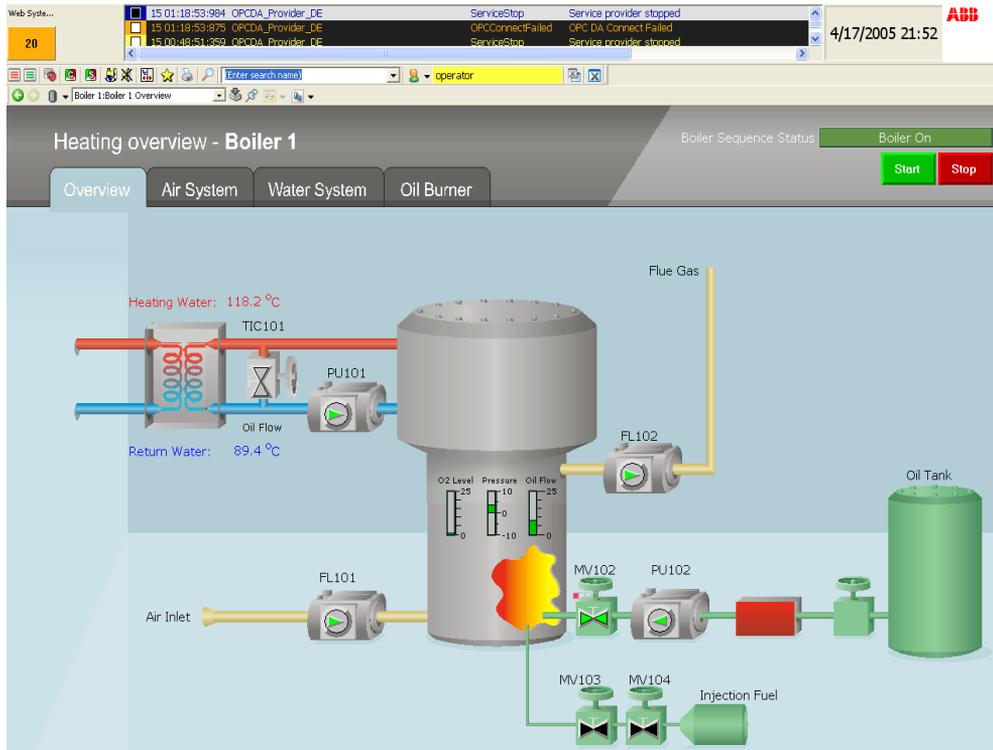


Figure 3. The Operator Workplace Window

## Plant Explorer Workplace

Plant Explorer is the main tool for exploring and building hierarchically structured models of a plant or a system. It is also used to create and configure the objects and aspects of these structures. The information about the plant is stored in a single place, which means that you just have to enter information once.

Plant Explorer Workplace is suitable and recommended for application engineers who want to configure an Operator Workplace.

### General User Interface

Compact HMI 800 workplaces use the window system provided by Microsoft Windows. They are designed so as to retain a familiar environment. Plant Explorer works in a similar way as Windows Explorer regarding for example the following functions.

- cut, paste, copy
- shortcut tools
- drag-and-drop operations within and between the Workplace panes, see also Using Drag-and Drop.
- context menu (reached by right-clicking), see Object Context Menu and Aspect Context Menu.

### The Plant Explorer Workplace Window

The Plant Explorer Workplace window is the tool you use when you work with aspect objects, aspects and structures.

[Figure 4](#) shows an example of the Plant Explorer window.

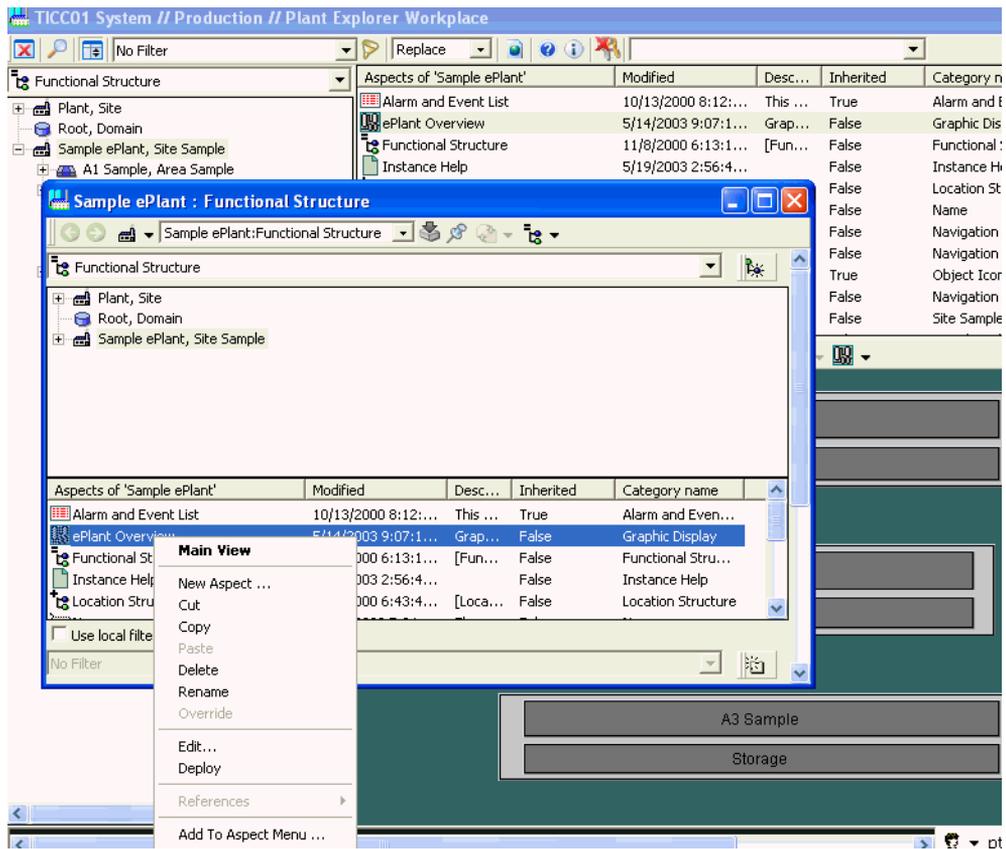


Figure 4. The Plant Explorer Workplace Window

Read more about the Plant Explorer in the *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration* instruction.

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## Section 3 Installation

### General

Industrial<sup>IT</sup> Compact HMI 800 version 4.1 is delivered as software pre-installed in PCs. Depending on the order, check that the delivery consists of:

- 1 server PC (The server includes one operator workplace client and one engineering workplace client) with:
  - one power cord
  - one keyboard
  - one mouse
  - one dongle
  - one cable for dual VGA
  - four Dell and two Microsoft backup DVDs
  - one Symantec Norton Ghost box
  - one product box. Including Getting Started manual, one mouse pad, one Server Restore DVD, and one As Manufactured DVD
  - one box including VB (Visual Basic 6) for Process Graphics and Aspect Express
- 0 - 4 client PCs (For operator workplaces (optionally).) with:
  - one power cord
  - one keyboard
  - one mouse
  - four Dell and two Microsoft backup DVDs
  - one Symantec Norton Ghost box

- one product box per PC. Including Getting Started manual, one mouse pad, one Restore Client DVD

The PCs are delivered and configured to automatically work together as one system. If more than one server, and four clients will be connected to the same network, the IP addresses has to be changed. See [IP Addresses and Workgroups](#) on page 44.

## Supported Standard PLCs

We support communication with, and guarantee compatibility with all PLCs or field devices that are compliant to the communication standards: OPC, Modbus RTU, Modbus TCP, SattBus and Comli.

The Compact HMI 800 supports connections to PLCs both via OPC with specific communication hardware as well as via serial communication channels.

Besides the serial channels, there is no upper limit on how many PLCs that may be attached to the system. Instead the total number of communicating signals that are limited by the purchased license size.

## System Power-up

Connect the keyboard with mouse in one of the USB ports in the front of the PC, or in one of the upper USB ports on the rear side. Connect the power cord, and the network cable to the PC's. Put the dongle in one of the USB ports in the server. See [Figure 5](#)

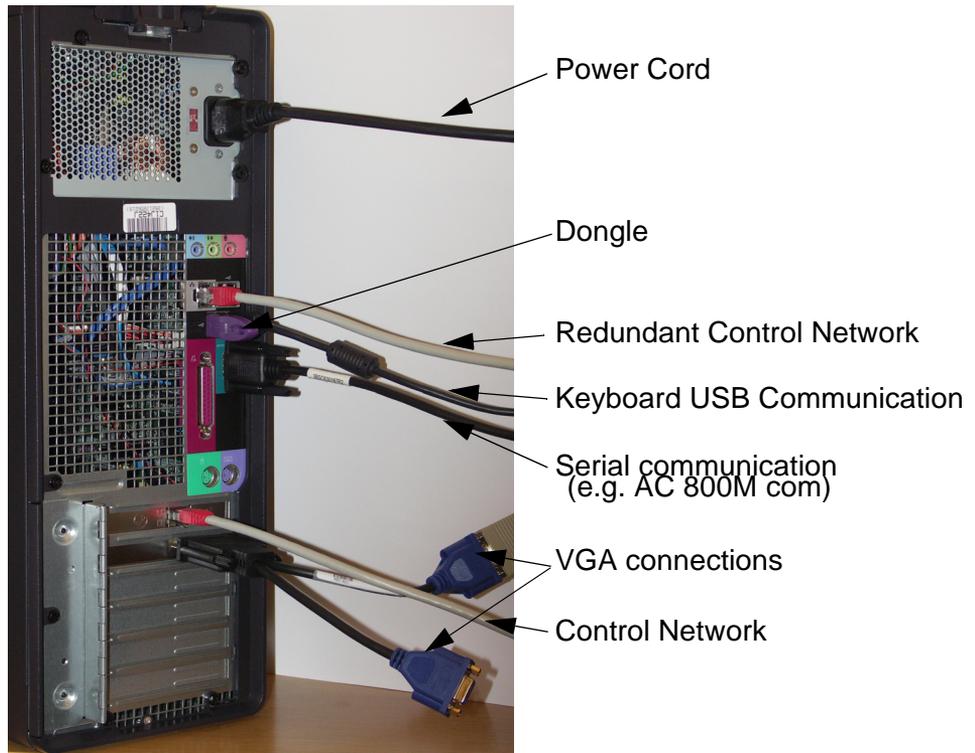


Figure 5. Rear side PC connections

The server and clients in Compact HMI 800 are connected via TCP/IP. To interconnect the PCs with a switch, use network cables TP Cat 5/6 RJ45. The software in the PCs are pre loaded and configured to be started automatically.

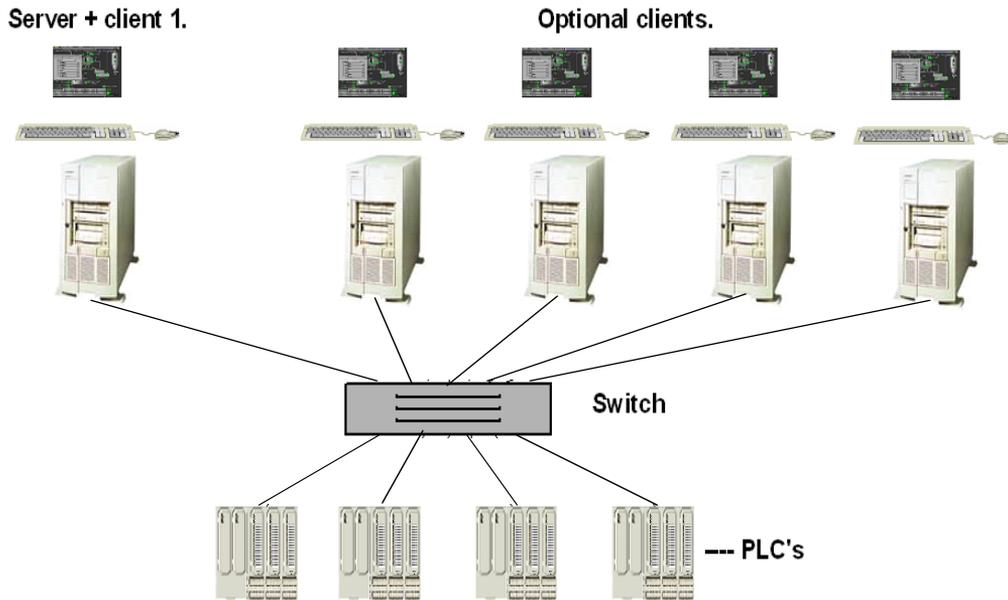


Figure 6. Network Setup

Each PC is equipped with a dual network card at delivery. If the intention is to connect any of the PCs with an intranet etc., a separate network for client servers and PLCs should be considered. It is also possible to split the client server and control networks for performance and other reasons. In any case, configure the addresses according to the *Industrial<sup>IT</sup> Base System, Automation System Network* instruction.

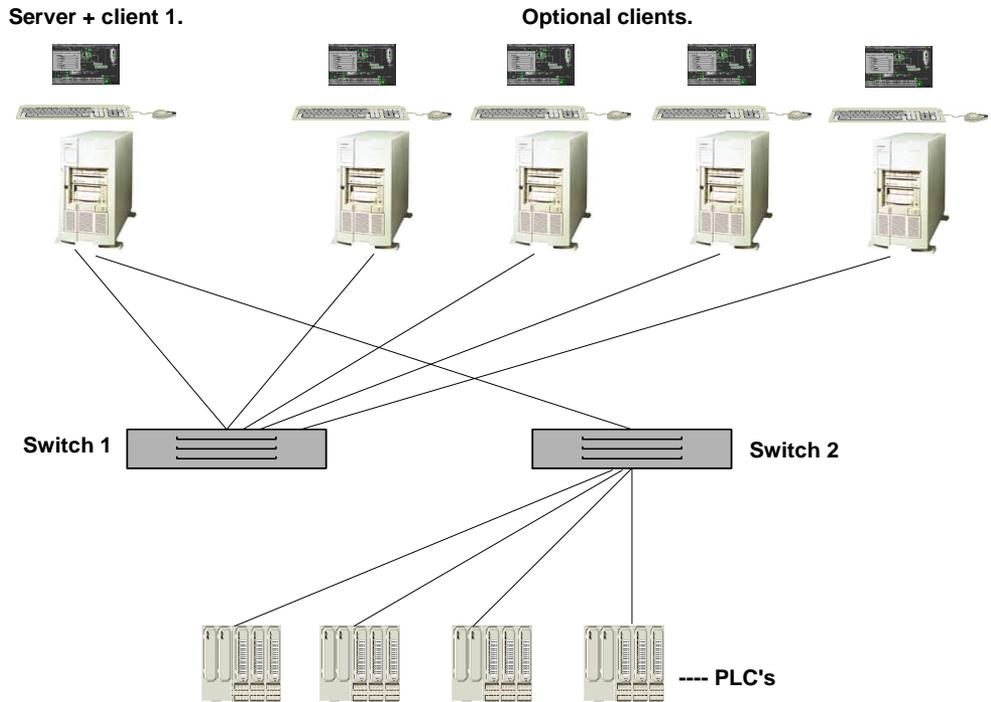


Figure 7. Separate Network Setup

## Compact HMI 800 Preconfigurations

The Compact HMI 800 has a number of properties preconfigured to help ease of use. These are described in this chapter.

Compact HMI 800 system is limited to one server and up to 4 clients. In total this adds up to 5 Operator Workplaces, one on each client and one on the server. The server is also used as an Engineering Workplace

The Windows Users shown in the [Table 3](#) below are created on the Compact HMI 800 system. They are members of user groups as shown in the [Table 3](#). In that manner the users have inherited correct configuration profile.

*Table 3. Windows User Groups*

	<b>Operator</b>	<b>AppEng</b>	<b>SysAdmin</b>
<b>User Groups</b>	Everyone	Everyone	Everyone
	Operators	Operators	Operators
		Application Engineers	Application Engineers
		System Engineers	System Engineers
			Administrators

Windows is configured in such manner that the Welcome screen is presented after the boot. The users presented on the Welcome screen are the users that are configured for this system, but not the only users in the system. Other users exist, but are hidden, and are only to be used in special system administration tasks.

Default passwords for the Compact HMI 800 users are the same as their user names.

## Start Up

After installing the hardware, the system is started as follows:

- Power up network switches and other communication equipment.
- Power up the server node.
- Power up the clients.
- Power up PLCs and other equipment.

When the nodes have started, a welcome screen asks the user to log in. Normally you start to log in as an AppEng (Application Engineer), to start the engineering work of the system.

If you need to do some system administration work, e.g. change the IP address, you log in as SysAdmin. As operator you log in as Operator. The following log in alternatives exist:

*Table 4. Predefined Users*

User	Password
<b>Server node:</b>	
Operator	Operator
AppEng	AppEng
SysAdmin	SysAdmin
<b>Client node:</b>	
Operator	Operator
<b>Both nodes (Service account)</b>	
SwServiceAccount	hmi800

It is recommended to change the default passwords above.

The SwServiceAccount is not available on the welcome screen.

## Connectivity to AC 800M

The Compact HMI 800 uses PLC Connect to connect to all PLCs and Controllers.

PLC Connect can be used to connect AC 800M/C controllers versions 3.0-3.2 using the corresponding Control IT OPC Server 3.0-3.2. PLC Connect can also be used to directly connect AC 800M 2.0/2.1/2.2/3.0/3.1/3.2 and AC800C 2.2/3.2 versions, using any of the following protocols with PLC Connect acting as master and AC 800M/C as slave:

- Serial connection and the Comli protocol. (Limited Comli).
- SattBus on TCP/IP (Ethernet).

If the Alarm and Event OPC server for AC 800M controllers is not used, the related event collector service may be switched off to get an all green system status structure. This is done by logging in as SysAdmin, and removing the enabled switch in the [Figure 8](#).

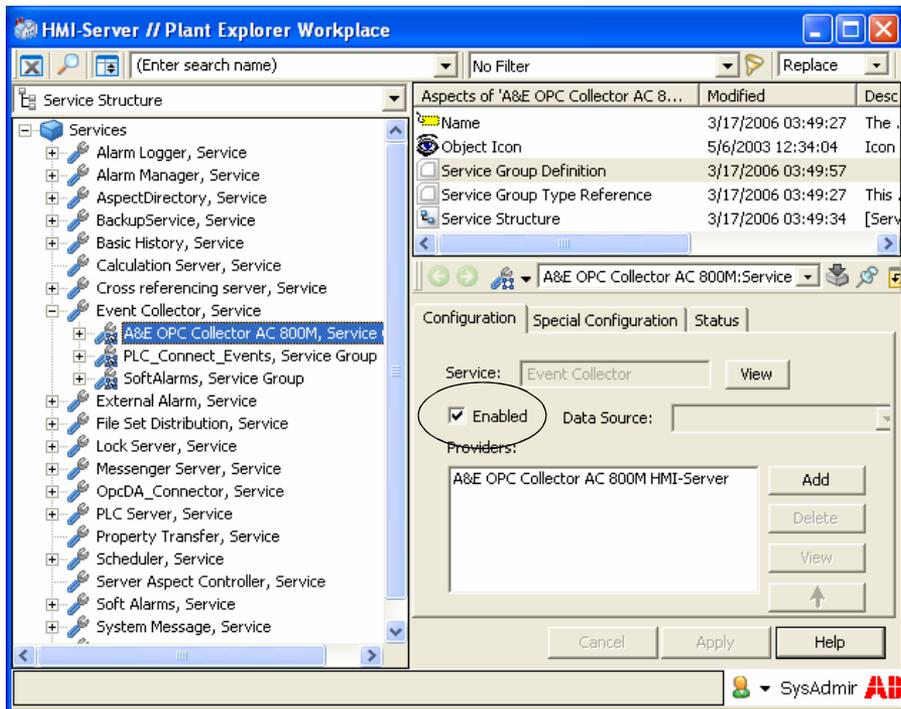


Figure 8. Event Collector Switched off

## Installation and Configuration of OPC Servers for PLCs

Compact HMI 800 can interface to standard PLCs. The connection is done using a specific communication driver, or via an OPC server for the PLC. To connect one or more PLCs via an OPC server follow the description below.

Install the OPC server for the PLC. The OPC server shall be installed as a Windows service if possible. Below is a typical workflow how to install and set up an OPC server to correctly interface the Compact HMI 800 software.

1. Log in as SysAdmin.
2. Install the OPC server.
3. If the server is prepared to be a Windows service, it shall be configured to run on an account SwServiceAccount.
4. Open the Plant Explorer and go to the Control Structure.
5. Select the OPC server object. See [Engineering Workflow](#) on page 47
6. Create a new object of the PLC Controller type. Name it to recognize the OPC server. (For example ABB\_OPC\_server\_1 etc.)
7. Select the protocol to be PLC OPC client.
8. Click Edit Driver.
9. If the OPC server is located in another node than the Compact HMI 800 server, fill in the server node name.
10. Select the OPC server in the OPC server drop-down list.
11. Press OK and then the Create button.

Now the OPC server is installed.

## Connection to Third Party Alarm & Event OPC Server

To get time tagged alarms from the controller into the Compact HMI 800 alarm list, the OPC AE client function of Compact HMI 800 should be used.

To associate an alarm with a suitable Aspect Object (normally a PLC signal object) an OPC Source Name aspect, or an Aspect Name aspect, should be created on the mentioned signal object.

Note. The Name Property in the OPC Source Name should be the same as exposed by the OPC AE server. Do not check “Is an Event” and “Is an Alarm” in “Alarm Event Configuration”.

Avoid identical names of PLC Process Object and PLC Signal Object (both Aspect Objects).

### How to do a configuration for a third party AE-OPC Server

The OPC Server is installed on the Compact HMI 800 node.

Create a Service Group for the Event Collector.

Create a Service Provider for the created Service Group.

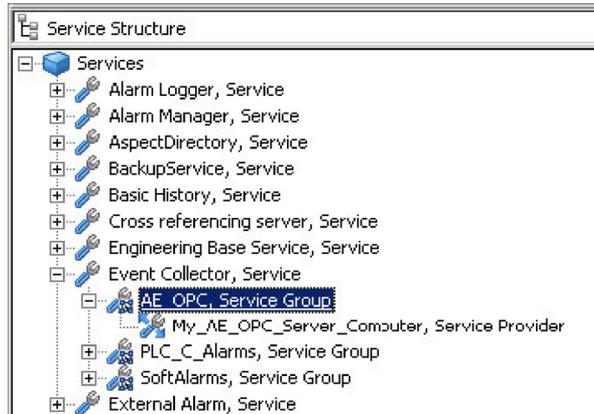


Figure 9. AE OPC Service Group.

Do the configuration of the Service Provider and of the AE-OPC Server.

Select the current PLC\_C node in the Service Provider Definition Aspect and select the Prog\_ID for the current OPC A&E Server in the Service Group Definition Aspect.

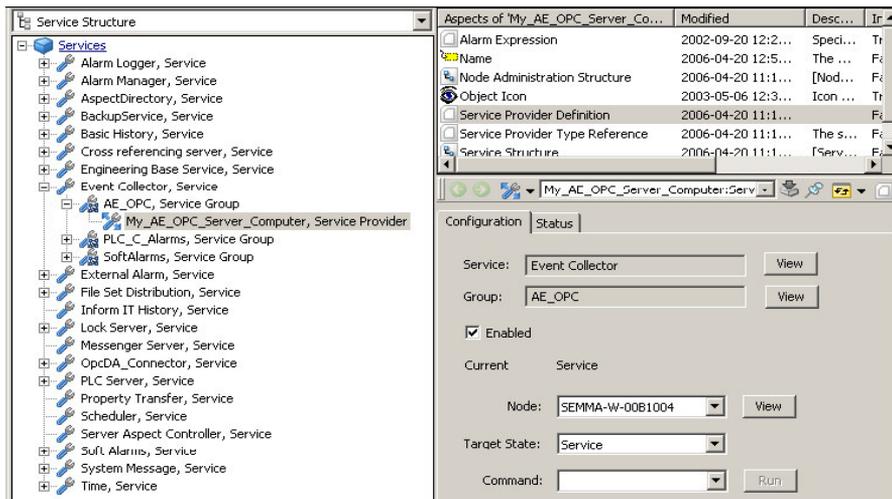


Figure 10. Service Provider Definition

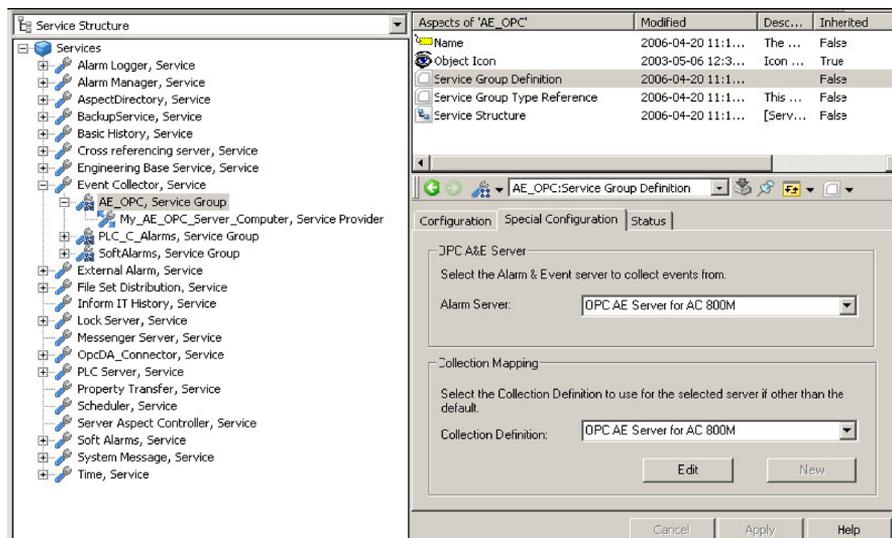


Figure 11. Service Group Definition

In the Controller (PLC) you need to configure the alarms.

SourceName and ConditionName need to be configured according to the OPC Specification. (In the OPC Specification it is stated: “A condition is a named state of an OPC AE Server. Each condition is associated with an OPCSource. An OPCSource may be a process tag or possibly a device or subsystem”).

This example is done with the Compact Control Builder for AC 800M (PLC Control Builder).

The AC 800M Connect can not be used in the 800xA System if the OPC Server for AC 800M is to be used for alarm handling as described here. This limitation is only valid to the OPC Server for AC 800M and not for third party OPC Servers.

In this example three alarms are defined and used so they will be displayed on one Object in the Compact HMI 800.

The FB AlarmCond is used in this example. The SrcName is set to MyObjectName\_A and the CondNames to SignalName\_x. Note that the SourceName must be unique!

Name	Data Type	Initial Value
1 SrcName_A	string[30]	'MyObjectName_A'
2 Signal_1	bool	
3 Signal_2	bool	
4 Signal_3	bool	
5 CondName1	string[15]	'SignalName_1'
6 Message1	string[60]	'AlarmText_1'
7 CondName2	string[15]	'SignalName_2'
8 Message2	string[60]	'AlarmText_2'
9 CondName3	string[15]	'SignalName_3'
10 Message3	string[60]	'AlarmText_3'
11		

**Variables**    Function Blocks

```

Alarm1 ( Signal := Signal_1,
          SrcName := SrcName_A,
          CondName := CondName1,
          Message := Message1 );

Alarm2 ( Signal := Signal_2,
          SrcName := SrcName_A,
          CondName := CondName2,
          Message := Message2 );

Alarm3 ( Signal := Signal_3,
          SrcName := SrcName_A,
          CondName := CondName3,
          Message := Message3 );
        
```

Figure 12. Alarm Conditions

To monitor the Alarm Status, the OPC Source Name aspect or, Aspect Name aspect needs to be added to each object. There can only be one alarm owner for each alarm source. This can be done from the Object Type Structure. Add the Aspect Name aspect and use the copy function from the Aspect Control Tab in the Object Type Definition Aspect. This has been done for the TestType as displayed below.

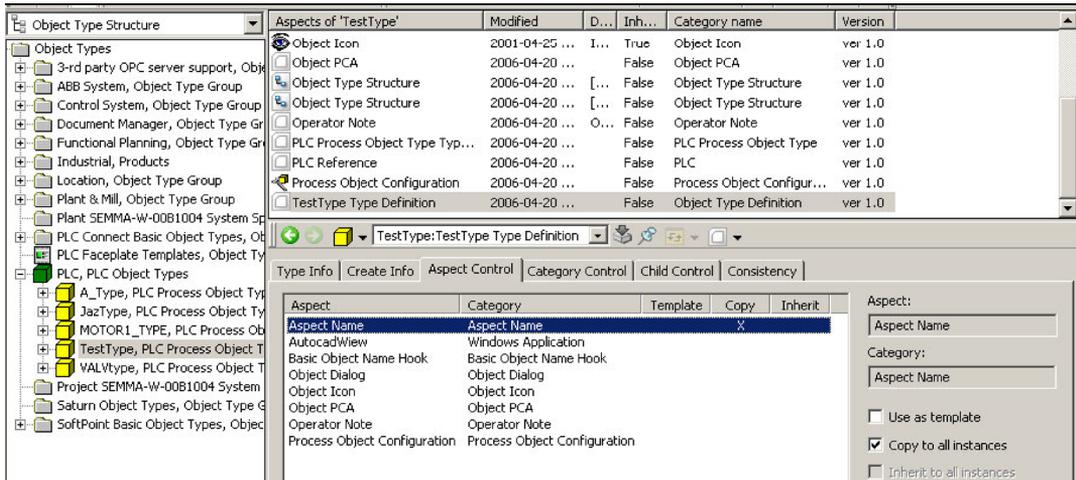


Figure 13. Aspect Control Tab in the Object Type Definition Aspect

The following Aspects are also added to the Object Type as usual; Alarm List, Alarm Status and a Faceplate. In this example this Graphic Element was also created containing the visualization of the AlarmState.

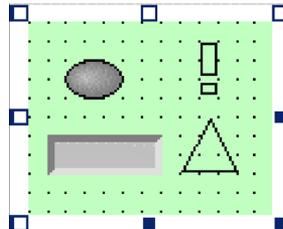


Figure 14. Graphic Element, visualization of the AlarmState

In the Control Structure the Aspect Name aspect on the Object is configured with the SourceName from the AE-OPC Configuration.

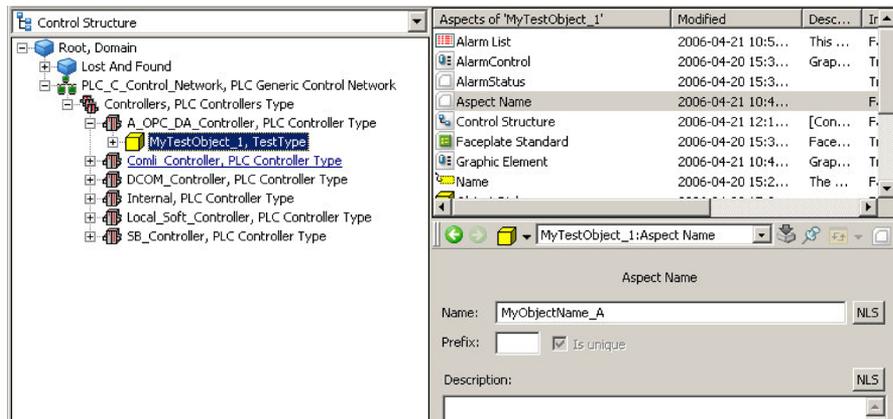


Figure 15. Control Structure and the Aspect Name aspect

When the alarms are activated the following information will be displayed in the Alarm List.

	Ack	Pri	Event Time	Object Name	Condition	Message Description	Auto Dis	Class
1	<input type="checkbox"/>	500	04-21 10:50:23	MyTestObject_1	SignalName_3	AlarmText_3	False	1
2	<input type="checkbox"/>	500	04-21 10:50:20	MyTestObject_1	SignalName_2	AlarmText_2	False	1
3	<input type="checkbox"/>	500	04-21 10:47:11	MyTestObject_1	SignalName_1	AlarmText_1	False	1

Figure 16. Alarms in the Alarm List

The Faceplate and the Graphic Element is displaying the Summary Alarm State of the Object.

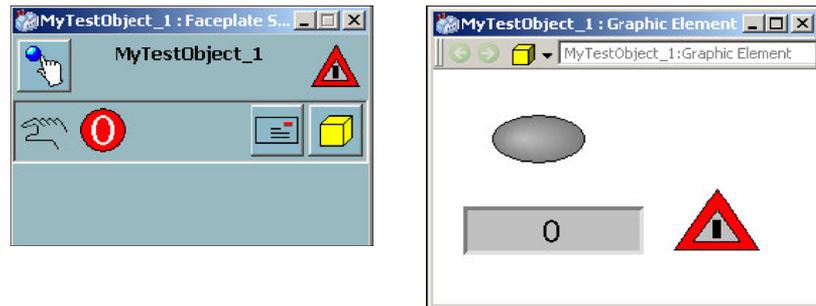


Figure 17. Examples of Faceplates

### Using AC 500 together with Compact HMI 800

When using Compact HMI 800 together with AC 500 the Control Builder and OPC server should be installed on the Server node.

It is recommended to use the ModBus TCP driver in the Compact HMI 800 to access the AC 500 controllers. When setting up the communication please note the following:

- Make sure that you use the same network mask in the AC 500 as in the Compact HMI. 800, i.e. 255.255.252.0.

If you are using the AC 500 OPC Server please note the following:

- The OPC servers should be set (in dcom config) to always be running as the same user, as the user running the AC 500 control builder. This is done by logging in as SysAdmin and then follow the following steps.

1. Open the Windows start menu and select **Run**, in the window that opens, type “**dcomcnfg.exe**”.
2. The application for configuring security for components opens up.
3. Move down to find the Component **OPC Server for CoDeSys...**

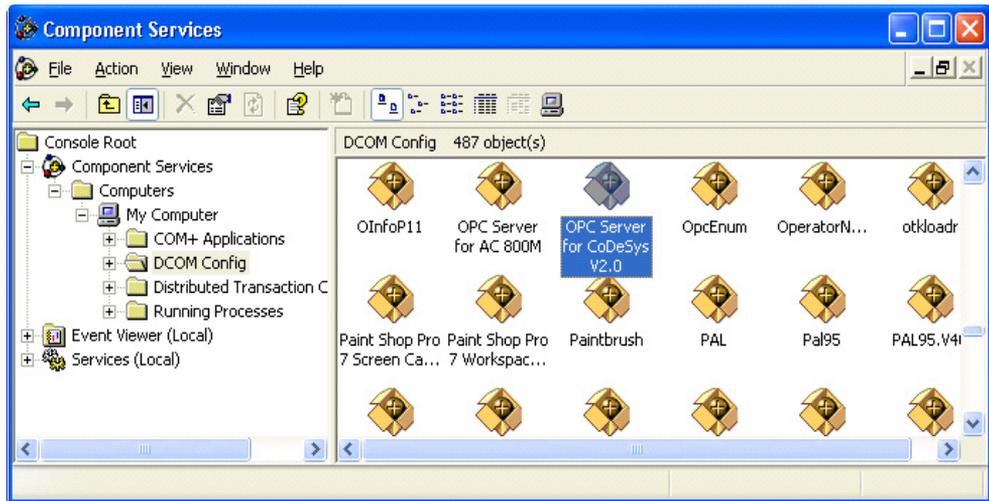


Figure 18. DCOM Config in Component Services

4. Right-click the icon and select **Properties**, then select the **Identity** tab to get the dialog below.

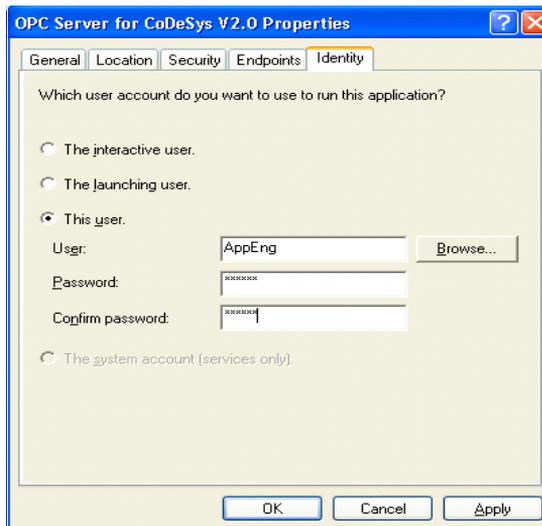
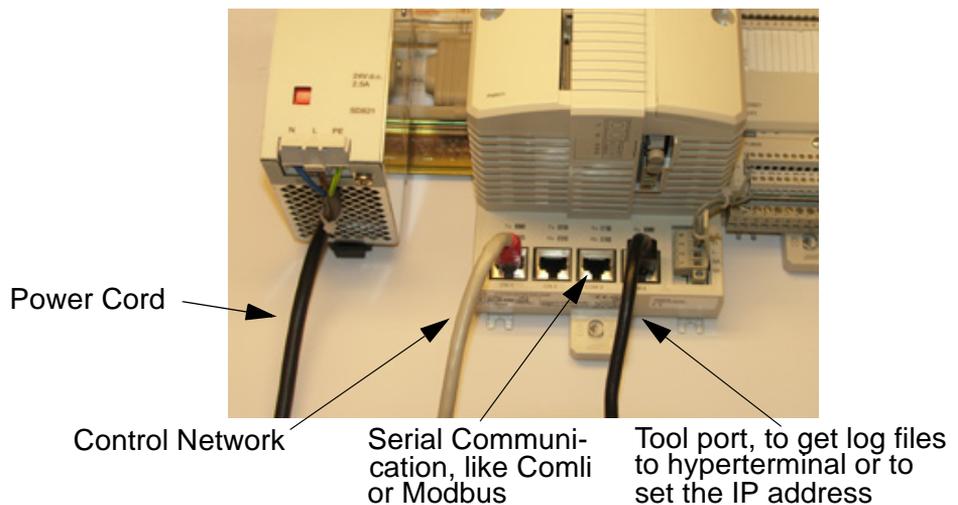


Figure 19. OPC Server for CoDeSys V2.0 Properties

5. Select this user as shown above and insert the user name and password for the user that should be logged on when using the AC 500 Control Builder. (typically the user AppEng).
6. Click OK and close the application and the system is ready to be used for both configuration and operation with the AC 500 controller.

## OPC Server for AC 800M is Preinstalled

If you are using AC 800M controllers, the Compact HMI 800 is ready to connect to the AC 800M controller out of the box. The OPC server is installed and the Compact HMI 800 has been configured accordingly. How to connect AC 800M, see [Figure 20](#)



*Figure 20. AC 800M connections*

## IP Addresses and Workgroups

Compact HMI 800 is delivered with preset IP addresses. If you have two systems they will have the same IP addresses by default.



If a Compact HMI 800 system is extended with additional client nodes ordered separately, those are always configured as Workplace Client 4. So if this node already exist the addresses needs to be reconfigured.

The pre loaded addresses are shown in [Table 5](#). If you for some reason need to change IP addresses, follow the scheme below:

1. Log in as System Administrator.
2. Change the IP address of the computer from the Windows control panel.
3. Update the Host file in the server and all clients to reflect the changed address.  
The file can be found in the following path:  
C:\WINDOWS\system32\drivers\ets\hosts.  
The file can be updated using Notepad.
4. Restart each computer after changing the IP addresses.

Below the IP addresses for the different network nodes are presented. The system is interconnected using Work Groups with the nodes defined in a Host table. This means that a standalone system does not need a Domain Server or a DNS server.

If the installation shall be included in an existing domain, please refer to the *Industrial<sup>IT</sup> Base System, Automation System Network* instruction:

- Section 3 for network issues
- Section 4 for Domain and DNS issues.

In [Table 5](#) the pre loaded or predefined IP addresses for a Compact HMI 800 system are presented.

*Table 5. Nodes and IP Addresses*

Node	IP Address
Server pre installed network card	172.16.4.21
Optionally - Server network card 2	172.16.4.11

Table 5. Nodes and IP Addresses (Continued)

Node	IP Address
Workplace client 1	172.16.4.71
Workplace client 2	172.16.4.72
Workplace client 3	172.16.4.73
Workplace client 4	172.16.4.74
AC 800M CB PLC	172.16.4.151 - 172.16.4.255
3'd party PLCs.	172.16.6.0 - 172.16.6.150
Switches	172.16.5.245 - 172.16.5.255



Use the IP address mask 255.255.252.0 for all nodes.

See also the *Industrial<sup>IT</sup> Base System, Automation System Network (Section 1)* instruction, for more information.



## Section 4 Engineering

This section describes how to engineer the Compact HMI 800. Please also refer to the following instructions that can be found under the menu START>All Programs>ABB Industrial IT Base>System>Documentation:

- *System*
- *System, PLC Connect - Configuration*
- *System, Operator Workplace Configuration*
- *System, Engineering Graphics*

and

- *Industrial<sup>IT</sup> Compact Control Builder, Getting Started*

that can be found by starting the Compact Control Builder from the menu START>All Programs>ABB Industrial IT PLC>AC 800M>Compact Control Builder and look under Help>Manuals.

### Engineering Workflow

Compact HMI 800 provides a variety of tools for acquisition of data and presentation of data on a computer screen. Below there are a simple workflow with recommended steps to engineer the Compact HMI 800. Decisions must be made on how to organize the displays, write control applications and how to sectioning the control network.

- Connect the PLCs and Controllers to the Compact HMI 800.
- Install the PLC tools and configure OPC servers.
- Define the Device and Process object types that shall be visible in the Compact HMI 800.
- Create instances of the Types and connect these to the PLCs.
- Structure the control application according to the controlled equipment.

- Create displays, alarm lists, logs, trends and documentation.

Below follows a step by step Tutorial with some of the steps described more in detail.



To carry out the activities below please log in to the system as the user AppEng (same password if not changed) if nothing else is specified.

1. Install PLC configuration tools and OPC servers.  
This activity is not covered in this manual as this is specific to each PLC. The tools for the ABB AC 800M PLC has been preinstalled. Further information can be found by starting the Compact Control Builder AC 800M tool below ABB Industrial IT PLC in the **Start** menu. Please open the menu item Help-Manuals for further information. Note that Compact Control Builder AC 800M can only be used by one of the compact HMI users (AppEng) and only in the server node.
2. Working with object types.  
This chapter describes how object types are created to make it possible to create an object oriented representation of the signals in the PLCs. The signals from the PLCs OPC servers are represented by signal objects in Compact HMI 800. The signal objects are grouped to form an object representing a controlled device or process object. To reduce the effort involved in this the Compact HMI 800 includes the possibility to use Object Types. Object Types are the base for the object instances. Objects instances are representations of each individual real device in the factory.
3. Creating the device objects and related signals. The signals from the PLCs are connected to device object instances. Device object instances are stored in the Control Structure.
4. Building the Functional Structure. In order to have displays, trends, alarm lists etc. logically organized, a Functional Structure should be created. The object instances in Control Structure are organized according to the functionality in the plant in the Functional Structure. Note that an object represented in 2 structures still refers to the same object in the system.
5. Creating Displays, Logs, Alarm lists and project documentation. These steps concludes the main part of the Compact HMI 800 engineering work.

6. Configuration of additional Functions. In addition to the functions above, Compact HMI 800 includes functions for Audit Trail, e-mail and SMS messaging, Calculations, Document handling etc. some of these are described here but are also available in the Base System documentation available from the **Start** menu.

## Working with Object Types

Object types are used to define objects that represents the different types of devices and process objects for which data will be fetched in the PLCs.

Object types hold information and functionality of a specific type of object, e.g. a pump. In this chapters the object type and its properties are defined.

The following steps will be described:

- Creating an object type
- Adding signals to an object type
- Adding graphical Elements
- Adding Faceplates
- Adding Alarm and Event
- Adding History logging
- Adding Trend display

It is important to note that these created object types can easily be exported and reused in several projects using Compact HMI 800.

## Creating an Object Type

The PLC Connect allows the user to get an object oriented handling of the properties retrieved from the PLCs. The grouping of properties into objects representing devices controlled by the PLC is done in the Object Type Structure.

For each type of device that is controlled by the PLC, there should be an object type created. To create an object type, open the Plant Explorer by double-clicking on the “My ePlant” icon on the desktop. Then change to “Object Type Structure” in the drop-down menu in the upper left side of the window, and go to the PLC object as shown below. To create an object type representing a specific type of device, right-click the PLC object and select **New Object** in the context menu.

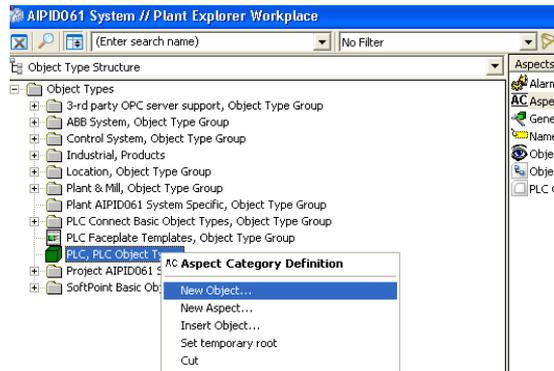


Figure 21. PLC Object in the Object Type Structure

Enter the name of the device type e.g. “Simple On Off Motor” and click **Create**.

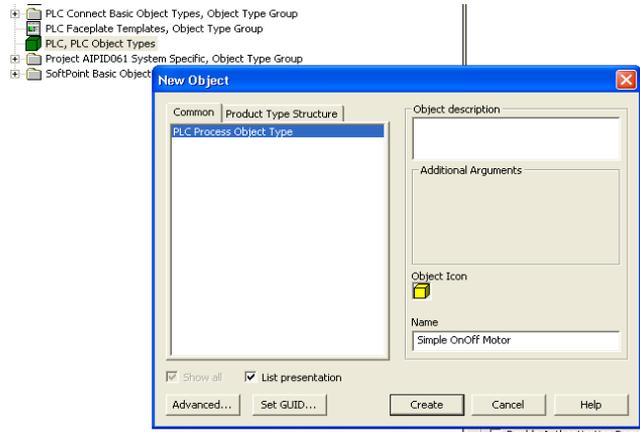


Figure 22. New Object - Simple OnOff Motor

The object type has now been created.

The object type will later be used to create instances which will be connected to the individual properties existing in the PLCs.

## Adding Signals to an Object Type

Signal objects are used to read and write data from/to the PLCs.

For each device type we need to define which properties we need to read or write from/to the PLC for this type of device. This is done by creating a PLC signal for each of the properties that should be accessed.

To configure e.g. Simple OnOffMotor do as follows.

1. In the Object Type Structure, expand the Simple OnOffMotor down to the lowest level.

2. Right-click and select **New Object** from the context menu (producing a new object).

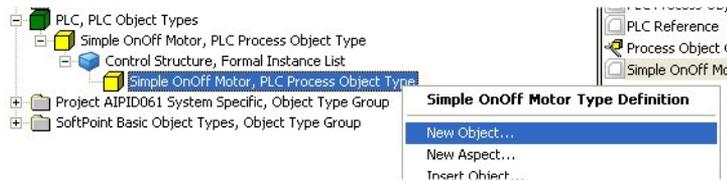


Figure 23. Simple OnOff Motor Object

3. Select the kind of signal that represents the property that you are going to access. (select one starting with PLC.. and then the preferred type)
4. Give the signal a name e.g. Motor\_ON. Repeat for each of the properties that need to be accessed for this type of device.



The OPC Server does not allow names of the signals as two words. The name of the signal should be, for example, Motor\_ON.

Now we are ready to create our first instance and test the connection to the PLC. To do this you can now proceed to [Creating Instances](#) on page 59. To add more functionality to the object type continue with the next chapter.

## Adding Graphical Elements

To be able to present data from instances of the object type in graphical displays, a display element must be created. This is done by following the steps below. See also [Section 8, PLC Connect Graphic Elements](#).

1. Open the Object Type Structure.
2. Select the Device object type created earlier. Right-click and select **New Aspect** from the context menu, then select Graphical Element in the list to create a new graphical element click **Create**.
3. Select the Graphical Element aspect and click **Edit**. Now you have entered the graphical builder. In the toolbar to the left, select e.g. an **AdvantElips** and draw a circle.

Now we will make the color change depend on the property value in the PLC. Click in the middle of the circle and the expression builder appears. Click on **FillColor** in the expression builder.

Now we will enter an expression that will change the color.

Example:

1. In the field FillColor type “**iif**(” (omit the circumflex signs when you type)
2. Then select the object property (that should trigger the color change) in the List of properties show in the Object Property tab in the Expression builder.
3. Click on e.g. “..Motor\_ON”
4. Then scroll down and double-click “Value - Binary PCA”, in the right column (now the property has been selected).
5. Write a comma (“,”) in the fill color field.
6. Select the color tab below.
7. Now select the color representing “on”. Double-click on the color named “measure”.
8. Write a comma (“,”) in the fill color field.
9. Select color “SymbolOff” as alternate fill color.
10. Enter ) at the end of the row and then type Enter.
11. Go to File menu and select Deploy, select **OK**.
12. The graphics element is now ready to be used in a display.
13. Close the graphics builder by **File > Exit**.

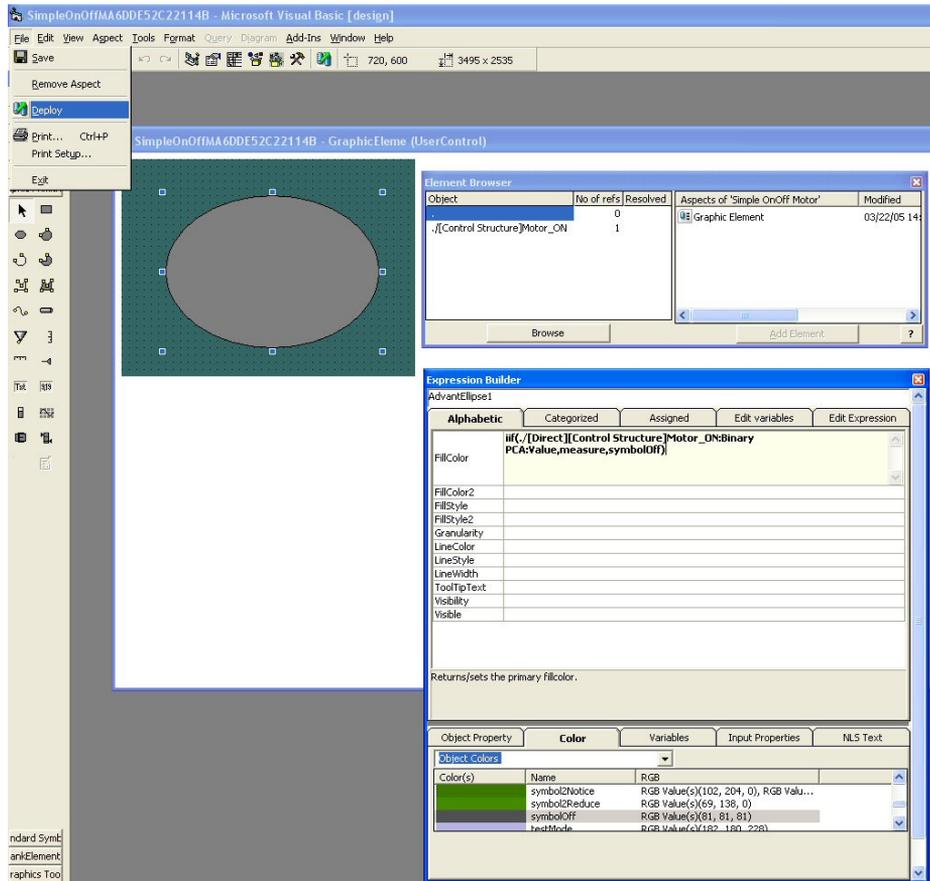


Figure 24. An Example of a Display Element Configuration

## Adding Faceplates

Faceplates are used to view, interact and change properties for devices and other process objects. The operator of the plant opens the faceplates by clicking on objects in graphic displays. For more information about the operator handling of faceplates, see *Industrial<sup>IT</sup> Base System, Extended Operation*.

In this example we will create a faceplate aspect that activates the start signal for the Motor “SimpleOnOffMotor”. The faceplate is created on the object type.



Before starting this section a new signal named “Motor\_Start“ should be added to the object type as shown in chapter Creating the Device Object Instances.

To create the faceplate, follow the steps below.

1. Go to the Object Type Structure, select the PLC Faceplate Templates. Copy the “Faceplate standard”.
2. Then select your object type for which a faceplate is required, e.g. SimpleOnOffMotor, and paste the copied “Faceplate standard”.
3. Open the **Config View** for the faceplate aspect, by using the context menu (right-click) on the aspect.
4. Select the **Buttons** tab.
5. Double-click the **Object** column in the row with a 1 Icon and browse to the newly created “Motor\_Start” signal.
6. Click on the **Property Name** column and select the value property. (Resize the window if the screen does not show up properly.)
7. Select property type “boolean” and property value “true” and click **OK**.
8. Click on the **Enabled** column and edit the code to the following:  
iif(\$./[Control Structure]:ObjectPCA:LOCK'=3,True,False).
9. Now we have configured the 1-Icon button, when the button is clicked, the value true will be sent to the PLC signal Motor\_Start if the object is reserved (e.g. LOCK=3).
10. Click ToolTip text and write “start motor” in the box, click **OK**.
11. Click **Apply**.

12. A warning for unresolved references will appear. This because of the unconfigured remaining buttons. Neglect the warning and click **OK**. Another option is to remove the unconfigured buttons.
13. You have now created a faceplate, with a button that sets a property in the PLC.
14. Close the window.
15. Set the faceplate to default aspect:
  - a. Open the faceplate aspect's context menu and select **Properties**.
  - b. Check the **Default aspect** check box under the Aspect Details tab.
  - c. Click **Apply**.
16. Double-click the faceplate aspect to view the result as shown below.

For additional information on configuration of faceplates please read the instruction *Industrial<sup>IT</sup> Base System, Engineering - Graphics*.

## Adding Alarm and Event Handling

The Alarm and Event Configuration aspect on the signal objects are used to create events and alarms based on the properties received from the PLC.

The events and alarms are viewed and accessed by the operator using alarm and event lists. A top level alarm list, which is handling all alarms in the installation, is preconfigured. It is possible to configure other alarm lists on lower levels, for example for a section of the site or a single motor. See the section about alarms in the *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration* instruction for more details.

To create an event or alarm the signal has to be configured, this is done in the Alarm and Event Configuration aspect on an object type or on the individual signal instance.

Object instances that generates events and alarms are recommended to be placed in the Functional Structure to be able to have alarm lists that covers only parts of the plant. The chapter Building the Functional Structure shows how to create an appropriate functional structure.

The configuration of an event or alarm can be done either on the signal type or on each instance. To define the event and alarm handling please go through the following steps.

1. Select the device object for which alarm handling is required (either an instance or an object type) e.g. Simple On Off Motor in the Object Type Structure.
2. Create a new signal “Motor\_tripped” representing the signal for which alarm handling is required.
3. On the Alarm and Event configuration aspect of the signal, select “is\_an\_event” and “log statuschanges on”. Click Apply.

The signal object has now been configured to generate an even when the value changes to on.



An instance of the object type has to be created and connected to the PLC to generate an alarm.

To see an alarm for a specific area, select the alarm list aspect for that area.

## Adding History Logging

The Log Configuration aspect is used to make an historic log of a value received from the PLC. The log can be defined either on the signal instances, or on the signal types. To define a log on a type (and by this for all instances), go to the Object Type Structure and add a **Log Configuration** aspect to the Signal object, then go through the following steps.

1. Open the aspect and select **Add Property Log**.
2. Select Property Value in the list, and then select the log template e.g. OPC Single Log.
3. Click **OK**.
4. Click **Apply**.



This log configuration will now be active on all instances for this signal object. To create a log on an individual object add and configure a “Log Configuration” aspect to an instance in the Control Structure.

## Adding Trend Display

An object type can have a default Object Trend that shows one or more of the signal values for the object. To add an Object Trend, for all instances, select the object type and do the following steps:

1. Open the Trend Display.
2. Create a new aspect “Trend display” on the device object type e.g. Simple On Off Motor.
3. Double-click the first field in the Object column. Click the “...” button to browse for an object. Browse to the Motor\_On signal object and click **OK**.
4. Select the aspect that has the value (e.g. Binary PCA) to trend.
5. Select the property to trend. e.g. Value.
6. Select TRIM as Log Name.
7. Configure additional fields if needed.
8. The trend is now configured and will show up on each instance of this type.

## Creating the Device Object Instances

Data from the PLCs are received by signal objects defined in the control structure. The signals are grouped below device objects representing devices in the factory. To be able to present the data in displays in Compact HMI 800, the device objects are equipped with graphics elements.

Device object types with corresponding signals, graphics elements and faceplates was created in the previous chapter. This chapter describes how these object types can be instantiated and connected to individual signals in the PLCs.

Before displays are built, the objects are moved to the Functional Structure where they can be easily addressed by the Graphics engine. Read more about structures in the *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration* instruction.

## Creating Instances

To create device instances that can be utilized for data presentation, do the following.

1. Open the Control Structure and select the OPC server for the PLC that contains the properties you want to access.
2. Right-click the OPC server and create a **New Object**. Select one of the object types created in the previous chapter e.g. “Simple OnOffMotor” and give it a name e.g. M1.
3. The Control Structure should now have the following contents:

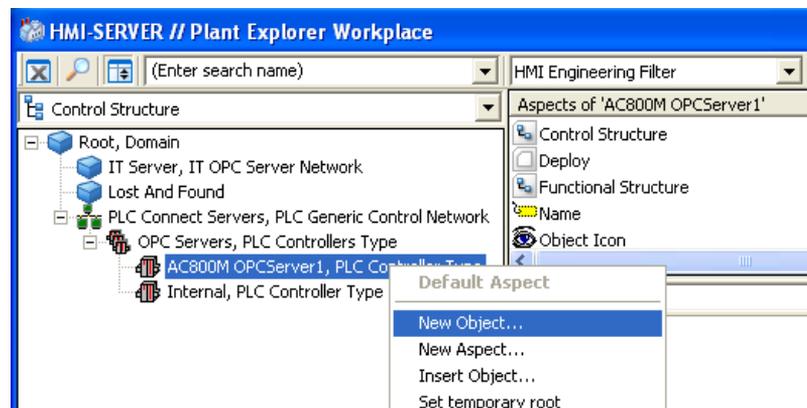


Figure 25. Control Structure

If you want to create several objects from one object do as follows. Choose **Generic Control Network** and then the aspect **Generic Control Network Configuration**. There you find one yellow cube with a star, and one yellow cube with a red cross. see [Figure 26](#). With these you can create or delete several objects.

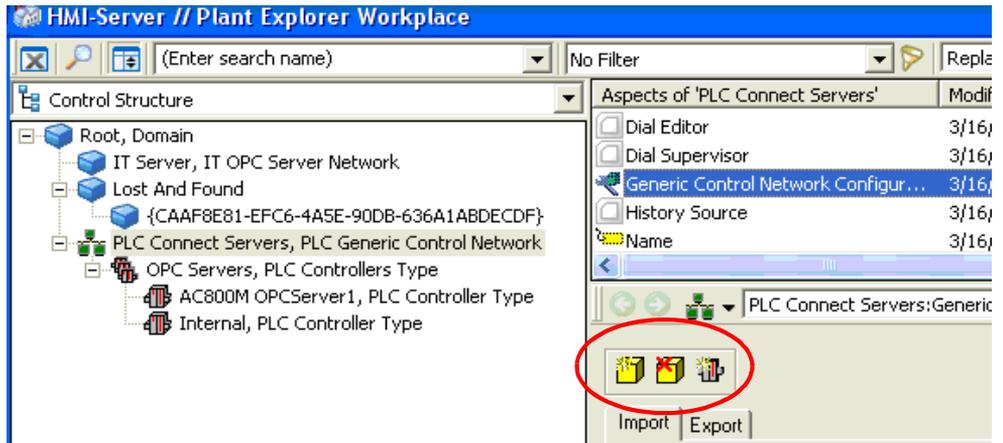


Figure 26. Yellow Cubes for Object Creation

If you click on the yellow cube with the star you will get the following dialog box:  
See Figure 27

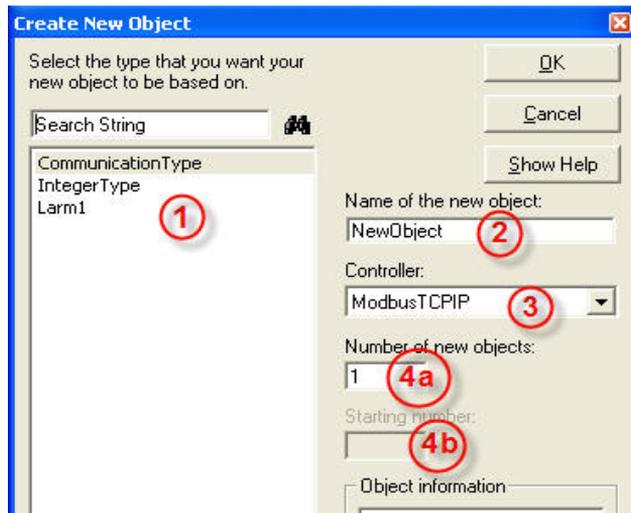


Figure 27. Create New Object

1. Choose from what type you want to create instances.
2. Give name of the new object.
3. Choose which controller the object will be placed in.
4. In 4a choose how many objects you want. If you choose more than one object in 4a, 4b will be opened and you can choose up to 999 objects. The objects will get numbers in row after the name.

## Connecting the Instances to Real Signals

Now each signal has to be connected with the corresponding property in the PLC. Do this by opening the signal configuration aspect.

To connect the signals, check the **connected** radio button in the **variable connection** field. Click **Browse** to connect to the property in the PLC. See the [Figure 28](#) below.

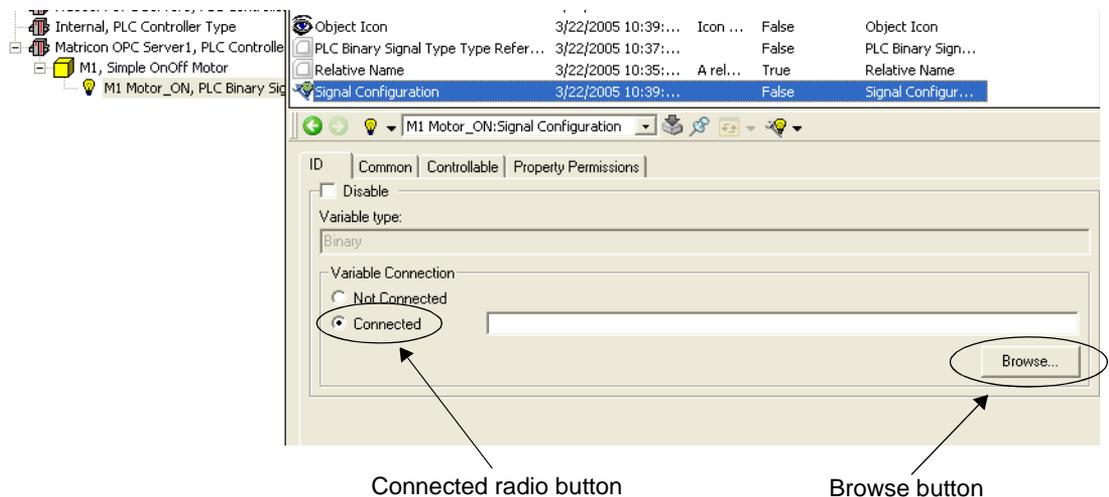


Figure 28. Connect the Signals

After selecting the property click **Apply** in the OPC browser window. See [Figure 29](#) below. Do not close the window. Repeat for each signal.



Note that the Browse function is only available if the OPC server implements the browse interface.

A signal can also be connected by just adding the address string for the property.

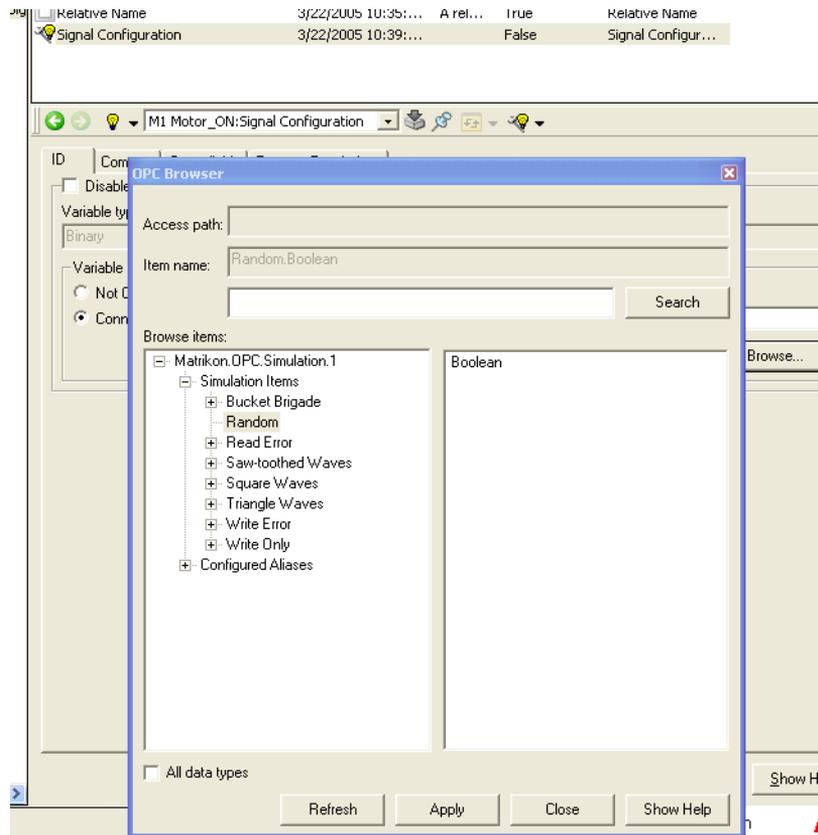


Figure 29. OPC Browser Window

To test your connection, select the PLC Connect Server objects and the Deploy aspect. Click the **Deploy** button.

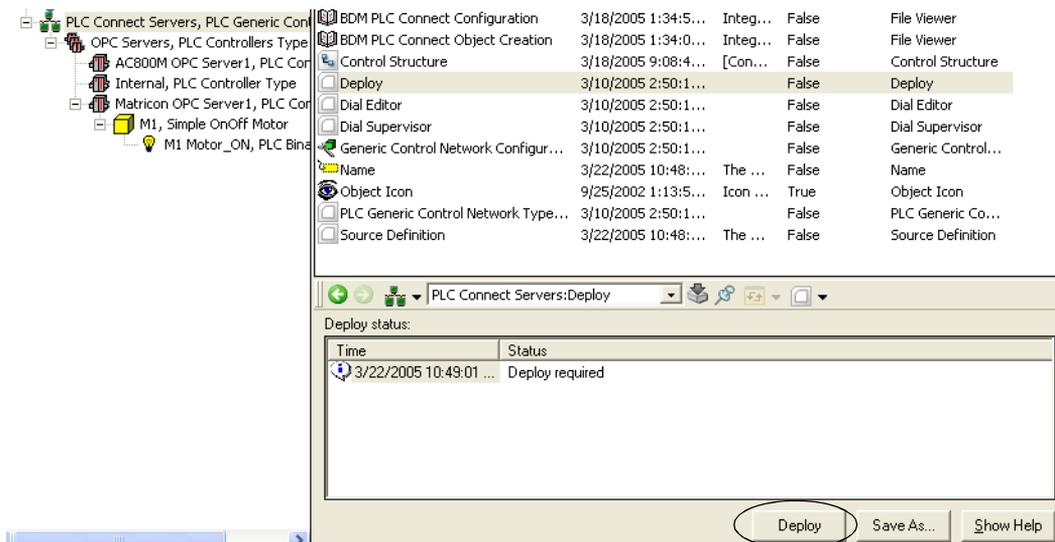


Figure 30. Deploy

Click one of the signal object and select the binary PCA (Process Control Aspect). Check the **subscribe for live data** check box to verify that data is retrieved from the PLC.



Figure 31. Subscribe for Live Data

Another way of getting live data is to choose the aspect named Object Dialog, see [Figure 32](#). Then you will get live data from all signals that are placed in this object. You will also get an icon with alarm indication, and you can also see if a signal is forced or not. If you get signal values here, you know that PLC Connect is working correctly.

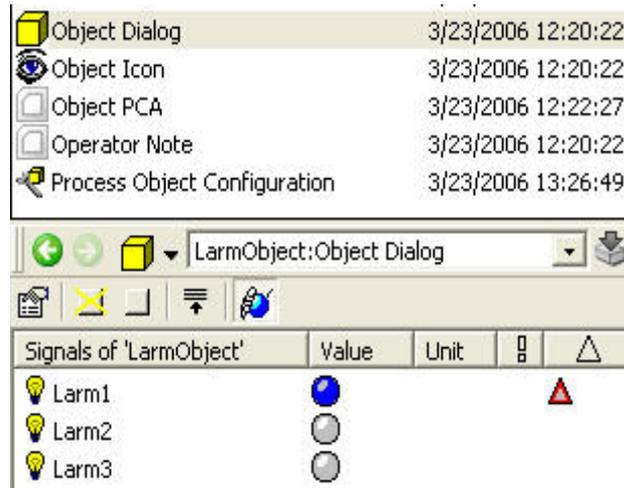


Figure 32. Alternative Way of Subscribing for Live Data

## Building the Functional Structure

Objects used to access data from the PLCs are placed in the Control Structure according to which OPC server and PLC that contains the retrieved properties. It is also feasible to organize the objects in a functional way reflecting the functionality of the objects in your plant. To perform this, objects should be placed in the Functional Structure to reflect the functions in the plant. Then Objects in the Control Structure should then be inserted into the Functional Structure.

Building objects are described in *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration* instruction.

To create the objects in your Functional Structure, follow the steps below:

1. Go to the Functional Structure and select the “<Plant name>” object.
2. Click on the object and select the “Name“ aspect. Change the name to the name of your Plant.

3. Add objects by right-clicking and selecting new object to define the structure of your plant, until the entire plant is covered. You should continue down to equipment modules in which it is suitable to add the process devices controlled by the PLCs.

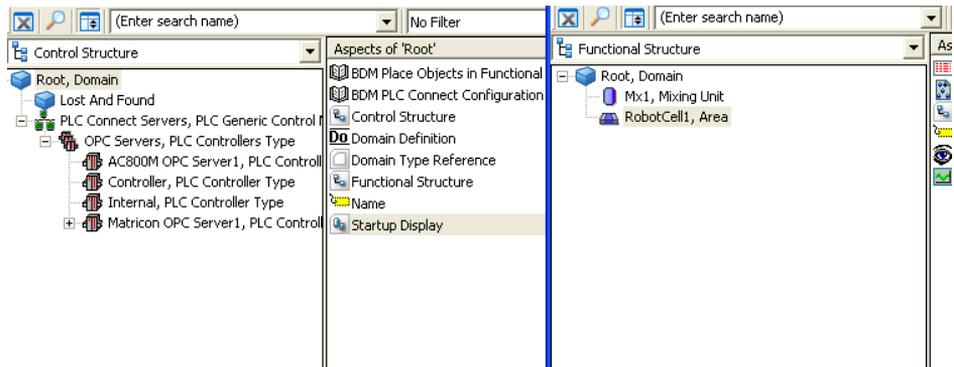


Figure 33. Control Structure and Functional Structure

Now we are ready to move the device objects in the control structure to the functional structure and for this we use the Bulk Data Manager (BDM) tool:

4. Switch structure to the Control Structure.
5. Select the root object in the Control Structure and open the **Bulk Data Manager place object in Functional Structure** aspect.
6. Right-click the aspect and select **Edit and Check Out**.



If there are data present in the spreadsheet in addition to the column headings, delete those.

7. If this is the first time you use the Bulk Data Manager (BDM), please select the menu item “Bulk Data Manager”, under **Bulk Data Manager>Activate**.

8. Select one of the OPC servers objects (e.g. Matricon OPC Server) in the Control Structure and drop them in the Bulk Data Manager. See Figure 34 below.

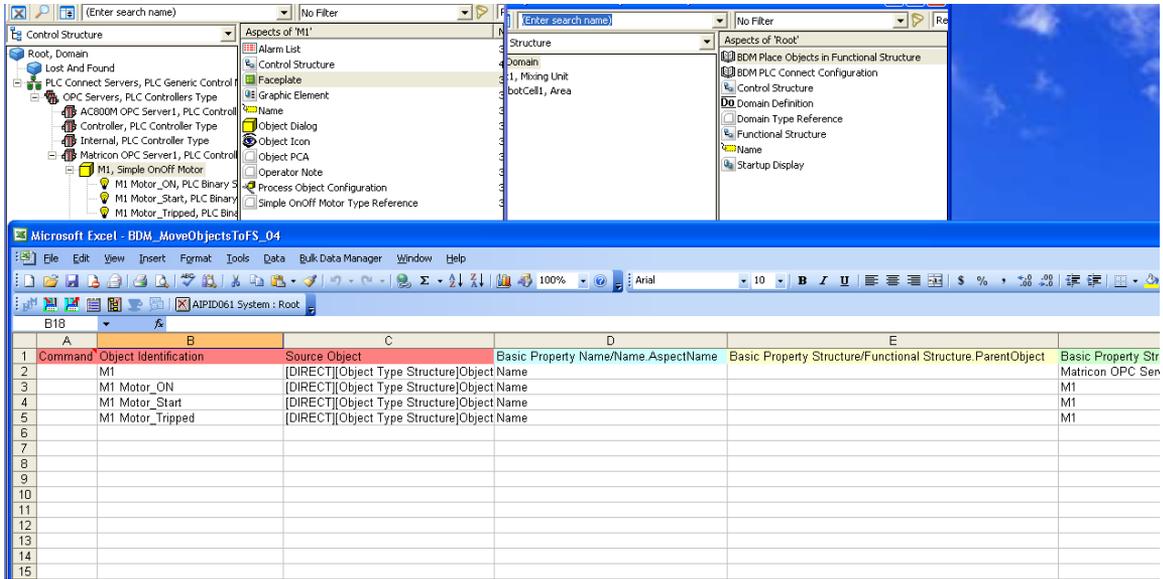


Figure 34. The Bulk Data Manager

9. Move contents of Column F to column E, select all texts in the column and cut it and paste it in column E. Deselect the items in Column E and click the **Save all objects** button.

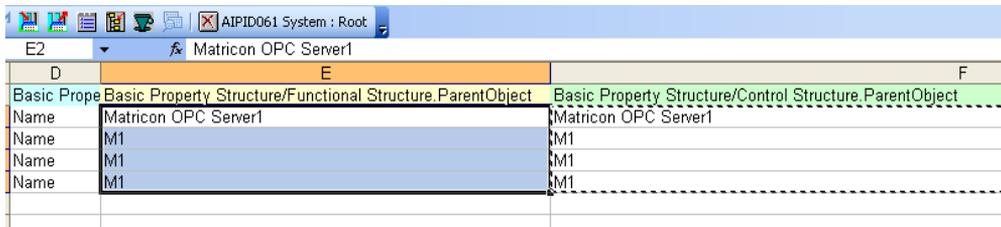


Figure 35. Move from the F-column to the E-column

10. The objects have now been placed also in the Functional Structure.

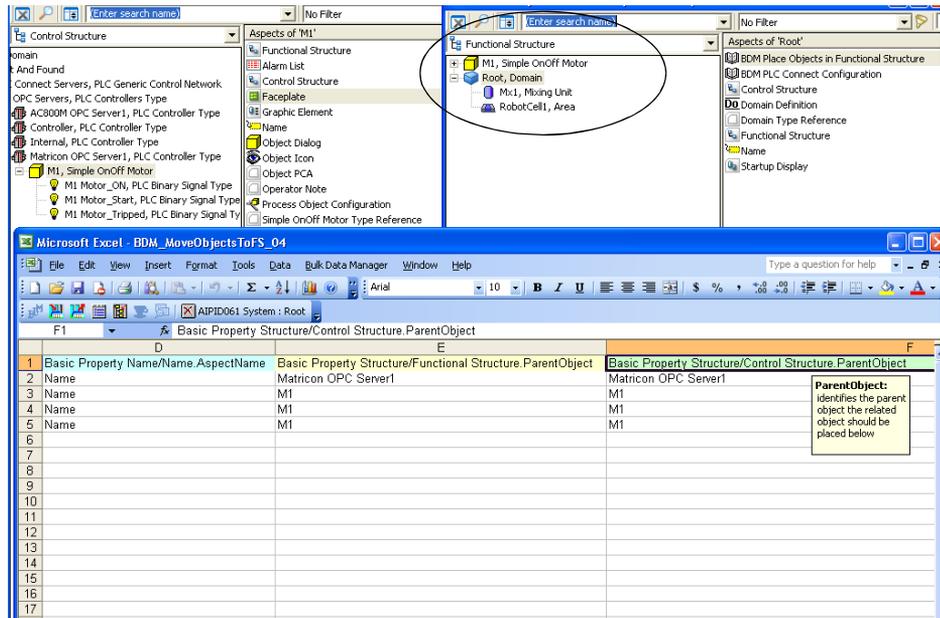


Figure 36. Copied Objects

11. You can now exit Excel, select Not to save the changes.

Now you can see the results in top of the Functional Structure. The objects are now ready to be dragged to the preferred places in the Functional Structure.

Move objects by selecting and dragging each of the device object to the correct function in the plant.

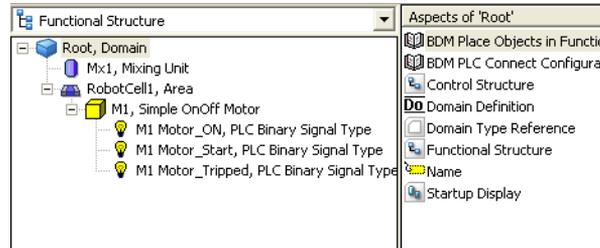


Figure 37. The Functional Structure



If you later add new objects, Only copy the new or changed objects from the F column to the E column **WARNING:** When you close the BDM tool, select “NO” on the question “Save document”.

## Adding Process Displays

When the basics of the Functional Structure are defined, it is time to define the displays. Structures and relationships between displays, can be defined in the Functional Structure. As a general rule, the Device Instances that have been created in the Control Structure, should additionally be placed into the proper place in the Functional Structure to support the displays (this was done in the previous chapter).

First add a structural object to host the graphics display as a graphics aspect (if you did not go through the previous chapter).

1. Select Functional Structure and the Root object.
2. Open the context menu and select **New object**.
3. Select a suitable object type depending on your application.
4. Name it for example **E.g. MU1**.
5. Click **Create**.
6. Right-click the object and select **New Aspect**.
7. Select the Graphics Display in the list and click **Create**.

8. Click the **Edit** button and start to edit the Graphics.
9. To add a device to the graphic click **Browse** in the element browser.

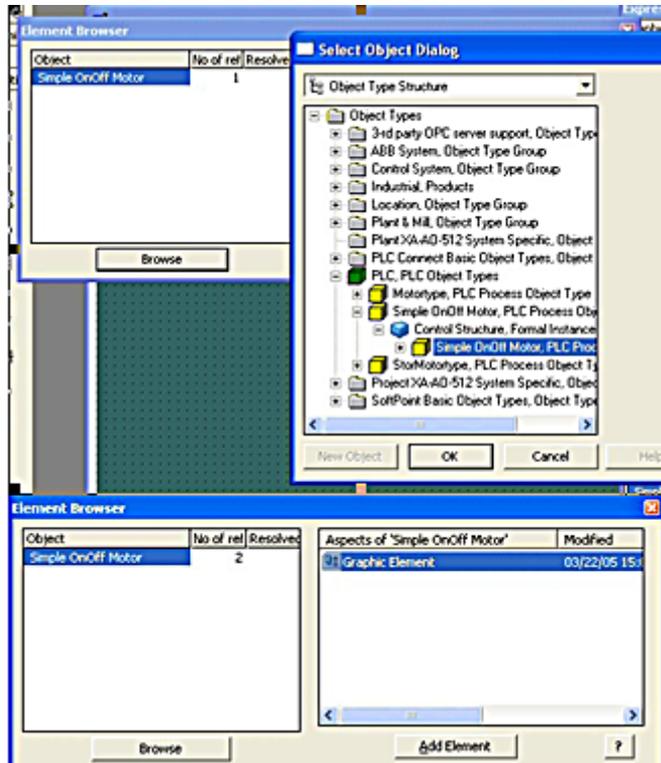


Figure 38. Element Browser

10. After selecting the object in the select object dialog the object appears in the Element browser.
11. To add a graphical element to the graphics select the object in the element browser and then select the element in the right column and click the **Add Element** button.
12. In addition to display element the graphics normally contain static information. several static graphical primitives exits in the toolbar to the left in the Graphics builder.
13. The Compact HMI 800 also contains a set of graphical elements named **Symbol Factory** these are made available in the graphics builder by selecting the Symbol factory tab in the left toolbar and then **right-clicking** the area and select **components**.
14. Now Scroll down to the entry “**Symbol Factory Controls**” check the check box and click **Apply**, then close the window with **Close**.
15. These components can Now be used by clicking on the **pump symbol** and then placing it in the graphics.
16. After placing the symbol the contents can be changed by **right-clicking** the symbol and select **Properties**
17. Now the whole library of symbols are displayed, just pick a suitable symbol and press **OK**.
18. When finished building the graphics select **File > Deploy** to make the graphics ready to be used.

See also the *Industrial<sup>IT</sup> Base Engineering, Graphics* instruction.

## Adding Trends

Follow the steps below to create a Trend Display aspect:

1. A Trend Display can be created in any structure. One proper structure is the Functional Structure.

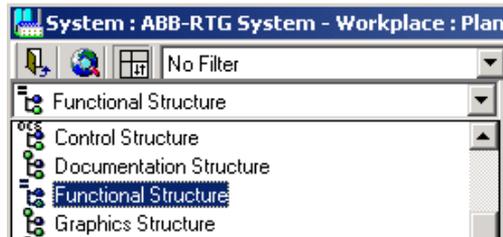


Figure 39. Select Structure

2. Select the place where you want to locate the Trend Display and select **New Aspect** in the context menu.

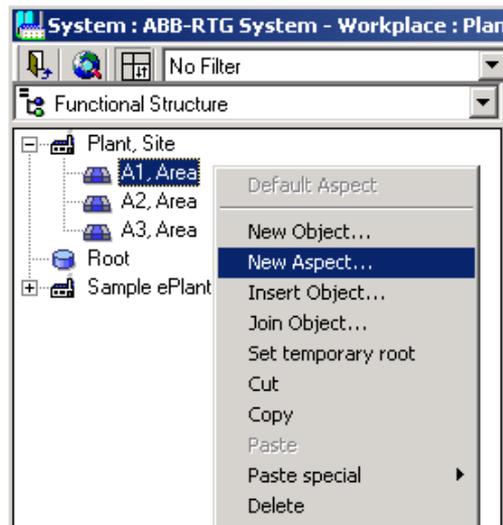


Figure 40. Create New Aspect

- In the New Aspect dialog, select the Trend Display aspect.



Note that there exist several different aspect categories of Trend Displays, the Operator Trend, the Trend Display and the Object Trend. The differences between the three categories of Trend Displays are the user roles required to modify them. (Operator- and Object-trend can be accessed by Show All in the new aspect dialog).

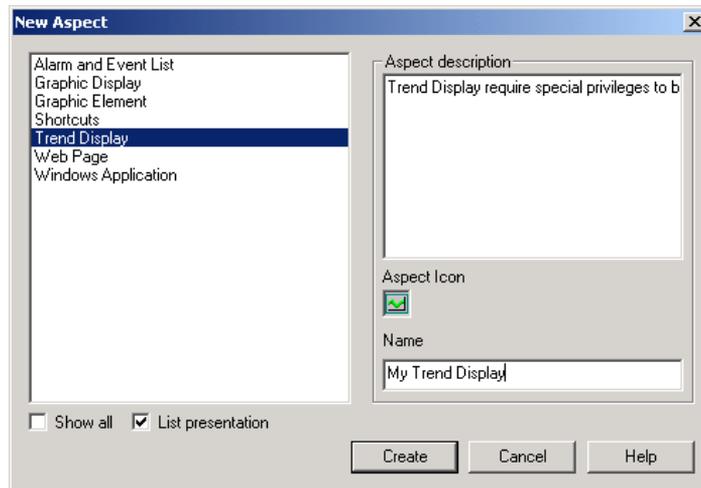


Figure 41. Create Trend Display

- Enter an aspect description in the **Aspect description** area, and a name in the **Name** text field before you click the **Create** button.
- Select the created aspect in the aspect list.

Aspects of 'A1'	Modified	Descr...	Inherited	Category name
Alarm List	11/25/1999 02:23...		False	Alarm and Event...
Area Type Reference	08/28/2000 05:44...		False	Area
Functional Structure	05/16/2001 06:24...	The F...	False	Functional Struc...
My Trend Display	05/21/2001 10:39...	Trend...	False	Trend Display
Name	11/25/1999 02:24...	The b...	False	Name
Object Icon	11/23/1999 10:14...		True	Object Icon

Figure 42. Select Trend Display Aspect

6. The created Trend Display aspect will look like the figure below:

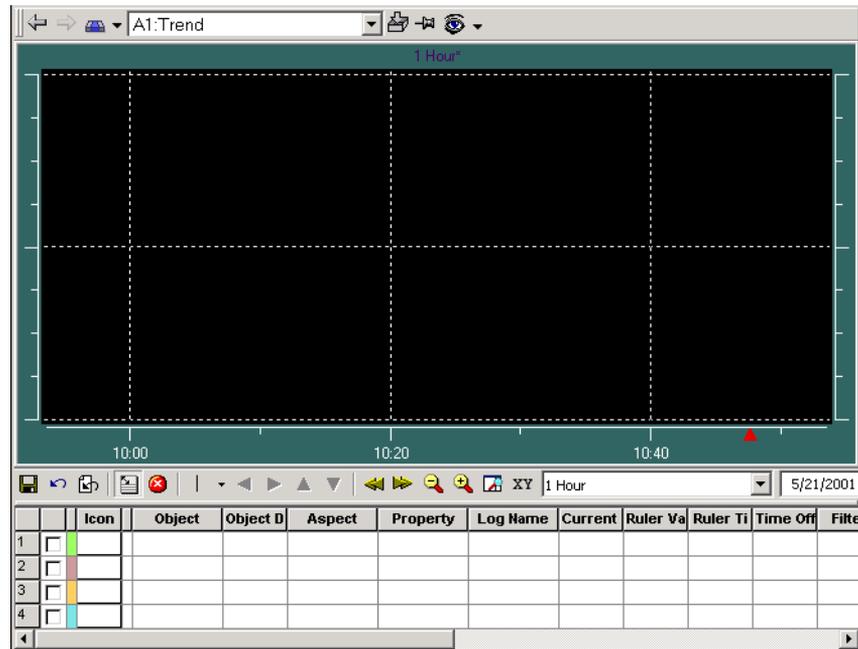


Figure 43. Trend Display

7. The created Trend Display uses the default Trend Template you must select it in the Config View.



Figure 44. Config View

8. In the Config View, select wanted Trend Template from the Trend Template drop-down list.

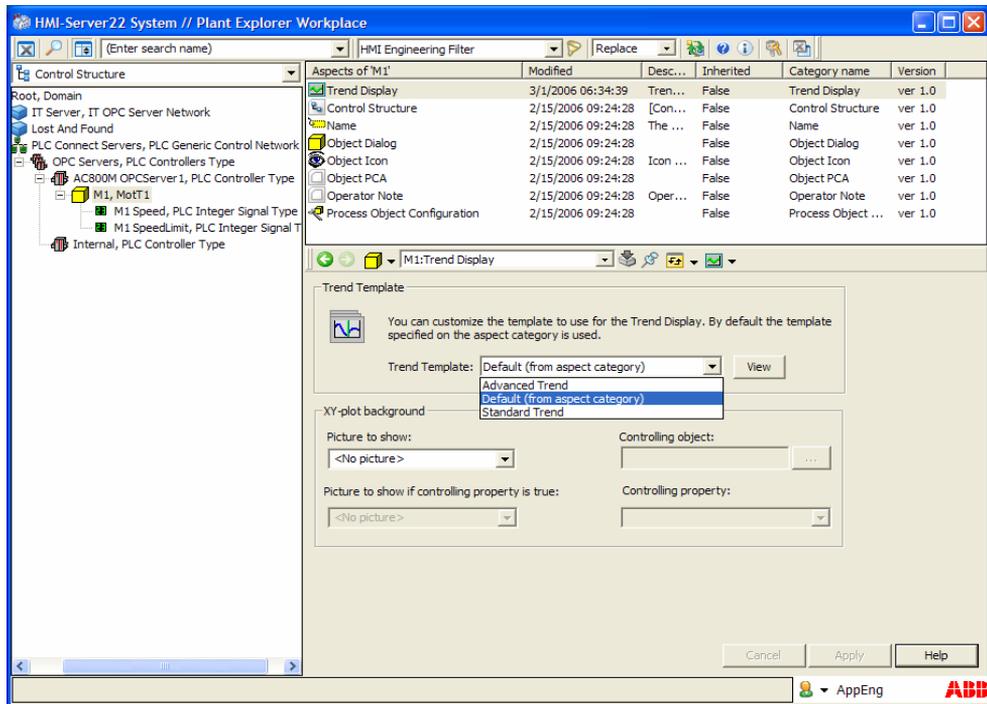


Figure 45. Select another Trend Template

9. Return to the Trend Display Main View.
10. To insert an object, make one of the following actions:
  - Click in the **Object** column and write the object name. (Or enter a **dot**)
  - Select a signal from the **Select Object** pop-up dialog.

- Drag the object and drop it in the **Object Name** column.

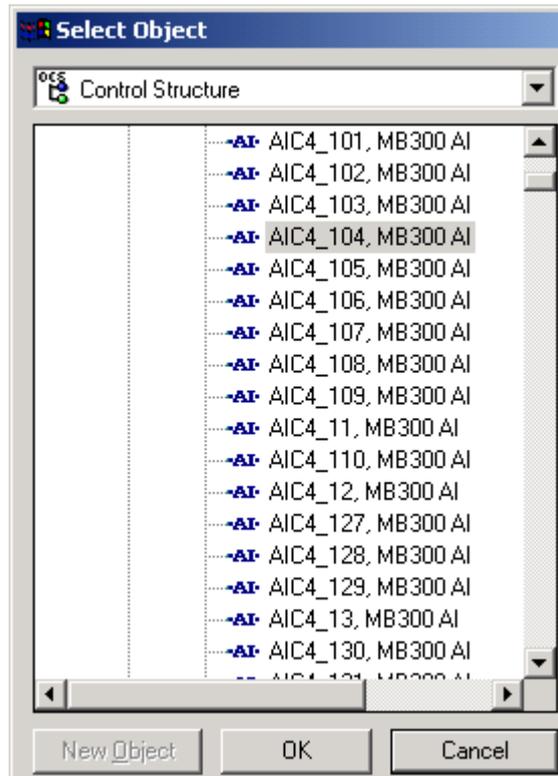


Figure 46. Select Object Pop-Up Dialog

11. Select **Aspect**, **Property** and **Log Name** from the drop-down menus.

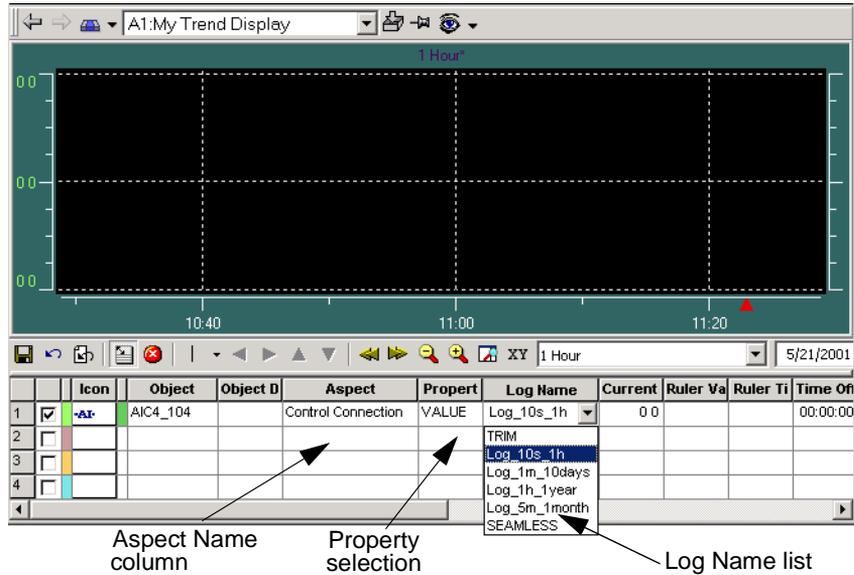


Figure 47. Select Trend Display Log

12. If needed, change the other columns as well.



If you are not selecting an aspect in the Aspect Name column (see Figure 47), all properties for the selected object will be listed.

Press SHIFT while selecting property in the **Property selection** column (see Figure 47), then only logged properties will be displayed.

If you are not selecting a Log Name, SEAMLESS will be selected by default (see Figure 47).

See also the section about History and Trends in the *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration* instruction.

## Adding Alarm and Event list for a plant Area

The functional structure can now be used as a base for sorting alarms according to the functional structure of the plant. To configure an Alarm and event list that shows alarms for a specific part of the plant use the following steps.

1. Select an object at the level in the functional structure for which an Alarm and Event list is required that includes alarms from all children of the object.
2. Right-click and select **Add Aspect**.
3. Select “Alarm and Event list” in the list then click **Create**.
4. The list is now ready to use.

For further information see *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration*.

## Adding Navigation

To add navigation functionality between displays there are several methods available. Below the four most common ways to navigate are listed:

- Shortcuts make it easy to navigate to the most important and/or most frequently used aspects of different aspect objects. You can find different shortcuts in the Application Bar.
- By clicking the Aspect Menu icon in the Tool Bar the Aspect Menu will be presented. From the Aspect Menu you can navigate to different displays by clicking on your Aspect Favorites.
- From the context menu you can select an aspect, action or a referenced display for the object or aspect. The content of a context menu differs depending on which object or aspect you have selected.
- You can move back to the previous display by clicking on the Back to Previous Display button. If the button is disabled, it is not possible to go backward.

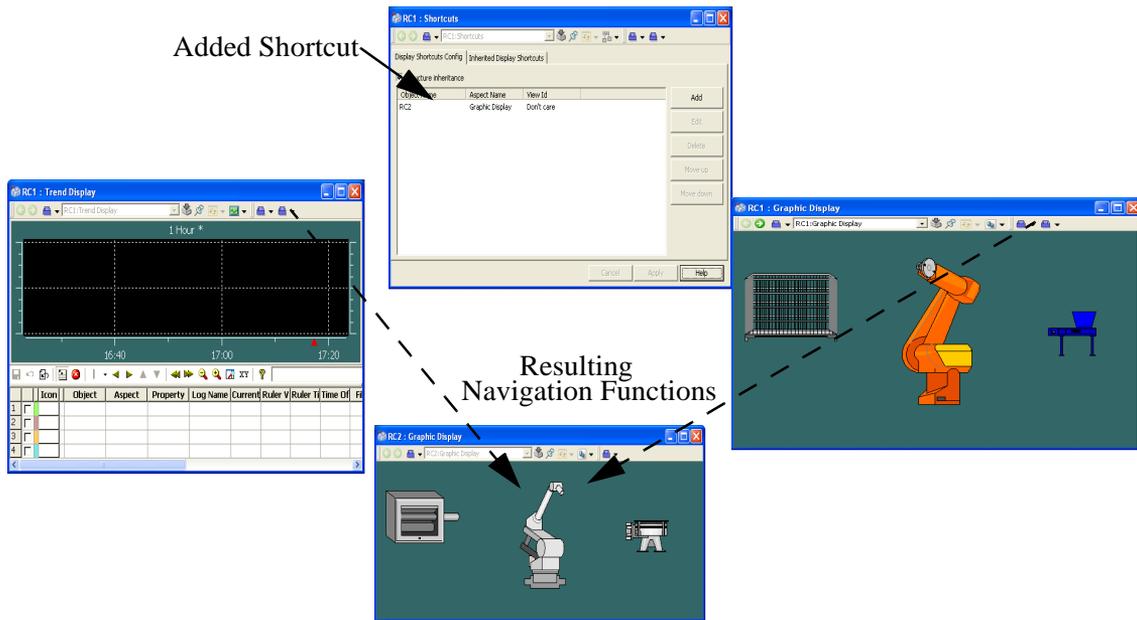
The additions of shortcuts are described in the next chapter.

For more information see *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration*.

## Adding Shortcuts for Navigation

In Compact HMI 800 the navigation is done in an object oriented way. When defining shortcuts for navigation, these are available from all aspects of an object by just adding the shortcut to the object itself, once as an aspect. This means that by adding a shortcut to the RC1 Robot Cell object, we can use the shortcut from all views of the cell. e.g. if we add a shortcut to RC1 that points to RC2, we will be able to navigate to RC2 aspects from RC1 Graphical Display, RC1 Trends Display, RC1 Mechanical Drawing etc.

The figure below shows how the navigation works:



By adding a shortcut to the RC1 object, pointing to the RC2 Graphic Display, the RC2 Graphic Display can be accessed both from the RC1 Graphics Display and the RC1 Trend Display.

### Shortcuts in the Application Bar

A shortcut in the Application Bar is created to get fast access to any viewable aspect associated with a particular object.

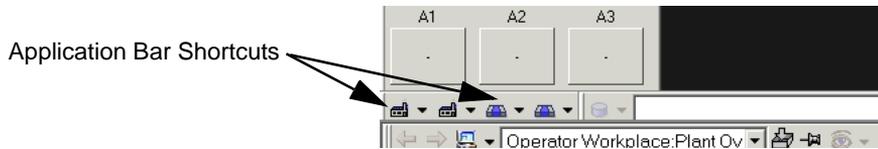


Figure 48. Application Bar Shortcuts

To create a shortcut in the Application Bar follow the steps below:

1. Log on as SysAdmin.
2. Add an Application Bar Shortcut aspect to the workplace object by doing like this:
  - a. Right-click on the workplace object and select **New Aspect**.
  - b. Select **Application Bar Shortcuts** in the dialog, and click **Apply**.
3. Double-click on the aspect and a dialog box opens. See [Figure 49](#).

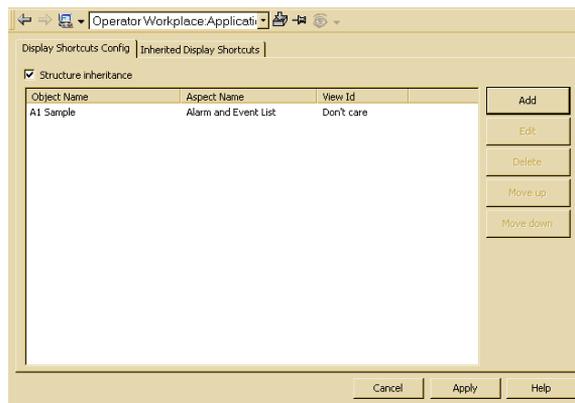


Figure 49. Dialog Box for editing of Application Bar Shortcut

- Click on the **Add** button, and a new dialog box pops up. See [Figure 50](#).

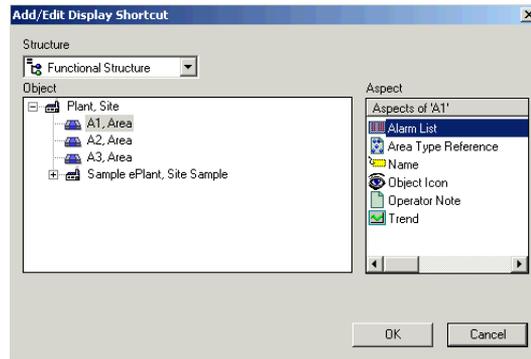


Figure 50. Application Bar Shortcuts Dialog Box

- Select structure, object and aspect in the dialog box, and click **OK**.
- The shortcut is now added to the shortcut list. Repeat steps 3-4 if you want to add more shortcuts.
- Click **Apply**. The shortcut is created next time you start up the workplace.
- Restart the configured workplace to activate the configuration.

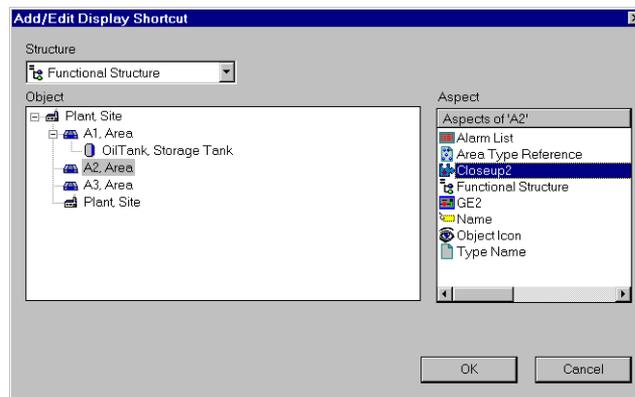
### Shortcuts in the Display Bar

Shortcut in the Display Bar is a shortcut button you can create to get fast access to **any** viewable aspect associated with a particular **object** and its descendents. The difference between a shortcut in the Application Bar and a shortcut in a Display Bar, is that the shortcuts in the Application Bar are associated with the Workplace, and are available at all times (no matter which Display you have selected). Shortcuts in a Display Bar are visible only when you have selected the Display that has that Display Bar.

By using shortcuts you can make displays related to, and of importance to, a certain display accessible by a simple click. This can be useful if you often look at a number of displays in sequence. Then you only have to click on the shortcut icon to go to the next display in the sequence.

To add a shortcut in the Display Bar follow the steps below:

1. Log on as SysAdmin.
2. Add a Shortcut aspect to the object from which the aspects should be linked.
3. Double-click on the aspect and a dialog box opens.
4. Click on the **Add** button, and a new dialog box pops up.
5. Select structure, object and aspect in the dialog box. See [Figure 51](#).



*Figure 51. Add/Edit Display Shortcut Dialog Box*

6. Click **OK**, and the shortcut will be added to the shortcut list.
7. A Display Shortcut will be displayed in the Display Bar, to the right of the other tools. See [Figure 52](#).

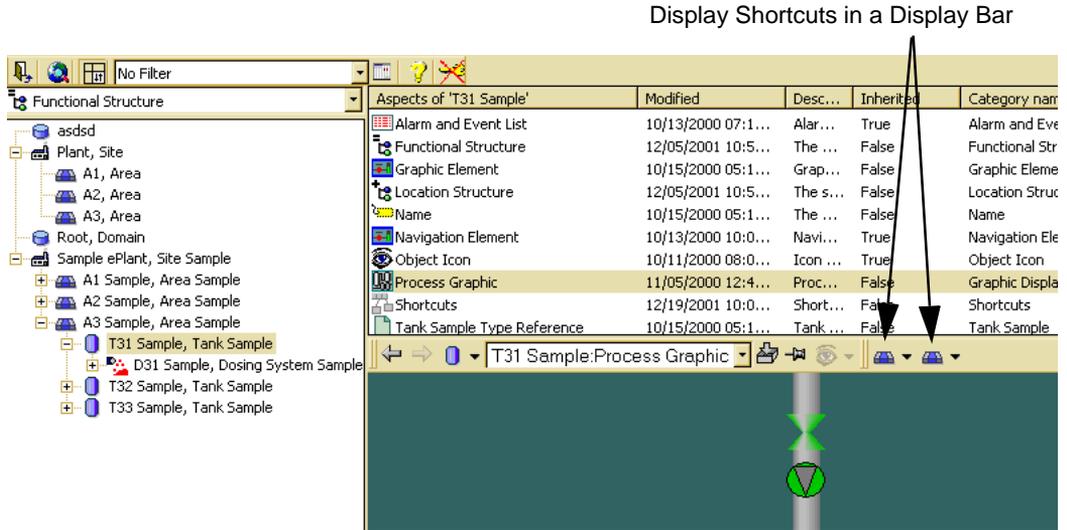


Figure 52. Display Bar Shortcuts

## Messaging Configuration

The messaging function is used to forward important alarms and/or events to user on the move. The messages can be forwarded using SMS, e-mail or paging services.

The example below shows how to configure the system to forward messages using the SMS distribution channel.

To configure the Messenger function to send alarm and events using SMS messages please go through the steps described below. For detailed configuration information use the help button in the corresponding aspects. Please note, that you need to be logged on as **SysAdmin** to continue.

Please use the shortcut buttons shown to the right directly above this view to get quick access to aspects referenced below:

1. Connect the Phone or other SMS capable device to an USB or serial port on the server computer. Use the normal PC connection cable.

2. Install device specific drivers. (normally downloadable from the device vendor) The drivers are installed using Windows new hardware detected wizard.
3. Open the Computer Management tool by right-click on My Computer in the **Start** menu and select manage. Click Device Manager and expand Ports.
4. Check which port your new device has been connected to. (Normally Com3)
5. Configure the SMS device used to send the messages. This is configured in the aspect:  
[Aspect System Structure]Aspect System Structure/Messenger/SMS Device/SMS Device:SMS Device
6. To configure please click the Ports tab and click **Add**.
7. Select the Port that you got above (normally port 3), click **Next**.
8. Enter the phone number for the phone that you are using including country code.
9. Enter the Initialization string for the Phone you are using. (look in help for initialization strings)

For newer models of SonyEricsson phones use the Initialization command string:

"AT+CBST=0,0,1;+CHSN=4,2,0,12" (omit the “ characters)

10. Configure the User that is supposed to receive the messages. This is done in the “Message Subscriber” and “Message Schedule” aspects on the user objects in the user structure.



Note, that the phone number entered in the Message Subscriber aspect should be without country code. e.g. 0701234567

11. Define which alarms and events that should be sent as SMS messages by adding and configure an “Alarm and Event list” aspect that defines which messages that should be sent out.
12. To direct the messages in the list to be sent as SMS messages you need to configure a “Message Handler” and an “Alarm and Event Message Source” aspect on the same object as where the alarm list is located. (No shortcuts available.)



Note, that you need to enable the function in the Message source tab in the Message Handler aspect.

13. When the configuration has been completed please restart the messenger service by disabling and enabling the service using the aspect:

[Service Structure]Services/Messenger Server/Basic:Service Group Definition

14. You are now ready to test the messenger function. By generating an alarm, that shows up in the created alarm list aspect, a message should be sent by SMS.

## Audit Trail

The Audit Trail function is by default enabled in the Compact HMI 800 when delivered. To view the Audit Trail please open the Audit Trail List aspect on the plant object in the Functional Structure.

To disable the Audit Trail function follow the steps below:

1. Log on as SysAdmin.
2. Open the Admin Structure in the Plant Explorer expand Administrative Objects and browse to aspect:  
Domains\HMI Server:Audit Trail Config
3. Double-click on the Audit Trail Config aspect to open the configuration view.
4. Unmark the **Audit Trail active** check box, and click **Apply**.
5. The Audit Trail function has now been disabled.

To enable the Audit Trail function follow the steps below:

1. Follow step 1-3 above.
2. Mark the **Audit Trail Active** check box and the **Audit Event Filtering** area will become active.  
If you select the **Log Generic Audit Events** check box, all the audit events which are predefined in the system without details will be logged.

If you select the **Log Selected Audit Event Classes** check box, you will be allowed to choose which audit event message classes to include.

3. Click **Apply**.



Re-authentication is required to apply changes in the Audit Trail Configuration if Advanced Access Control is activated.

## Security Configuration

The default configuration contains a security setting valid for all objects in the system. This default configuration can be found at path:

“[Admin Structure]Administrative Objects/Inventory Object/Domain/<System Name>:Security Definition”.

The default configuration gives the operator Read and Operate permission.

In some application this approach is not enough. For example could different groups of operators have different access rights to application areas. This can be achieved by adding Security Definition aspects with structure range on top of the areas in the Functional Structure.

Individual objects can also have extended protection by adding a Security Definition aspect with object range directly on the object.

For more information how to configure security, see the *Industrial<sup>IT</sup> Base System, Administration and Security* instruction.

## Import of Application from 800xA

### Export of application from 800xA

To export the controller communication definition part of a PLC Connect based application in 800xA do the following:

1. Open the Plant Explorer in the 800xA system in the Control Structure.

2. Open the Import Export tool and drag the “PLC Generic Control Network” object to the Import Export tool and drop it.
3. In the Add Item dialog press Finish. All instances has now been exported with dependencies i.e the object types are included in the exported data.
4. Save the file on a media to transport it to the Compact HMI 800.

## Import to Compact HMI 800

Before the import can be done, the “PLC Controller Type” objects representing the controllers have to be manually created in the Compact HMI 800 system. This has to be done because the configuration of these objects are dependent on the installation of the drivers in the node. So before proceeding, the steps for creating a new PLC Controller type should be followed for each controller. When all controllers have been created and configured, continue with the steps below:

1. Copy the file to the Compact HMI 800 hard disc.
2. Double click the file to start the Import Export tool.
3. Select the Object Type structure in the structure selector box in the Import Export tool.
4. Right click the PLC Object Types Object and select import and then Finish.
5. Select the Control structure in the structure selector box in the Import Export tool.
6. Expand to see the PLC Controller Type objects.
7. For each PLC Controller Type object expand to see the children and use shift click selection to select all child objects.
8. Right-click on the selected objects and select import.
9. In the Importing dialog box select Import Settings and remove the selection “Include Dependencies”.
10. Press Finish.
11. When asked for the restore path (“Do You want to place manually“) select “Apply to all Items” and Yes.

12. Browse to the location of the PLC Controller that contains these objects in the Compact HMI 800 structures.
13. Press OK for each imported item.
14. Repeat steps 7-13 for each PLC Controller.
15. Before the objects will start communicating a deploy has to be done.

This concludes the transfer of the PLC Process Objects and Corresponding signal objects from the 800xA to the Compact HMI 800.



## Section 5 Operation

This section describes how to operate the Compact HMI 800. Also refer to *Industrial<sup>IT</sup> Base System, Extended Operation* and *Industrial<sup>IT</sup> PLC Connect Operation*.

### Workplace Layout and Tools

Below is an overview of the screen layout of the Compact HMI 800 and a description of available tools and their use.

The Operator Workplace window is divided into four main parts, all of which are described in this section.

- Application bar. It contains information that must be present all the time, regardless of what displays are shown. One example is the alarm line. Tools in the application bar influence the system or handles aspect objects. Some of the tools are very useful for navigating.
- Display bar. It influences the display area only and is the main area for navigation between displays. It changes when the base display is changed.
- Display area. It is used to present the different types of displays.
- Status bar. The status bar contains information regarding the process control system. The Status bar is not configured to be visible in the Operator Workplace for the Compact HMI 800.

The Operator Workplace can be configured per user or user group, which means that all users can have different or identical layouts according to their preferences.

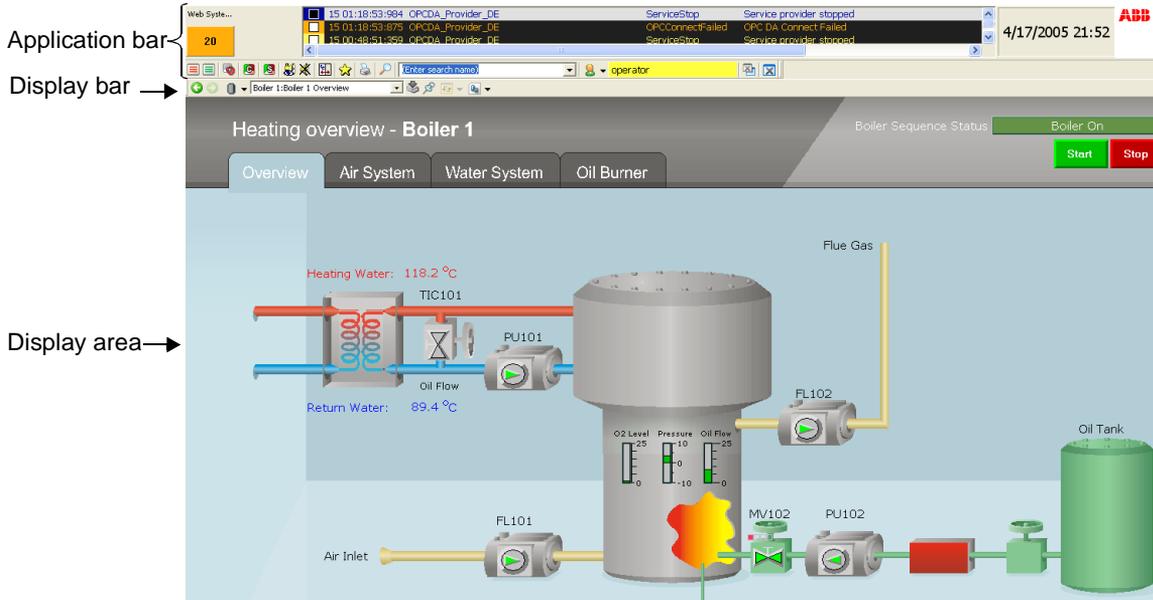


Figure 53. Operator Workplace in Operator Mode

## Application Bar

The Application Bar occupies the top area of the Operator Workplace window. See Figure 53 and Figure 54. It is used to show information that should be visible all the time. The main use is to show the latest alarms, give easy access to the alarm situation for a process area and direct links to displays or other aspects and tools. Below is a description of the available tools.

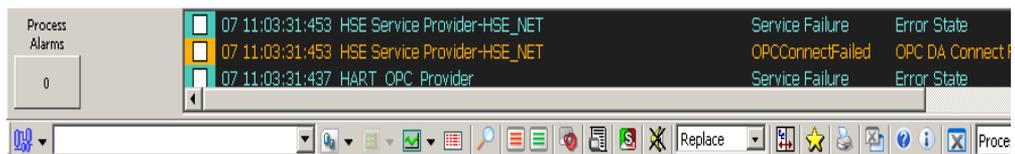


Figure 54. The Application Bar

Below, the tools are listed and described as they appear from left to right. On the very top of the Application bar there are four (4) fields. From left to right they are:

- **Alarm Band**  
The Alarm Band provides a summary display for selected alarm lists. It provides a link to the corresponding alarm list display. The number on a button (e.g. 1 for Process Alarms) represents the number of currently unacknowledged alarms. The color of the button shows the highest priority of an alarm presented at the moment. To go to an alarm list, click on the button.
- **Alarm Line**  
The Alarm Line is an Alarm List, specially configured to show the three latest process alarms. [Figure 55](#) shows an example of an Alarm Line.



*Figure 55. Alarm Line*

- **Clock**  
Shows the system clock.
- **ABB logo**  
Can be configured.

Below the alarm-oriented information described above, the following tools are available:

- **Process Alarm**  
Click on the Process Alarm List button in the Application Bar to see a list of all process alarms.
- **Process Events**  
Click on the Process Event List button in the Application Bar to see a list of all process events.
- **System Alarm**  
Click on the System Alarm List button in the Application Bar to see a list of all process alarms.

- **System Status**  
System Status shows the status of the hardware in the Control Structure. Possible problems in the control hardware can be detected.
- **System Status**  
System Status shows a list of status information for system services in the Service Structure.
- **External Alarm**  
Click on the External Alarm List button in the Application Bar to see a list of all external alarms.
- **External Alarm Silence**  
Click on the Silence Alarm List button in the Application Bar to silent all external alarms
- **Toggle Browser**  
The Toggle Browser switches the Object Browser on and off. When it is switched on, the Object Browser is opened in a pop-up window. You can then browse the object structures. The tool has two states - up and down. When the button is down the Object Browser is displayed in a separate window. When the button is up, the Object Browser is closed.
- **Aspect Menu (Favorites)**  
Use the Aspect Menu tool to group and organize the most visited aspects for fast navigation. Click on the icon and the Aspect Menu will be presented at the configured position on the screen.
- **Print screen**  
Print Screen is used to print the Operator Workplace contents. The screen where the tool is clicked will be printed.
- **Find tool**  
The find tool is used for finding specific objects and aspects in the system. See the *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration* instruction for further information.
- **Quick find tool**  
The find tool is used for finding specific objects and aspects in the system. \*This is a “lighter” version of the find tool. See the *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration* instruction for further information.

- **Log over tool**  
This tool enables a user to log out of the workplace and log in as a new user without actually changing the windows user.
- **Close Overlaps**  
Click on Close Overlaps to close all overlap windows.
- **Close Workplace**  
Click on Close Workplace to close the Workplace.

## Display Bar

The Display Bar, see [Figure 56](#), can be used to control and identify the contents of the Display Area.



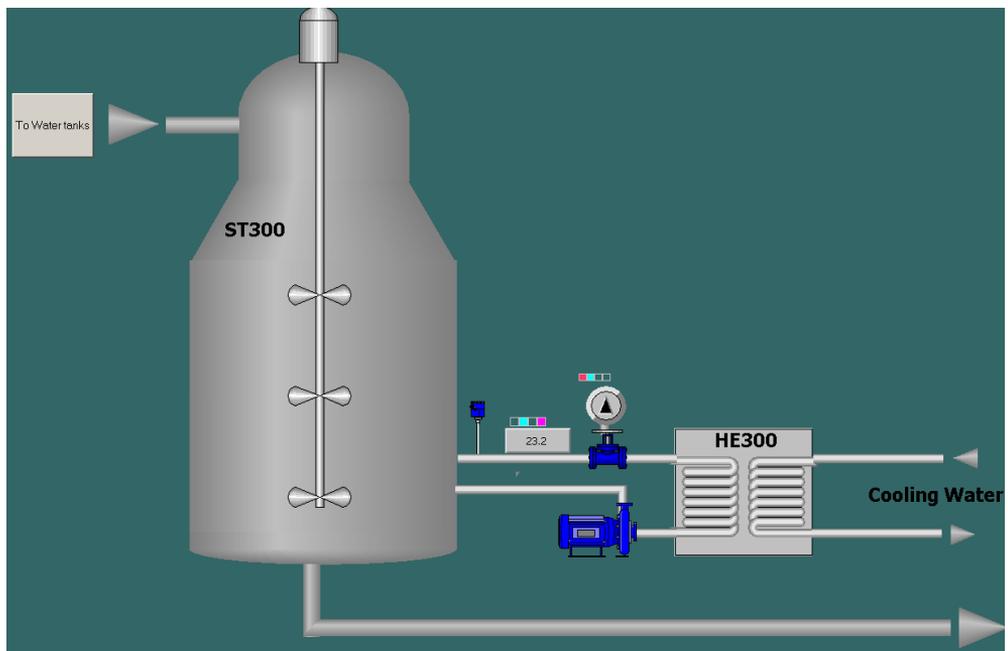
*Figure 56. Display Bar*

- **Back to Previous Display** shows the previous display.
- **Forward to Next Display** shows the next displays.
- **Aspect History List** shows a list of the most recently viewed aspects or type of information (the latest used displayed on top).
- By dragging an aspect to the **Drop Target**, it will be displayed in the Display Area.
- The **Pinned Tool** pins the display like a note on a billboard. The display can not be changed by clicking on the Backward or Forward button, or drop a display on the Drop Target tool. To enable change of display, you first have to remove the pinning of the display.
- **Main View** shows a drop-down menu of the other available views of the aspect you have selected. If placing the cursor on the View Selector, a tooltip will show the current view. This is normally not relevant for operators.
- **Shortcuts** provides shortcuts to specific displays. Shortcuts can be added and configured to point out specific displays.

To change the display in the Operator Workplace window, begin by placing the pointer in the main Operator Workplace window or a pop-up display, where you want to change display. Click once with the left mouse button. The Title Bar will be high-lighted (marked). Change the display in this selected display area by using one of the ways listed above.

## Display Area

This is the main area for the displays, see [Figure 57](#) below.



*Figure 57. The Display Area*

It is used to show a view of an aspect (a display), and can be used to present information like process displays, trend displays, alarm lists, etc. Displays can appear as base displays covering the entire Display area or as one or more overlap displays. The tools in the Display bar can be used to control and identify the contents of the Display area.

## Status Bar

The Status Bar, see [Figure 58](#), occupies the lower part of the Operator Workplace Window.



At delivery, the Compact HMI 800 is configured not to include this area. It is possible make it visible by configuration and revert to the standard Operator Workplace, used in the Base System. The standard Operator Workplace is delivered as well. See the Industrial<sup>IT</sup> Base System, Operator Workplace Configuration.



*Figure 58. The Status Bar*

- The **Operator Message Line** shows the latest Operator message from the control system.
- The **Operator Message List** shows a list of all Operator messages from the control system.
- The **Current User Tool** shows who the current user is. Users have different roles and privileges depending on security settings.



In Operator Mode it is not possible to cover the Status Bar with other displays.

## Navigation

### General

The Operator Workplace in the Compact HMI 800 contains a default set of tools to navigate among structures, aspects and objects.

This section includes recommendations of how to use these tools to navigate through displays. The recommended tools and methods are adequate for most applications.

In the Compact HMI 800 the basics for presenting information from the system is based on the Aspect Object concept. All information is treated the same way regarding navigation etc.

An Operator working with the Operator Workplace wants to, in an easy way, address and find for example graphic displays, faceplates, trend displays and alarm lists.

A process industry site is often divided into different process sections, where the top level display shows an overview of the entire section with details. Underlying details may be accessed via the top level display or via other tools.

## Recommended Tools for Navigation

The basic recommended tools for navigation between displays are presented below. A detailed description of the tools is found in [Workplace Layout and Tools](#) on page 89 and in *Industrial<sup>IT</sup> Base System, Operator Workplace Configuration*.

### Start Display

At log in as an Operator, the start display will be presented on the screen. It is recommended to program one of the functional keys F1-F12 or the HOME key to bring up this display.

### Display Links (Aspect links)

In a Process graphics display, links to other displays may be defined. These display links are configured when the Graphic display is built. The links may lead to other process graphics displays, trend displays or alarm lists etc. With this feature it is possible to define hierarchies and/or find the next display. Left-click on a display link to bring up next display (graphics, an alarm list etc). Right-click to select among other available aspects of the linked object. A special case of Display link is when you open another display by left clicking on an object. Normally that is the Faceplate for the object, but it might also be configured to be another Graphics display, a trend display etc.

See also [Context Menu](#) on page 97 below.

### **Shortcuts in the Display Bar**

As an alternative to use display links built into the display, shortcuts can be defined in the display bar. These shortcuts are placed to the right of the standard tools in the display bar. Each display has its own set of shortcuts, unlike the shortcuts in the Application bar that are always available. The shortcuts in the display bar also have the advantage to inherit underlying displays (aspects). Left-click on a shortcut to bring up next display (graphics, alarm lists etc). Right-click to select another available aspect under the linked object.

### **Shortcuts in the Application Bar**

Shortcuts in the application bar works basically in the same way as shortcuts in the Display bar. These shortcuts are also typically defined by the Application Engineer and show up to the right of the standard tools in the application bar. Application bar shortcuts remains as you switch displays and no inheritance occurs. Shortcuts in the application bar is an alternative or a complement to Hot Keys.

In the Application bar, there are a number of shortcuts by default.

### **Context Menu**

By right-clicking an object in a display (or alarm list etc), a list of aspects associated to the object is presented. If right-clicking the background, a list of underlying displays is presented, provided that they are configured to show up.

By left-clicking an object, the default aspect of the object is invoked. Normally that is the Faceplate for the object, but it might also be configured to be another Graphics display, a trend display etc.

### **Hot Keys**

A Hot Key is a specific predefined key combination (or a single key) that perform a specific function. For example opening an aspect view, activating a verb or accessing an object.

Function keys F1-F12 or any standard key can be configured to bring up displays, typically different sections of the plant and / or to important displays.

The hot keys operations can be global, i.e. independent of selected or highlighted object or affect the selected or the highlighted object.



There is a difference between a selected and a highlighted object. Current selection is displayed in the Object Shortcuts tool. Selection is set for example when clicking a Graphic Element in the object browser.

An object is highlighted when placing the mouse pointer over a graphic element.

The following tables show available predefined Hot Keys in the Operator Workplace.

*Table 6. Workplace Hot Keys*

<b>Hot Key</b>	<b>Operation</b>
ALT+HOME	Show Cursor
CTRL+F	Find tool
CTRL+SHIFT+3	All process alarms
CTRL+SHIFT+4	All process events
CTRL+SHIFT+5	System alarms
CTRL+SHIFT+6	System events
CTRL+SHIFT+7	System status
CTRL+SHIFT+S	Direct external alarm silence
CTRL+ALT+F4	Close all overlaps
ALT+F4	Close Active Window
F1	Context Sensitive Help
CTRL+SHIFT+F1	Show hot key map

Table 7. Selected Object Hot Keys

Hot Key	Operation
CTRL+G	Show Object Type

### Simple Scenario for Navigation

The simple **scenario** below shows some examples of navigation (the scenario is not available in the product) in Compact HMI 800.

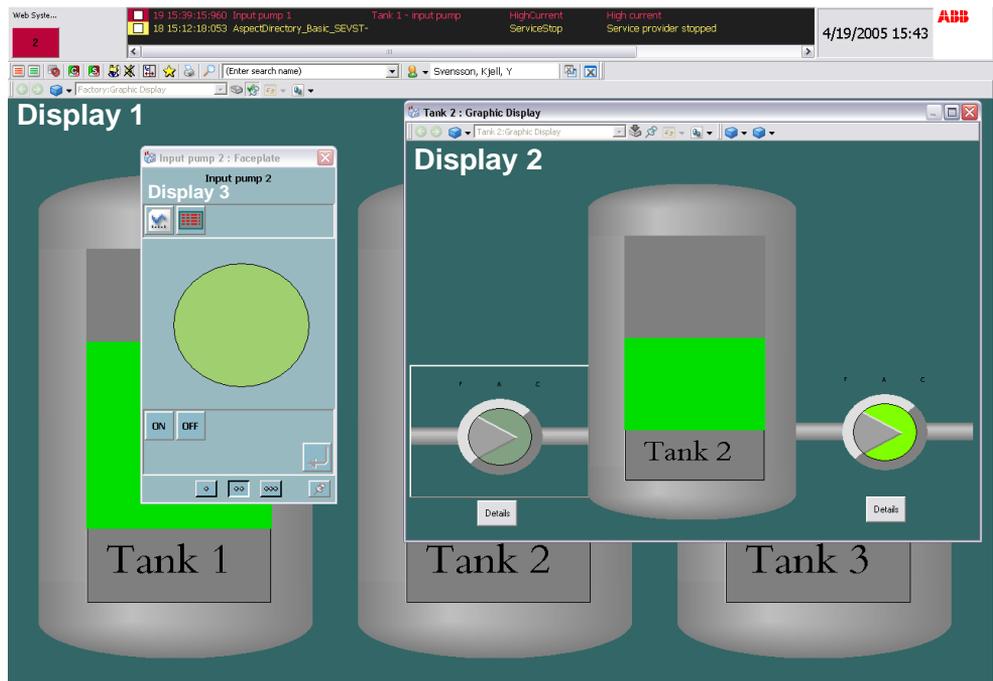


Figure 59. Navigation Scenario

- Display 1: Overview containing 3 tanks. (each representing a section of the plant).

- Display 2: Contains details for the tank 2.
  - Display 3: Contains details for pump 2 in the tank 2 display.
1. At start up, Display 1 is shown.
  2. A few alternatives are available to go to display 2 from display 1:
    - a. Left click on tank 1 (tank 1 is displayed as a graphic element and the Display 2 is the default aspect of tank 2).
    - b. Press F6 functional key (F6 configured as a key shortcut).
    - c. Left click on the Display Link in Display 1 (the Display Link is referring to Display 2).
  3. To go to Display 3, alternatively:
    - a. Press F7 functional key (F7 configured as a key shortcut).
    - b. Left click on the Display Link in Display 2.
  4. To go back to Display 1, alternatively:
    - a. Press F5 functional key (F5 configured as a key shortcut).
    - b. Click on previous Display in the Display tool bar.
    - c. Use the Display history tool in the display bar.

## Faceplate Usage

A Faceplate is a process dialog for supervision and control.

The faceplates can e.g. be opened in the following ways:

- From a process display by left-clicking on the process object (display element).
- By entering (or selecting) the object name in the Object Shortcut tool.

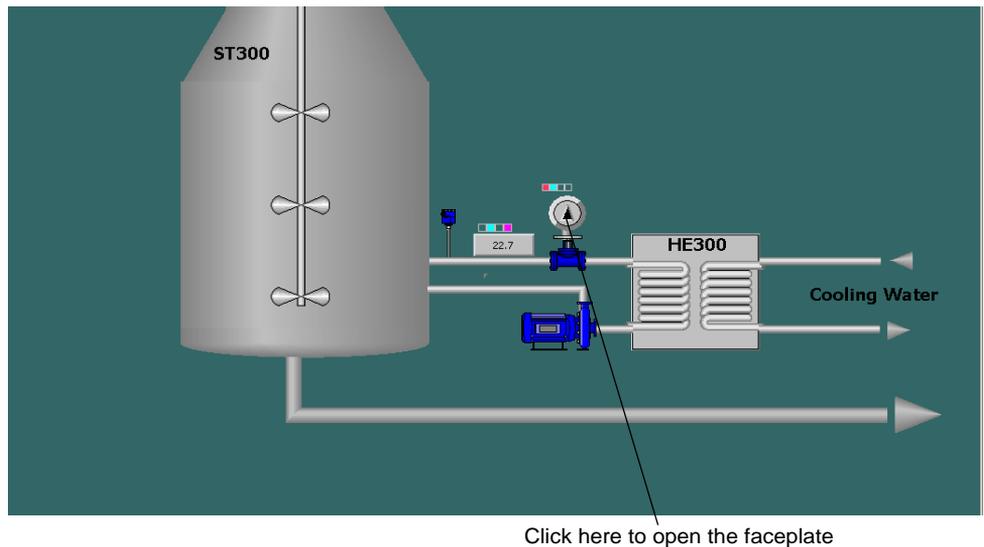


Figure 60. Graphic Display

A faceplate can have up to three different views. Possible views are:

- **Reduced View.** This view is optimized to be as small as possible, and yet cover the most used commands and the most important information on an object.
- **Faceplate View.** This is usually the default view. It is larger than the reduced faceplate, and contains more information and normal operator commands.
- **Extended View.** This view usually has two groups of tabs with additional process information and functionality.  
This view is used to display the maximum amount of information and is intended for the process engineer or the advanced operator.

The active Faceplate view is indicated at the bottom of the Faceplates, the corresponding **view selection** button is pressed. A non-existing view has the corresponding view selection button disabled.

The different views are presented in the figures below:

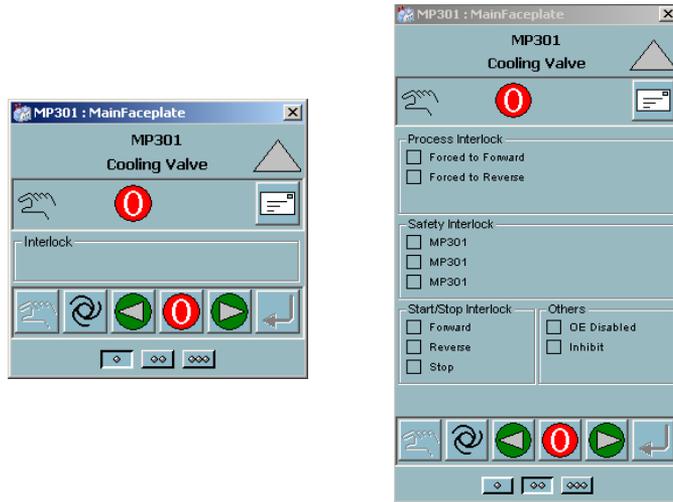


Figure 61. Reduced Faceplate and Faceplate View

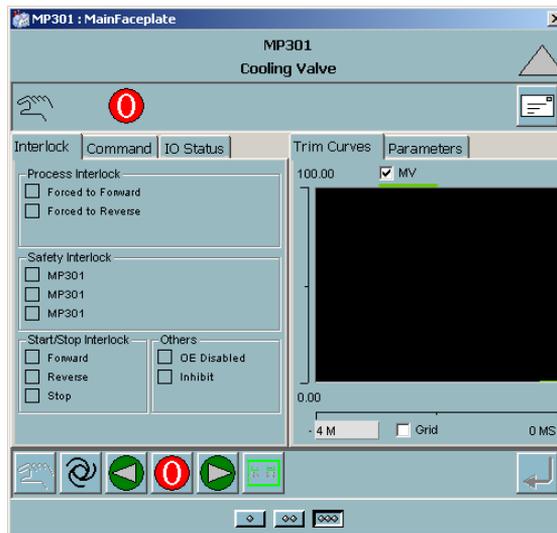


Figure 62. Extended Faceplate

## Trend Usage

The Trend Display can present data seamlessly from both run-time and historical data. When a Trend Display for an object is selected all available data can be viewed via the trend. This also means that it is possible to move the time range back and forth without worrying about where data is coming from provided that the seamless function is enabled in the Trend Display. The Trend Display can hold a number of Trend Traces and it is possible to trend any property. It is possible to insert new traces for comparison with the existing in all trends but the modified trend can only be saved if it is an Operator Trend. Functions for rulers, time zooming, magnifying glass etc. are available in the Trend Display. The time-offset function can be used to trace a signal in real time and compare it with values from yesterday. It is possible to present trend relationship between two values as XY plots.

### Accessing Trend Display

Two possible ways to access a Trend Display for an object are from a shortcut in the Application Bar or from the context menu.

The Trend Display is divided into three areas: the Trend Area, the Tool Bar and the Trend Table. See [Figure 63](#).

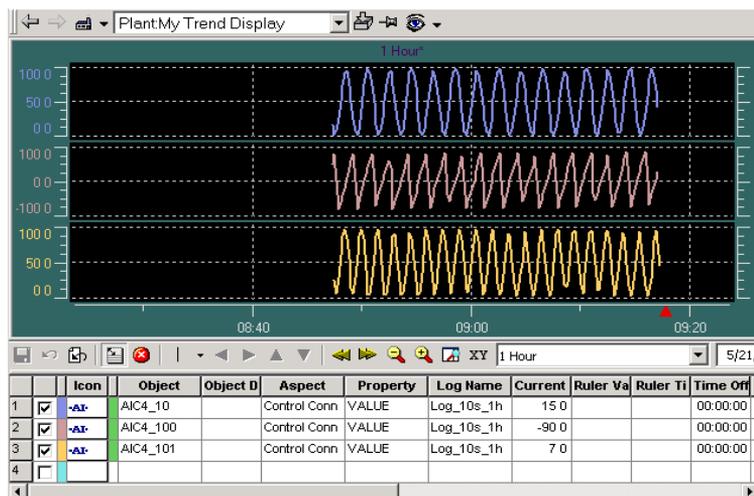


Figure 63. Trend Display

**Trend Area**

It is possible to adjust the size of the Trend Area and the Trend Table to your preference. Drag the Split Bar, which is located between the Tool Bar and the Trend Table, to desired size. It is possible to enlarge the Trend Table until all rows are visible but not further. The Split Bar does not affect the Tool Bar. The Trend area is edge (border) sensitive. If you click and drag the mouse over the grid edge, the Trend Area starts to scroll in that direction.

This is typically the case when you use zooming together with the ruler. To change color of Background, Table, Trace area, Grid, Axis or traces, the Trend Template must be changed.

**Tool Bar**

The Tool Bar contains buttons for frequently used functions to operate the Trend Display. The Tool Bar lets you, among other things:

- freeze the graphical view in time.
- select a point on the graphical view, and then read the corresponding times and values for each trace.
- pan the Trend Area left and right.
- zoom in to see greater detail, and zoom out to see a wider time scope.

Some of the functions in the Tool Bar can be made with typing letters on the keyboard. Note that the Trend Area must be active for this function to work.

The letters are:

- I = zoom in
- O = zoom out
- A = area zoom
- P = toggle XY plot

## Alarm and Event Usage

Alarms and events both from the process and the control system itself can be viewed and acted upon in the Operator Workplace via lists, alarm summary indication etc. The main difference between an alarm and event is that an alarm normally requires an action by an operator, e.g. acknowledge. An alarm list only includes the alarms that an operator needs to pay attention to, normally unacknowledged and still active alarms. Some alarms may be hidden, which means that they will not be included in the standard alarm list.

Hidden alarms can still be viewed in the event list. Typically alarms generated as a consequence of another alarm or other alarms that are irrelevant for the operator in the current process operation mode may be hidden.

An event list includes the history for both alarms and events. Alarms or events can have different priorities that are indicated by different colors in e.g. lists.

Process alarm and event lists can either include all process alarms or alarms for a specific part of the process down to a single process object.

The following pre-configured lists exist to view different types of alarms and events:

- Process alarm list displaying all process alarms except hidden alarms
- System alarm list displaying all system alarms for the Compact HMI 800 system.
- Process event list displaying the process event history
- System event list displaying the system event history
- Alarm lists on standard process objects displaying the alarms for the object
- Event lists on standard process objects displaying the event history for the object.

### Process Alarms

Process Alarms are alarms that are generated from the process, such as failure in a valve or pump or an overpressure in a tank.

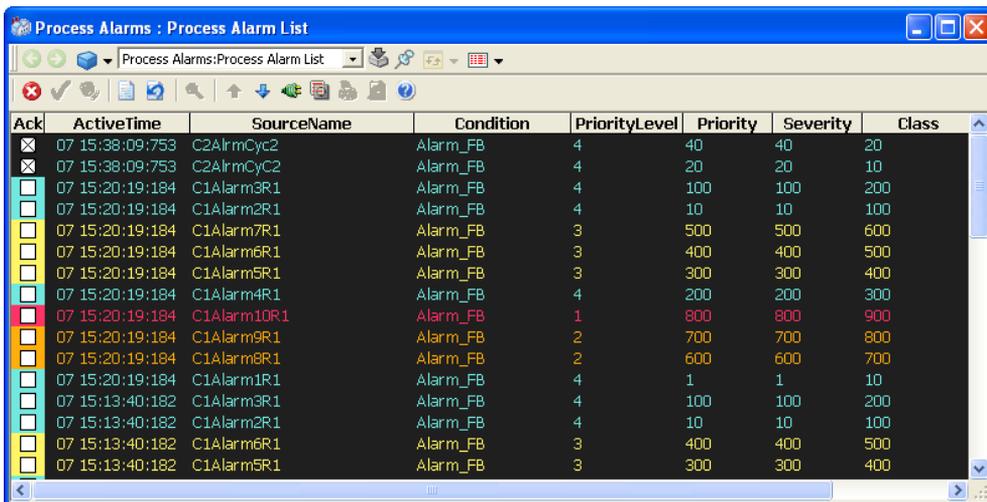
Examples of how to access different Alarm Lists are listed below.

- Click on the Process Alarm List button in the Application Bar to see a list of all process alarms, see [Figure 64](#).
- Click on the Alarm List shortcut in a faceplate to see a list of alarms for a specific object, see [Figure 65](#)
- Click on an Alarm Band button to see a list of all alarms, [Figure 65](#) for a specific process area, see [Figure 64](#). For more information about Alarm Band see [Alarm Band on page 108](#)
- From an Alarm Line in the Application Bar using the context menu (see [Figure 64](#)).



Figure 64. Accessing the Process Alarm List

Below an example of a Process Alarm List.



Ack	ActiveTime	SourceName	Condition	PriorityLevel	Priority	Severity	Class
<input checked="" type="checkbox"/>	07 15:38:09:753	C2AlrmCyc2	Alarm_FB	4	40	40	20
<input checked="" type="checkbox"/>	07 15:38:09:753	C2AlrmCyc2	Alarm_FB	4	20	20	10
<input type="checkbox"/>	07 15:20:19:184	C1Alarm3R1	Alarm_FB	4	100	100	200
<input type="checkbox"/>	07 15:20:19:184	C1Alarm2R1	Alarm_FB	4	10	10	100
<input type="checkbox"/>	07 15:20:19:184	C1Alarm7R1	Alarm_FB	3	500	500	600
<input type="checkbox"/>	07 15:20:19:184	C1Alarm6R1	Alarm_FB	3	400	400	500
<input type="checkbox"/>	07 15:20:19:184	C1Alarm5R1	Alarm_FB	3	300	300	400
<input type="checkbox"/>	07 15:20:19:184	C1Alarm4R1	Alarm_FB	4	200	200	300
<input type="checkbox"/>	07 15:20:19:184	C1Alarm10R1	Alarm_FB	1	800	800	900
<input type="checkbox"/>	07 15:20:19:184	C1Alarm9R1	Alarm_FB	2	700	700	800
<input type="checkbox"/>	07 15:20:19:184	C1Alarm8R1	Alarm_FB	2	600	600	700
<input type="checkbox"/>	07 15:20:19:184	C1Alarm1R1	Alarm_FB	4	1	1	10
<input type="checkbox"/>	07 15:13:40:182	C1Alarm3R1	Alarm_FB	4	100	100	200
<input type="checkbox"/>	07 15:13:40:182	C1Alarm2R1	Alarm_FB	4	10	10	100
<input type="checkbox"/>	07 15:13:40:182	C1Alarm6R1	Alarm_FB	3	400	400	500
<input type="checkbox"/>	07 15:13:40:182	C1Alarm5R1	Alarm_FB	3	300	300	400

Figure 65. Process Alarm List

Right-click on an alarm line to bring up the context menu. From the context menu you can perform some actions on the alarm line, or access any aspect of the object in the alarm state.

You can acknowledge alarms for an object in the following ways:

- By clicking on the Ack State box for the alarm in the list.
- By right-clicking on an alarm line and selecting Acknowledge (all alarms for that object will be acknowledged) or Acknowledge Selected (only the selected object will be acknowledged) from the context menu.
- By selecting one or several alarms in the alarm list and clicking the Acknowledge button (green check mark)
- By clicking on the alarm status button in a faceplate

- By using the Hot Key CTRL+SHIFT+Q (all active alarms will be acknowledged).



To be allowed to acknowledge an alarm you need to be granted permission for this operation. Default permission to acknowledge is Operate.

### Alarm Band

The Alarm Band provides a link to the Alarm List Display. The number within the band represents the number of unacknowledged alarms. The color of the band represent the highest priority alarm present. Click on the Alarm Band (button) to go to the Alarm List



Figure 66. Alarm Band

A red cross over the Alarm Band indicates that the alarm band does not have contact with any server. If the cross is orange some server providing alarms is not accessible.

If the button looks like in the figure above (Figure 66), the alarm band has lost contact with some server (partial connected). In this case it is still possible to for example make acknowledge.

### System Alarms

System Alarms are alarms generated from the Compact HMI 800 System, such as network problems, file system errors or server errors. In many cases these alarms need to be taken care of by your system administrator. There are several ways to access the System Alarm List for an object. The following are some typical examples:

- from the System Alarms button in the Tool Bar
- from an Alarm Line in the Application Bar using the context menu

- from an Alarm Band button in the Application Bar (Figure 67).

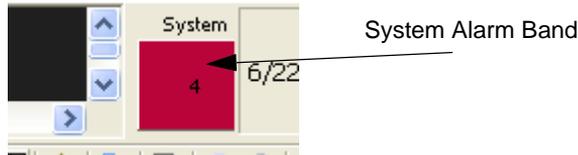


Figure 67. Accessing the System Alarm List

Ack	ActiveTime	Condition	SourceName	MessageDescription
<input type="checkbox"/>	07 09:58:59:634	ServiceStop	System Message_Basic_PPAID	Service provider stopped
<input type="checkbox"/>	06 16:54:56:968	RNRPConnectionDown	System Messages	RNRP connection down to 172.16.16.166 path 1
<input type="checkbox"/>	06 16:54:56:608	RNRPConnectionDown	System Messages	RNRP connection down to 172.16.16.166 path 0
<input type="checkbox"/>	06 16:54:55:062	RNRPConnectionDown	System Messages	RNRP connection down to 172.16.16.166 path 0
<input type="checkbox"/>	06 16:35:55:218	ServiceStop	OPCDA_Provider_PPAID27	Service provider stopped
<input type="checkbox"/>	06 16:35:55:109	OPCConnectFailed	OPCDA_Provider_PPAID27	OPC DA Connect Failed
<input type="checkbox"/>	06 16:35:44:265	ServiceStop	OPCDA_Provider_PPAID26	Service provider stopped
<input type="checkbox"/>	06 16:35:44:156	OPCConnectFailed	OPCDA_Provider_PPAID26	OPC DA Connect Failed
<input type="checkbox"/>	06 16:35:41:531	RNRPConnectionDown	System Messages	RNRP connection down to 172.16.16.166 path 1
<input type="checkbox"/>	06 16:35:40:611	RNRPConnectionDown	System Messages	RNRP connection down to 172.16.16.166 path 1
<input type="checkbox"/>	06 16:35:39:765	RNRPConnectionDown	System Messages	RNRP connection down to 172.16.16.166 path 1
<input type="checkbox"/>	06 16:35:39:062	RNRPConnectionDown	System Messages	RNRP connection down to 172.16.16.166 path 1
<input type="checkbox"/>	06 16:34:09:609	ServiceStop	AspectDirectory_PPAID78	Service provider stopped
<input type="checkbox"/>	06 16:31:29:734	RNRPConnectionUp	PPAID78	RNRP connection up node 172.16.16.78 path 1
<input type="checkbox"/>	06 16:31:29:734	RNRPConnectionUp	PPAID78	RNRP connection up node 172.16.16.78 path 0
<input type="checkbox"/>	06 16:22:41:453	RNRPConnectionDown	System Messages	RNRP connection down to 172.16.16.166 path 0
<input type="checkbox"/>	06 16:22:40:171	RNRPConnectionDown	System Messages	RNRP connection down to 172.16.16.166 path 0

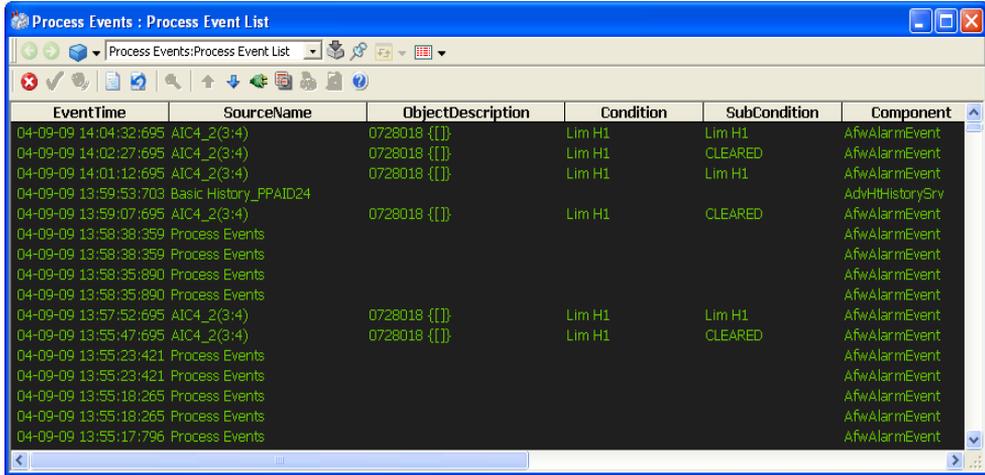
Figure 68. System Alarm List

### Process Events

There are several ways to access a Process Event List for an object. The following are some typical examples that may be configured:

- from an Event Line in the Application Bar using the context menu.

- from the Process Events List button in the Tool Bar.



The screenshot shows a window titled "Process Events : Process Event List" with a toolbar and a table of event data. The table has the following columns: EventTime, SourceName, ObjectDescription, Condition, SubCondition, and Component. The data rows are as follows:

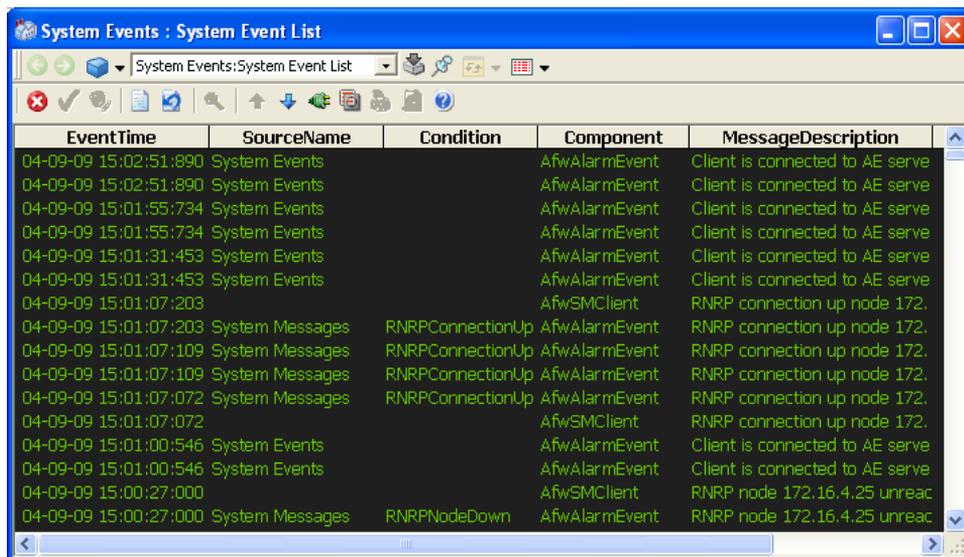
EventTime	SourceName	ObjectDescription	Condition	SubCondition	Component
04-09-09 14:04:32:695	AIC4_2(3:4)	0728018 {[]}	Lim H1	Lim H1	AfwAlarmEvent
04-09-09 14:02:27:695	AIC4_2(3:4)	0728018 {[]}	Lim H1	CLEARED	AfwAlarmEvent
04-09-09 14:01:12:695	AIC4_2(3:4)	0728018 {[]}	Lim H1	Lim H1	AfwAlarmEvent
04-09-09 13:59:53:703	Basic History_PPAID24				AdvHbHistorySrv
04-09-09 13:59:07:695	AIC4_2(3:4)	0728018 {[]}	Lim H1	CLEARED	AfwAlarmEvent
04-09-09 13:58:38:359	Process Events				AfwAlarmEvent
04-09-09 13:58:38:359	Process Events				AfwAlarmEvent
04-09-09 13:58:35:890	Process Events				AfwAlarmEvent
04-09-09 13:58:35:890	Process Events				AfwAlarmEvent
04-09-09 13:57:52:695	AIC4_2(3:4)	0728018 {[]}	Lim H1	Lim H1	AfwAlarmEvent
04-09-09 13:55:47:695	AIC4_2(3:4)	0728018 {[]}	Lim H1	CLEARED	AfwAlarmEvent
04-09-09 13:55:23:421	Process Events				AfwAlarmEvent
04-09-09 13:55:23:421	Process Events				AfwAlarmEvent
04-09-09 13:55:18:265	Process Events				AfwAlarmEvent
04-09-09 13:55:18:265	Process Events				AfwAlarmEvent
04-09-09 13:55:17:796	Process Events				AfwAlarmEvent

Figure 69. Process Event List

### System Events

There are several ways to access a System Event List for an object. The following are some typical examples that may be configured:

- from an Event Line in the Application Bar using the context menu.
- from the System Event List button in the Tool Bar.



The screenshot shows a window titled "System Events : System Event List" with a toolbar and a table of event data. The table has five columns: EventTime, SourceName, Condition, Component, and MessageDescription. The data rows show various system events and messages, including connections to AE servers and RNRP connections.

EventTime	SourceName	Condition	Component	MessageDescription
04-09-09 15:02:51:890	System Events		AfwAlarmEvent	Client is connected to AE serve
04-09-09 15:02:51:890	System Events		AfwAlarmEvent	Client is connected to AE serve
04-09-09 15:01:55:734	System Events		AfwAlarmEvent	Client is connected to AE serve
04-09-09 15:01:55:734	System Events		AfwAlarmEvent	Client is connected to AE serve
04-09-09 15:01:31:453	System Events		AfwAlarmEvent	Client is connected to AE serve
04-09-09 15:01:31:453	System Events		AfwAlarmEvent	Client is connected to AE serve
04-09-09 15:01:07:203			AfwSMClient	RNRP connection up node 172.
04-09-09 15:01:07:203	System Messages	RNRPCConnectionUp	AfwAlarmEvent	RNRP connection up node 172.
04-09-09 15:01:07:109	System Messages	RNRPCConnectionUp	AfwAlarmEvent	RNRP connection up node 172.
04-09-09 15:01:07:072	System Messages	RNRPCConnectionUp	AfwAlarmEvent	RNRP connection up node 172.
04-09-09 15:01:07:072			AfwSMClient	RNRP connection up node 172.
04-09-09 15:01:00:546	System Events		AfwAlarmEvent	Client is connected to AE serve
04-09-09 15:01:00:546	System Events		AfwAlarmEvent	Client is connected to AE serve
04-09-09 15:00:27:000			AfwSMClient	RNRP node 172.16.4.25 unreact
04-09-09 15:00:27:000	System Messages	RNRPNodeDown	AfwAlarmEvent	RNRP node 172.16.4.25 unreact

Figure 70. System Event List



## Section 6 System Preconfiguration

On the client machines only user Operator is visible on the Windows Welcome screen. On an Operator logon, the Compact HMI 800 Operator Workplace opens in a full screen mode. The tools necessary for a Compact HMI 800 Operator are presented in the Application Bar of this workplace.

The Operator is only allowed to see the Functional Structure in the Plant Explorer. Default filter for the Operator is “Process Operation Filter”.

On the server machine, users Operator, AppEng and SysAdmin are visible on the Windows Welcome screen.

Operator behaves in the same manner as on the client, as the server machine acts as a client as well.

AppEng is allowed to see the following structures in the Plant Explorer:

- Functional.
- Control.
- User.
- Object Type.

Default filter for the AppEng is “PLC Engineering Filter”. The “PLC Engineering Filter” includes the aspects that are needed for engineering the Compact HMI 800 system.

SysAdmin has no restrictions.

The following system extensions are loaded as default to a Compact HMI 800 system:

- ABB PLC Connect.
- Central Licensing System.
- Engineering Base.
- Inform IT Calculations.
- Inform IT Scheduler.
- System Instructions.

Full backup of the system is scheduled to be once a week. The backups are saved on D:\BACKUP.

Log-over and Audit trail are as default enabled in the Compact HMI 800 system.

Compact Control Builder is installed and ready to be used for AC 800M configuration tasks.

ABB AC 800M OPC Server is installed and the controller for this server is configured in the Plant Explorer. Alarm and event services are connected to the controller. See [Connectivity to AC 800M](#) on page 33.

License server software is installed on the server machine. License clients are installed on the client machines. License server is loaded with a license-file which provides correct functionality of the system. The client machines use the server machine as their license server. To run the system is a dongle required. The dongle is delivered with the server and shall be inserted in one of the server USB ports.

## Section 7 Administration

This section describes how to Add Users, make a Backup and Restore and other system administration and maintenance tasks. Also refer to *Industrial<sup>IT</sup> Base System, Administration and Security*.

### Adding New Users

The Compact HMI 800 product is set up to run Work groups in Windows. Three user roles (User Groups) are defined at delivery: Operator, AppEng and SysAdmin. All these have default passwords, see [Table 4, Predefined Users on page 33](#).

To add a new user to the Compact HMI 800 after it has been created in Windows, follow the steps below:



All Users and groups has to be created in all the Compact HMI 800 nodes with the same spelling and passwords

1. Log in as System Administrator.
2. Start the Configuration Wizard.
3. Go to System Administration/<System>/Users.
4. Click **Add Windows Account** button.
5. Add a user.
6. Click **Next** and **Finish**.

To add a user to a new group do as follows:

1. Log in as System Administrator.
2. Start the Configuration Wizard. **Start > All Programs > ABB Industrial IT Base > System > Configuration Wizard**.
3. Go to System Administration/<System>/Users.
4. Select **User** and move a group from the list box “Not member” to “Member”.

5. Click **Next**.
6. Click **Finish**.



The Windows user must be a member of the Industrial IT User group to use the Compact HMI 800.

## Backup and Restore

The Compact HMI 800 server is equipped with two hard drives, one that is used for the runtime data of the system (disk C), and the other for the Ghost images and backups (disk D).

The Compact HMI 800 server is delivered with two recovery DVDs. One is labeled “As Manufactured DVD” and contains a Ghost image of the computer, as it was manufactured by the computer vendor. The other DVD is labeled “Server Restore DVD”.

The “Server Restore DVD” contains the following:

- A ghost image including the Compact HMI installation named “Server Restore DVD”.
- A folder with a Compact HMI system configuration dump named `Compact_HMI_Full_Backup_<version>`.
- A folder with Compact HMI Native Language Support files named `CHMI_NLS`.

A copy of the contents of the DVD is also available on the Backup Disk (D:).

The “Server Restore DVD” Ghost image is used in case of a system crash. This is an image of the C disk before the system is created. This image is to be used on recovery because the restore functionality demands that no system exist on the computer.

Backups are configured as full backups of the Compact HMI 800 system and are scheduled to be executed once a week. The backup images are saved on the drive D. In case that the system is corrupted in some way, the System Administrator must do the following steps:

1. Load the “Server Restore DVD” Ghost image.
2. Start the Configuration Wizard and run the Restore task to load the last backup, and the status of the system will be as the last known correct configuration.

Instead of loading the Ghost image it is also possible to delete the Compact HMI 800 system with the Configuration Wizard and then restore the last known correct configuration from the backup drive. Note that a restore is not possible if there are any Compact HMI 800 systems created. It is crucial that the Configuration Wizard is used when deleting the Compact HMI 800 system. Deleting the system manually by just removing the files from the hard drive is not enough.

To use the supplied Ghost software and to restore a Ghost image, a bootable Ghost CD is required. Use one of the supplied Bootable Ghost CDs.

## Backup and Restore of Configuration Data

To backup the configuration data of the system follow the steps below. Note that the data for the applications that are not integrated in the system, needs to be backed up separately.

1. Log on as SysAdmin and open the Plant Explorer.
2. Select the maintenance structure and expand the object backup definitions. Select the aspect Backup definition to get the view below.

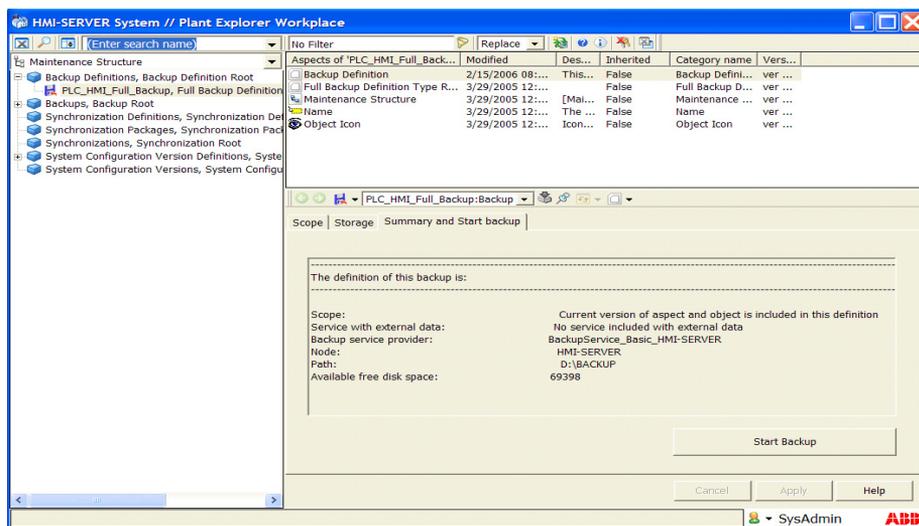


Figure 71. Plant Explorer Workplace

3. Select the tab **Summary** and **Start Backup**.
4. To start the backup press the button **Start Backup**.
5. Press **OK** to start the backup, and then a popup window shows the progress of the backup.
6. When the backup is finished close the window.

### Restore System

To restore the system go through the following steps.

1. Open the **Configuration Wizard** and select **Restore System** and click **Next**.
2. If the backup shows up in the window go to step 22. If the backup does not show up in the window, click **Select Path**, and add, and then browse to the folder shown below.

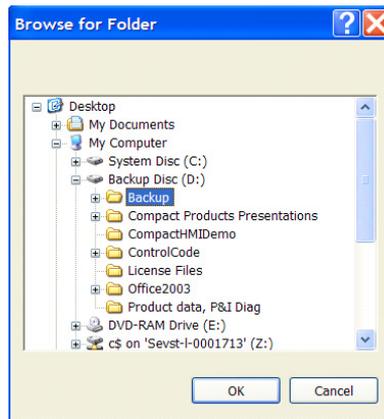
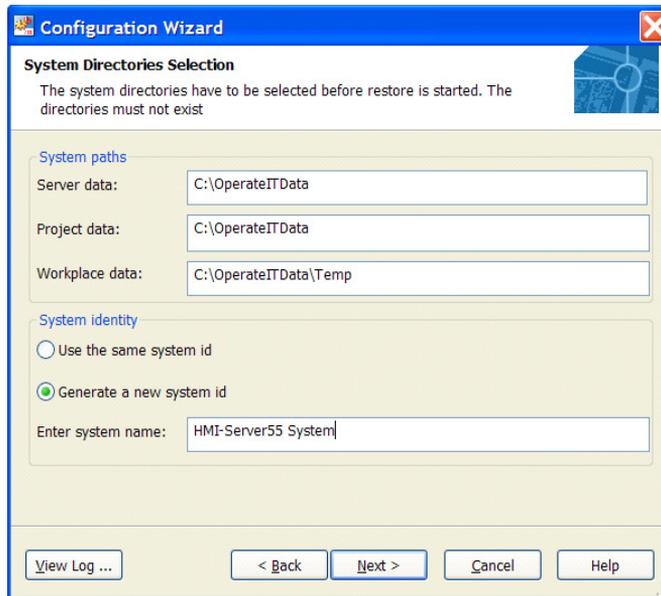


Figure 72. Backup Folder

3. Click **OK** and **OK** again.
4. Select the backup that was done in step 2, and press **Next**. (If the change of Computer Name has been done before the system has been configured, use the restore dump available on the DVD supplied in the Compact HMI 800 delivery (another path needs to be added)).

- Now select **Generate New System ID** and enter the system name e.g. “HMI Server55 System” and press **Next**.



The screenshot shows a Windows-style dialog box titled "Configuration Wizard" with a close button in the top right corner. The main heading is "System Directories Selection". Below the heading is a note: "The system directories have to be selected before restore is started. The directories must not exist".

The dialog is divided into two sections:

- System paths:** This section contains three text input fields:
  - Server data: C:\OperateITData
  - Project data: C:\OperateITData
  - Workplace data: C:\OperateITData\Temp
- System identity:** This section contains two radio buttons:
  - Use the same system id
  - Generate a new system idBelow the radio buttons is a text input field labeled "Enter system name:" containing the text "HMI-Server55 System".

At the bottom of the dialog, there are five buttons: "View Log ...", "< Back", "Next >", "Cancel", and "Help".

Figure 73. System Directories Selection

- Press **Next** in the dialog below, and then **Finish**.

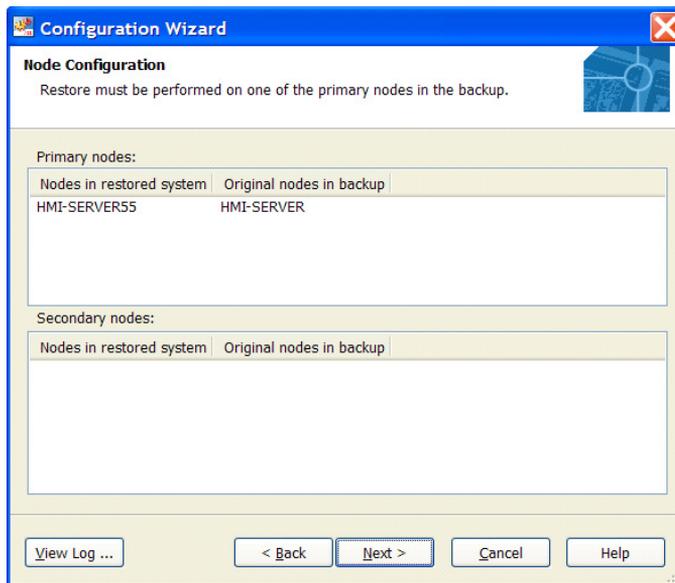


Figure 74. Node Configuration

7. Wait until the restore is complete and then press **Exit**.

## Store Controller Application in the System

To include controller configuration data, or other type of information in the automatic system backup, the data can be stored in the File Viewer Aspects.

To do this follow the steps below:

1. Create a zip-file containing all files included in the controller application.
2. Log on as user AppEng and open Plant Explorer.
3. Select an object that represents the part of the plant that the control application covers. e.g. a plant section object in the functional structure.
4. Right-click the object and select New Aspect.

5. Select the File Viewer aspect and give it a name e.g. Control Application 1.3-2006-05-23.
6. Right-click the selected aspect and select Config View.
7. Click the **Attach** button in the Public Document part of the window, and browse to the newly created zip-file. Select the file and click **Open**.
8. The file is now stored in the system and will be part of any future system backup.

## Installation of Ghost

To install Symantec Ghost follow the steps below:

1. Load Symantec Ghost CD into the CD/DVD drive.
2. Select **Install Symantec Ghost Corporate Edition**.
3. Choose **Install Console** and **Standard Tools**.
4. Move on through the installation by pressing **Next** until the User Information dialog box is shown.
5. In the User Information dialog box, write the information including a working e-mail address and eventual Serial Number. Without a serial number, the software will only function for a limited period of time.
6. Click **Next** to install the software to its default path. Select **Change** if you want to place the software files somewhere else.
7. In the **Custom Setup** dialog box, select the components to be installed. Leave the default configuration which includes all in case of uncertainty.
8. Select the **Console Service Account Name** and **Console Service Account Password**. It is recommended to choose something easy to remember, e.g. "ghost" and "ghost".
9. Click **Install**.
10. To complete the installation click **Next**, **Next** and then **Finish**.

## Load an Image

To load an image follow the steps below:

1. Boot the computer from the Ghost CD. (You may need to change BIOS settings to be able to boot from the CD).
2. When the Ghost application has been started, select **From Image** to load an image to a drive.
3. Point out the appropriate image from the DVD that was delivered from ABB.
4. Load the image and reboot into Windows.

## Upgrade of Compact HMI 800 to a New Version from a Ghost Image

The software upgrade of a Compact HMI 800 is for some versions delivered as a Ghost image. In these cases follow the steps below to upgrade the Compact HMI 800 to a new version:

1. Backup the configuration data in all nodes. For the Compact HMI 800 configuration data, use the system backup function to make a backup, as described in [Backup and Restore](#) on page 116.
2. Make a safety Ghost copy of the C disk of the server computer, using the Norton Ghost software supplied in the original delivery of the Compact HMI 800.
3. Boot the server computer from the Ghost CD and restore the ghost image containing the SW upgrade.
4. Now the application and system data should be restored. To restore the system to an original state (without application data) the backup residing on the DVD with the ghost dump should be used. To restore the application created with an earlier system version, restore the dump created in step 1.
5. For the description on system restore, see [Backup and Restore](#) on page 116.

## Other Maintenance

### Check for and Install Latest Software Updates

It is important to check if there has come any software updates to the installed Compact HMI 800 software. To make sure that the latest software versions are used in the Compact HMI 800, this can be done by checking the document “*Industrial IT System Base SV 4.x System Software Versions*” in ABB library, which lists the latest releases of relevant software from ABB. The document includes a chapter describing which software modules that are used by the Compact HMI 800 product. The following link can be used:

[http://abblibrary.abb.com/GLOBAL/SCOT/SCOT296.nsf/0/b4ff1a398ed0b65fc125710f00789cd1/\\$FILE/3BSE037782R4001\\_J\\_en\\_IndustrialIT\\_System\\_800xA\\_SV\\_4.x\\_System\\_Software\\_Versions.pdf](http://abblibrary.abb.com/GLOBAL/SCOT/SCOT296.nsf/0/b4ff1a398ed0b65fc125710f00789cd1/$FILE/3BSE037782R4001_J_en_IndustrialIT_System_800xA_SV_4.x_System_Software_Versions.pdf)

By comparing the versions of the software modules listed in the document for Compact HMI 800, with the versions shown in the computer under Add Remove Programs in the Control Panel, the versions can be verified.

If there is a newer version listed than what is installed, this software should be downloaded and installed in each node where there is an older version of the software installed. This is done in the following way:

1. Stop the Compact HMI 800 system services on the server (described in [To Stop and Start the System](#) on page 123).
2. Download and install the software updates in all nodes connected to the server. The document referenced above contains information from where the software can be downloaded.
3. Start the Compact HMI 800 system (described in [To Stop and Start the System](#) on page 123).

### To Stop and Start the System

The Compact HMI server nodes contains a set of software services that are running continuously in the background in the computer. These services are often referred to as the system or Compact HMI 800 system. During some maintenance activities it is necessary to stop and start these services. This is described below. When switching on the power to a Compact HMI 800 server the system is automatically started.

## Stop System

To stop the system without switching off the power follow these steps:

1. Log in as SysAdmin.
2. Open the Configuration Wizard (START>All Programs>ABB Industrial IT Base>System>Configuration Wizard).

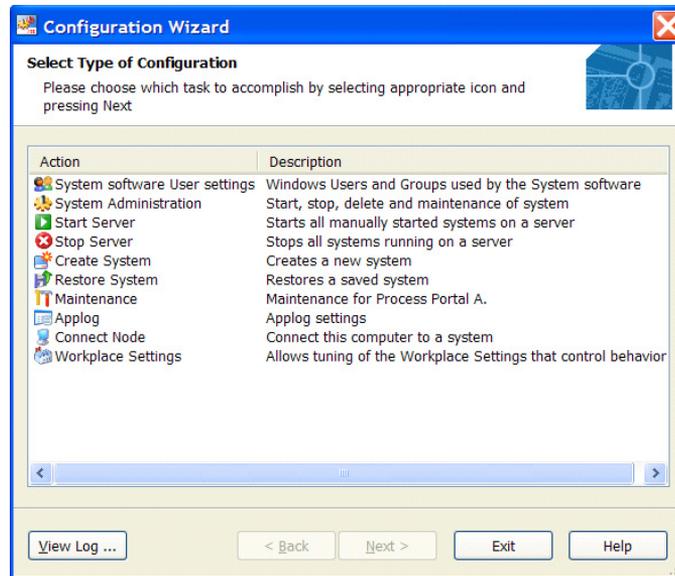


Figure 75. Select Type of Configuration

3. In the dialog above select **System Administration**.
4. Then click **Next** and **Next** again.
5. In the window below select **Systems** and press **Next**.

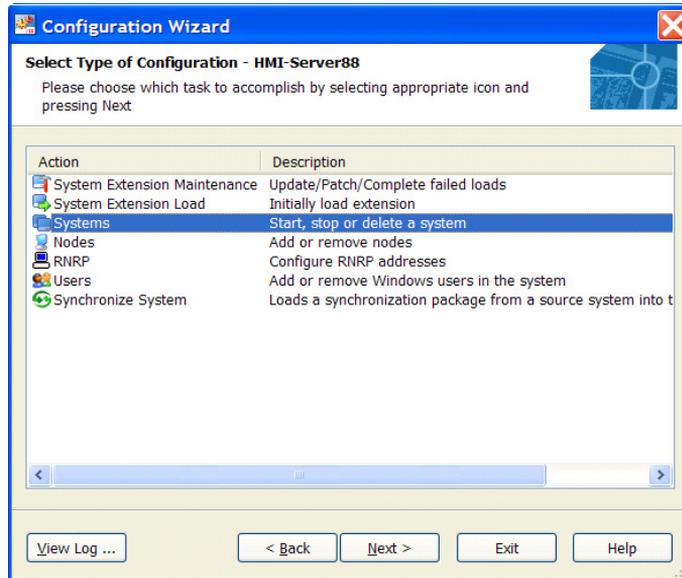


Figure 76. Select Type of Configuration - HMI-Server88

6. Select **Stop** and press **Next** and then **Finish**.
7. Wait until the system has stopped. (the dialog in step 2 shows up).

### Start System

To start the system without switching off and on the power follow these steps:

1. Log in as SysAdmin.
2. Open the Configuration Wizard (START>All Programs>ABB Industrial IT Base>System>Configuration Wizard).

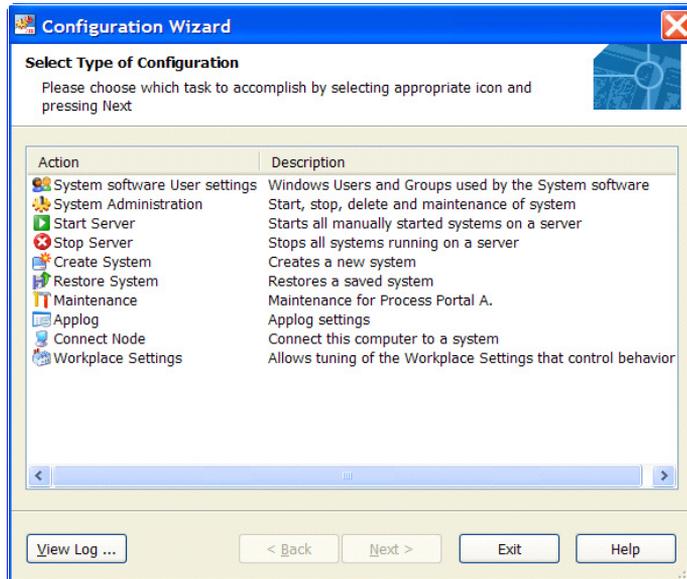


Figure 77. Select Type of Configuration

3. In the dialog above select **System Administration**.
4. Then click **Next** and **Next** again.
5. In the window below select **Systems** and press **Next**.

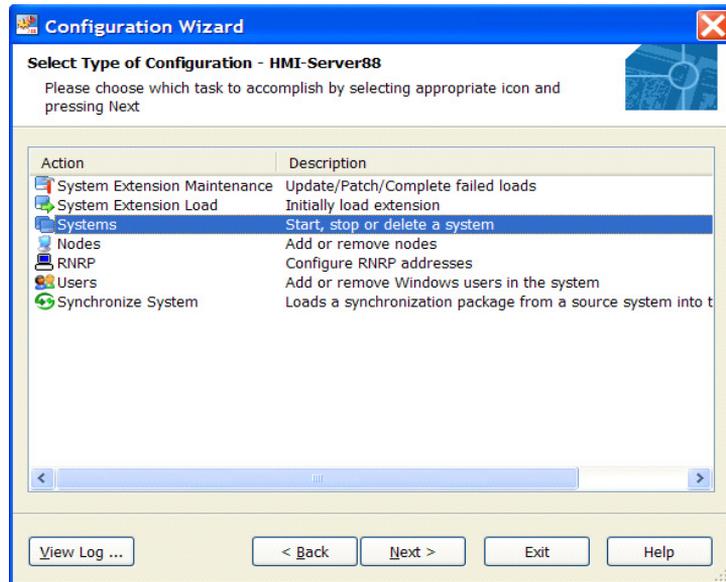


Figure 78. Select Type of Configuration - HMI-Server88

6. Select **Start** and press **Next** and then **Finish**.
7. Wait until the system has started. (The dialog in step 2 shows up).

## Autonomous Redundancy Setup

Compact HMI 800 supports an autonomous redundancy scheme. This means that two Compact HMI systems are running in parallel accessing the same controllers. One of the systems are considered to be the main system and the second is the backup system.

All configuration changes should be done in the main system and then transferred to the backup system by using the system backup function.

The setup of an autonomous redundancy configuration is done by the following main steps:

1. Make a system backup of the configuration in the main system.

2. Change the windows computer names and IP addresses in the backup system, including restore of the backup created in Step 1.

Step 1 and Step 2 are described in more detail in the chapters [Backup and Restore of Configuration Data](#) and [Change the Windows Computer Name in the Server Node](#).

## Change the Windows Computer Name in the Server Node

To change the Windows Computer Name of the Compact HMI 800 Server node please go through the following steps:

1. If the node name is change directly after delivery the steps 2 and 3 can be omitted. In this case proceed to step 4.
2. Make a Ghost backup of the node, using the Norton Ghost software supplied in the original delivery of the Compact HMI 800.
3. Make a system backup (will be restored in a later step) as described in [Backup and Restore of Configuration Data](#) on page 117.
4. Log in as SysAdmin.
5. Stop the system as described in [To Stop and Start the System](#) on page 123.

6. Delete the system, by opening the Configuration Wizard (START>All Programs>ABB Industrial IT Base>System>Configuration Wizard).

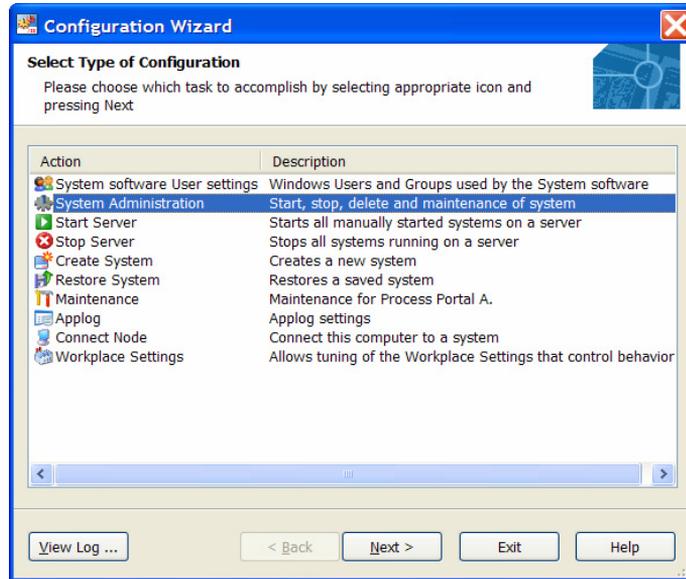


Figure 79. Select Type of Configuration

7. Select System Administration and click **Next**, and **Next** again.
8. Select System Start, Stop or Delete and press **Next**.
9. Select Delete System on a Node and click **Next**.
10. Be aware of that all configuration data will be lost if you proceed and has not done step 1 and 2.
11. Click **Next** and **Finish**.
12. Now wait until the system has been deleted (the dialog in step 6 shows up, with some fewer options), then Exit the Configuration Wizard.
13. Restart the Computer and log in as SysAdmin.

14. Now change the Windows Computer Name and if needed the IP address of the computer. Remember to update the Host file (in both server and clients). (“C:\WINDOWS\system32\drivers\etc\hosts”).
15. The server address for the license system has to be adjusted. To do this open START>All Programs>ABB Industrial IT Base>System>Licensing>License Status Viewer.
16. Select Tools>Change CLS Machine, to get the dialog below.

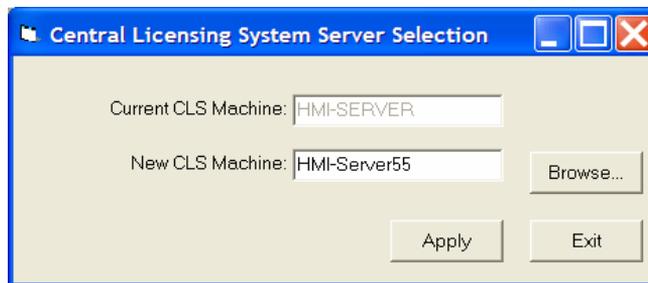


Figure 80. Change CLS Machine

17. Enter the new name e.g. “HMI-Server55” and press **Apply** and exit the License Status Viewer.
18. Restart the computer and log in as SysAdmin.
19. If you are using the AC 800M OPC server, open the OPC server configuration dialog and disconnect and connect each of the controllers once. After this save the configuration.
20. If you are setting up an autonomous redundant backup system (otherwise skip this step) please copy the backup files from the main system server (typically from folder located on "Backup Disc:\Backup" in the server workplace) to the backup system server (same location).
21. Open the Configuration Wizard and select Restore System and click **Next**.

22. If the backup shows up in the window go to step 22. If the backup does not show up in the window, click Select Path and add, and then browse to the folder shown below.

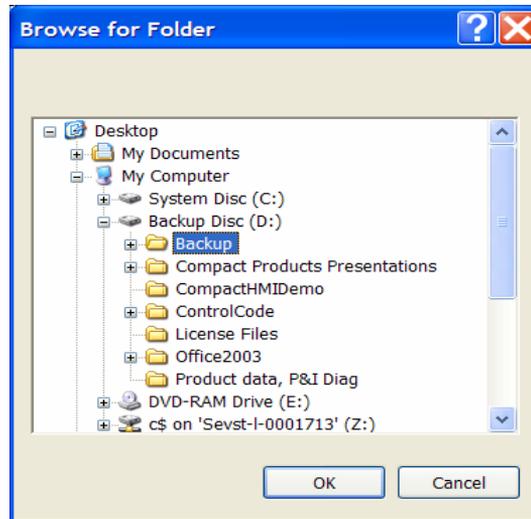


Figure 81. Backup Folder

23. Click **OK** and **OK** again.
24. Select the backup that was done in Step 2 (or that was copied from the main system, if you are setting up an autonomous redundant backup system), and click **Next**. (If the change of Computer Name is done before the system has been configured, use the restore dump available on the DVD supplied in the Compact HMI 800 delivery (another path needs to be added)).
25. Now select Generate New System ID and enter the system name e.g. “HMI Server55 System” and press **Next**.

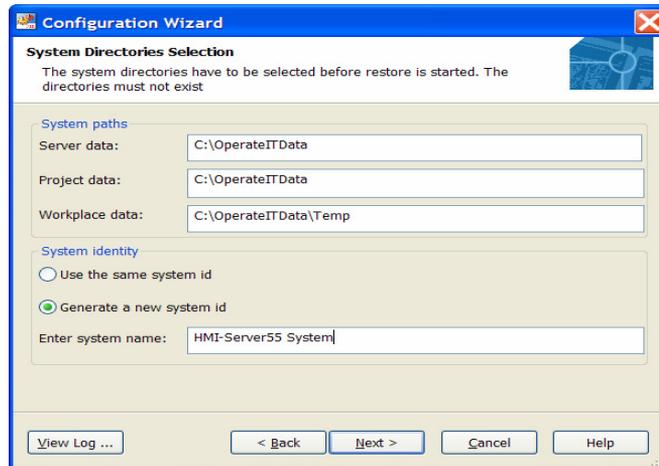


Figure 82. System Directories Selection

26. Press **Next** in the dialog below, and then **Finish**.

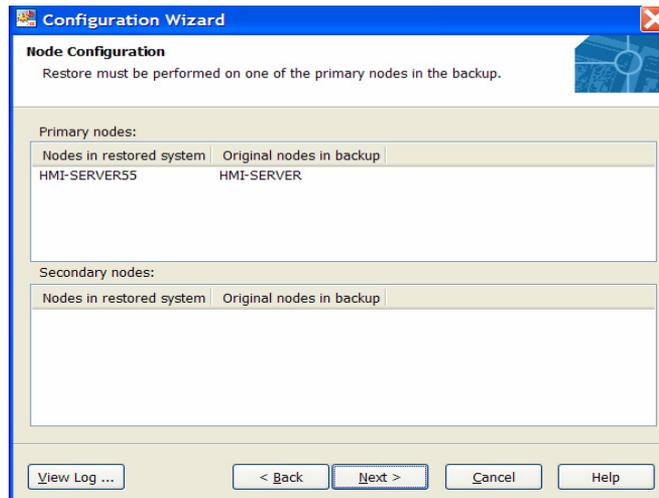


Figure 83. Node Configuration

27. Wait until the restore is complete and the press **Exit**.
28. After restoring the backup the systems references to the OPC servers should be reconfigured to make sure that the correct OPC servers are used. To do this follow steps a-e below, for each OPC server.
  - a. Open Plant Explorer and go to the Control Structure.
  - b. Click on each of the objects of the type "PLC Controller Type" and select the PLC controller configuration aspect as shown in the figure below.

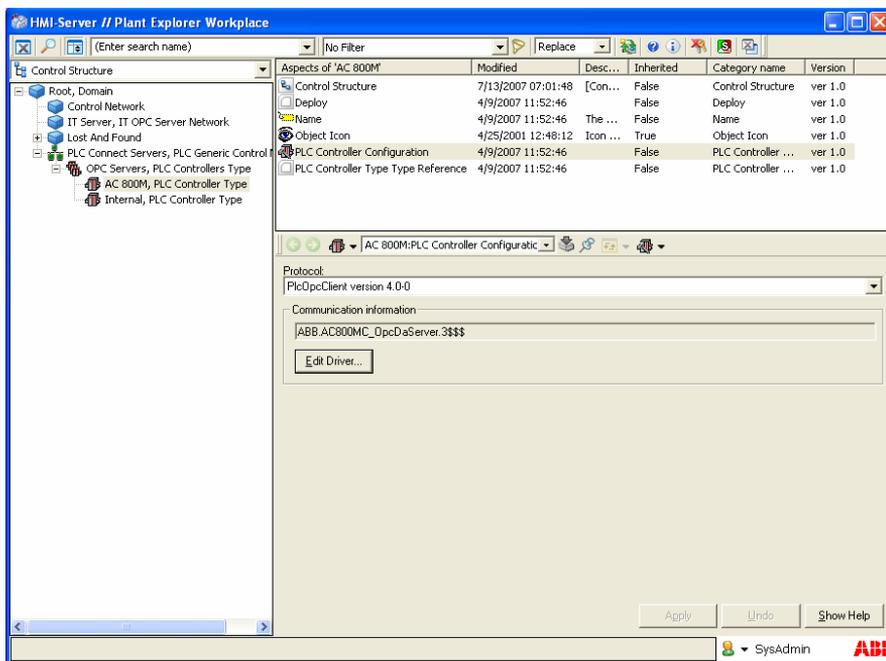


Figure 84. OPC reconfiguration

- c. Click the **Edit Driver** button and the dialog in the figure below is displayed.

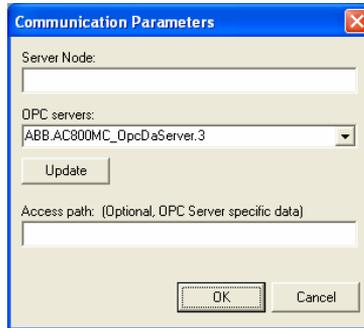


Figure 85. Communication parameters

- d. Click the **Update** button and select the OPC server to be used as shown above.
  - e. Click **OK** and then **Apply** to save the new configuration.
29. Select the object PLC Connect Servers and the Deploy aspect.
  30. Click **Deploy**.
  31. When deploy has ended, the Node name change for the server is completed.
  32. If clients are connected to the server each client needs to be updated as described in the following four steps:
    33. Log in as SysAdmin in the Client.
    34. Open the Hosts file using Notepad and update the file with the new name of the server.
    35. Restart the client.
    36. Connect the client to the system server as described in [Connect and Disconnect Client Nodes](#) on page 135.

## Change the Windows Computer Name in the Client Node

To change the Windows Computer Name of a Compact HMI 800 Client node please go through the following steps

1. Log in as SysAdmin.
2. Disconnect the client from the servers as described in chapter [Connect and Disconnect Client Nodes](#) on page 135.
3. Change the Computer Name and or IP address of the client.
4. Update the Hosts file in the client and the server with the changes (“C:\WINDOWS\system32\drivers\etc\hosts”).
5. Remember that if the name of the server has been changed, the License Status Viewer should be opened, and the CLS machine be changed.
6. Connect the client to the server as described in chapter [Connect and Disconnect Client Nodes](#) on page 135.
7. The node name change of the client is now ready.

## Connect and Disconnect Client Nodes

Client nodes has to be connected to the system. This is done in the following steps:

1. Connect the client node to the network.
2. Log in on the server node as SysAdmin.
3. Start the Configuration Wizard.
4. Select System Administration and click **Next**, and **Next** again.
5. Select **Nodes** and click **Next**.
6. Select **Add Client** and click **Next**.
7. In the dialog shown below select the client to be added e.g. HMI-Client01.

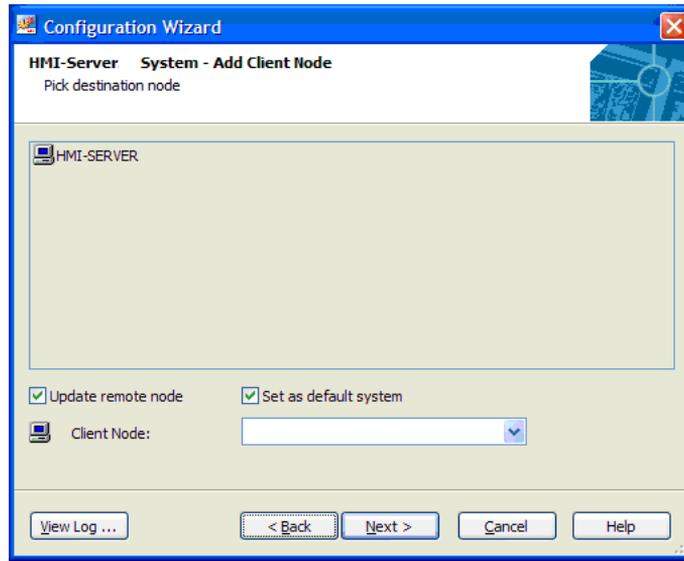


Figure 86. Add a Client Node

8. Click **Next** and then **Finish**.
9. The client has now been added.

### Disconnect a Client

To Disconnect a client from a system go through step 1-5 above, and then continue with these steps:

1. Select **Remove Client** and click **Next**.
2. In the dialog below select the client to be removed.

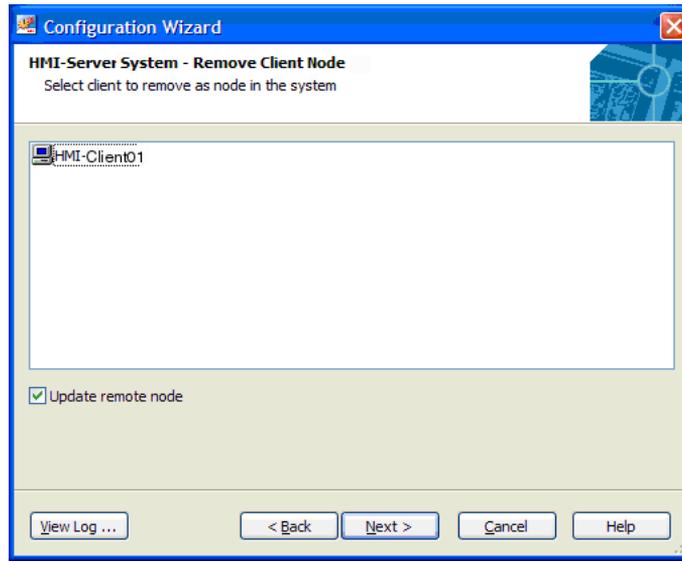


Figure 87. Remove a Client Node

3. If the client exists on the network, keep the switch Update Node selected. If the client is not available on the network remove the switch.
4. Click **Next** and then **Finish**.
5. The client has now been removed.

## Spare Part Computer

The spare part computer can be used as both client and server computer.

### Spare Part Computer used as Server

When using the computer as a server the license file and related dongle has to be moved from the original server to the spare part computer. In addition the latest backup file needs to be restored before the server is ready to be used. To restore the server please follow the instructions in chapter [Backup and Restore of Configuration Data](#) on page 117.

### Spare Part Computer used as Client

When using the spare part computer as a client, the computer name and the IP-address needs to be changed before connecting the computer as a client. This is described in chapter [Change the Windows Computer Name in the Client Node](#) on page 135.

## Defragmentation

Defragment the hard drive regularly. This helps keeping the good performance of your computer.

## Virus

Do not connect the computers directly to the internet. The computers must be protected behind a hardware firewall. See the section about computer security in the *Industrial<sup>IT</sup> Base System, Administration and Security* instruction.

## Windows Update

Update Windows regularly. This helps keeping the good performance of your computer and the stability of your software.

This must be done in a secure manner, as recommended below.

The system administrator or a central engineering department can make the updates available on a dedicated distribution server on the office or corporate network by installing them from CD/DVD, or by downloading them from a trusted server e.g. on the Internet.

## Save of OPC IP Address for PLC Connect

Open the OPC server interface and connect your PLCs in the **Add Your PLCs**. When all PLCs are connected and the communication is verified, click **File** and **Save configuration**. To enable the Autostart, click **Settings** and **Autoload Configuration**. When the pop-up window shows up, check the **Enable Autoload Configuration** check box, and use the browse interface to locate your saved configuration. All your PLCs are now stored in a file, that is pre-loaded in the OPC-server at computer startup.

## Using Virus Protection with Compact HMI 800

### Introduction

The description below shows an example of how to set-up virus scan software for the Compact HMI 800 product. In this example the McAfee software has been used, but other virus scan products can also be used with Compact HMI 800 by configuring the relevant functions in the way described in this chapter.

All computer systems should be scanned for viruses at regular intervals. A reputable and reliable virus scanner should be used and updated regularly. However, when a virus is found, damage may already have been done. For a mission critical system it is therefore more important to effectively prevent viruses from being introduced into the system than to frequent run virus scans.

Virus checking affects the performance and response times of any computer system. For an automation system such as Compact HMI 800, where real-time performance and reaction times must not be compromised, the impact of virus checking must be limited. This can be accomplished by excluding certain frequently accessed directories and file types from on-access scanning, and by running on-demand scanning of excluded files at times when normal system activity is low.

This section describes how McAfee VirusScan® Enterprise can be configured to avoid interference with the Compact HMI 800 operation.

## Configuration Settings

### Overview

McAfee VirusScan® Enterprise 8.0i can be configured for on-access and on-demand virus scanning.

- On-access scanning is automatically activated at system startup and will check files as they are accessed. To prevent this from causing performance degradation, folders containing files that are frequently accessed need to be excluded from on-access scanning.

- On-demand scanning can be configured to run cyclically at predetermined times or intervals, or be manually initiated. All files that are excluded from on-access scanning should be scanned on-demand at regular intervals. However, since this scanning will impact system performance and reaction times, it should be done when normal system activity is low.

### On-access scanning for Low and high risk processes

McAfee allows you to select different on-access scanning options for low and high risk processes, see [Figure 88](#). This feature shall be enabled during testing.

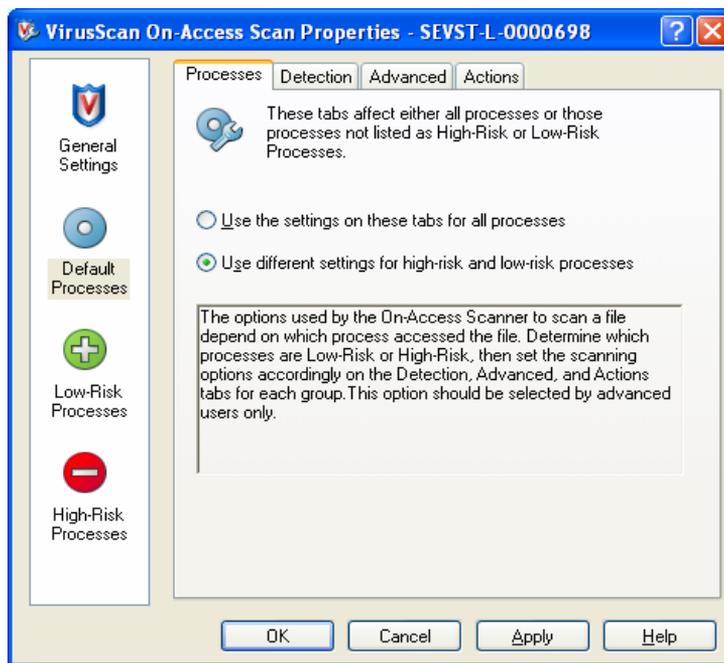
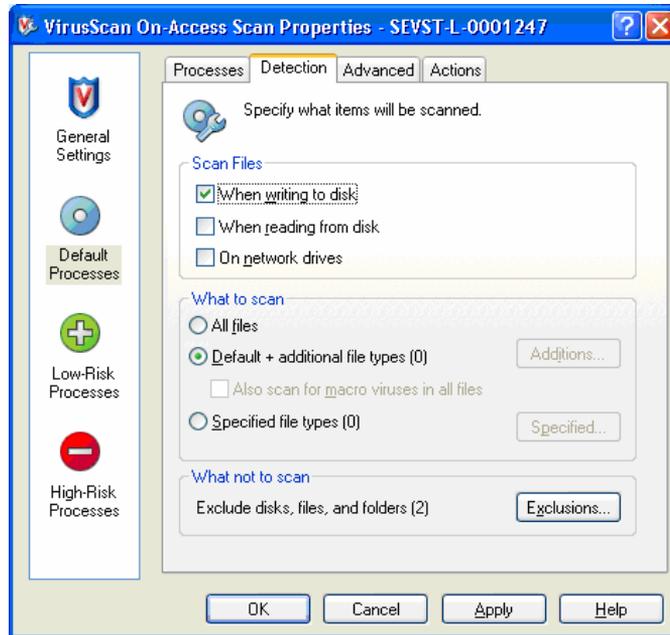


Figure 88. Enabling different settings for low and high risk processes

### Settings for default processes

Make the following settings for the default processes. See [Figure 89](#).



*Figure 89. Settings for default processes*

When pressing “Additions ...” the default file types defined in the current McAfee DAT file are listed. Here the additional file type .afw was added.

When pressing “Exclusions ...” a list of the disks, files and folders that are excluded from on-access scanning is presented ([Figure 90](#)):

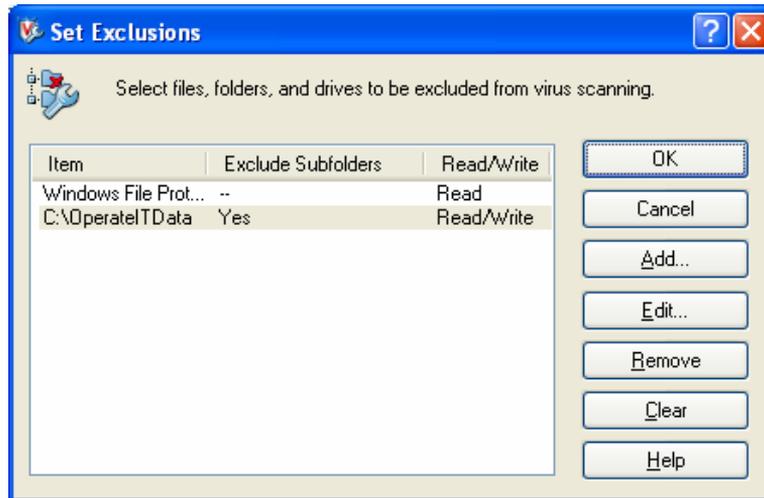
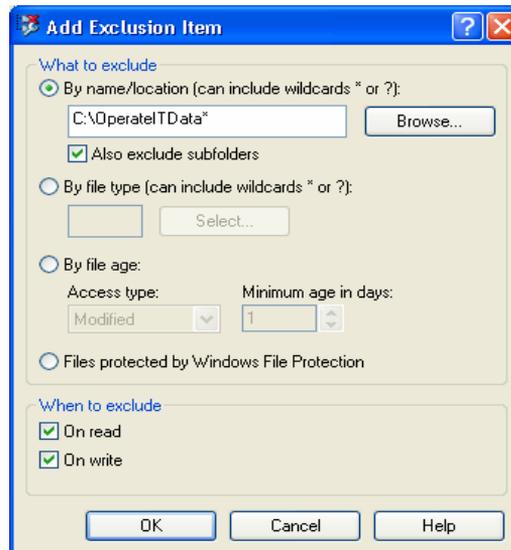


Figure 90. List of disks, files, and folders excluded from on-access scanning

New folders are added to this list by pressing “Add ...” and filling in the relevant folders as shown in [Figure 91](#).

The folders and file types that need to be excluded depend on which products are installed. A list is provided in [Folders Excluded from On-access Scanning](#) on page 148.

Note that “Also exclude subfolders”, “On read”, and “On write” were checked.



*Figure 91. Adding a folder to exclude from on-access scanning*

### **Settings for low risk processes**

The Compact HMI 800 system function Afworkplaceapplication was added to the list of low risk processes, as shown in [Figure 92](#):

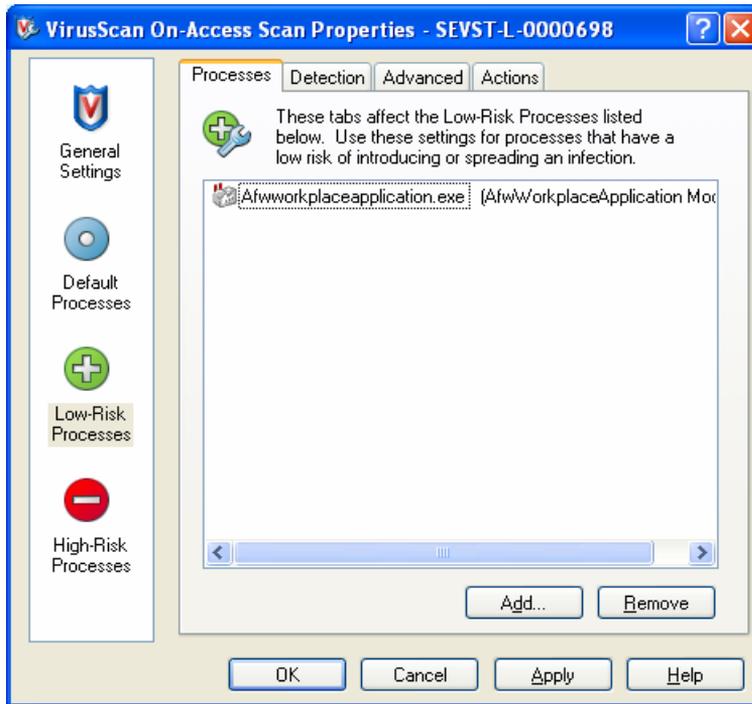


Figure 92. Adding low risk processes

The same detection settings that were used for default processes were also applied to low risk processes (see [Figure 89](#)).

The same folder and file type exclusion settings that were used for the default processes (see chapter [Folders Excluded from On-access Scanning](#) on page 148) were used also for low risk processes. In addition, the following folder was also excluded:

```
\Program Files\ABB Industrial IT\Operate IT\Process Portal A\bin
```

## On-demand scanning

### Configuring folders to scan

The folders that are excluded from on-access scanning should be regularly scanned, either at scheduled intervals, or manually initiated. Since scanning these folders will impact system performance and reaction times, it should be done when normal system activity is low.

For the purpose of the test, cyclic scanning was configured for all folders excluded from on-access scanning. This is illustrated in [Figure 93](#) (note that [Figure 93](#) does not show all relevant folders).

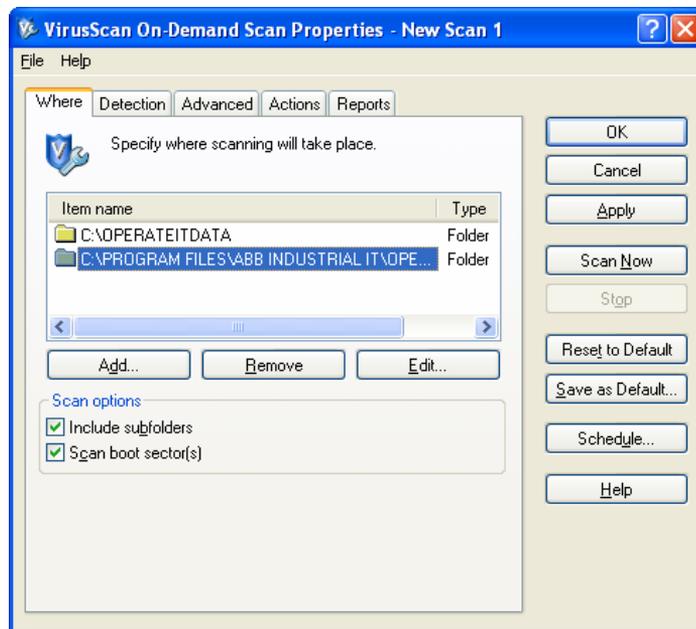


Figure 93. Configuring cyclic scanning

The schedule is specified by pressing the button “Schedule”, see [Figure 93](#).

In applications where it is not possible to select a regular time when on-demand scanning can be done without disturbing operation of the system, there should be procedures for manually initiating the scanning as often as practical. This is done by pressing the button “Scan Now”, see [Figure 93](#).

### Limiting the CPU utilization

It is possible to limit the share of available CPU capacity that is utilized by McAfee for on-demand scanning, as shown in [Figure 94](#). After modifying this setting it is wise to run the scan once to ensure that it finishes within an acceptable amount of time.

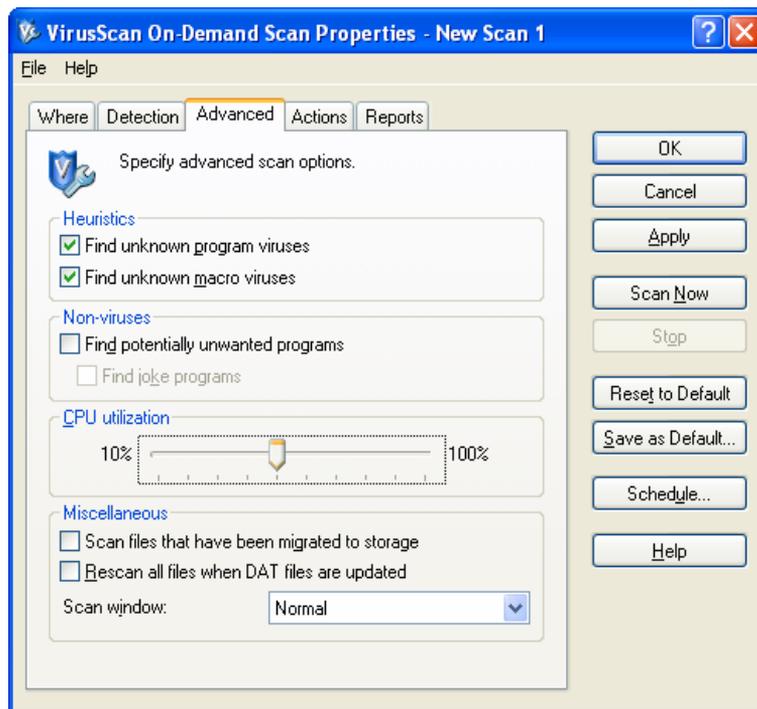
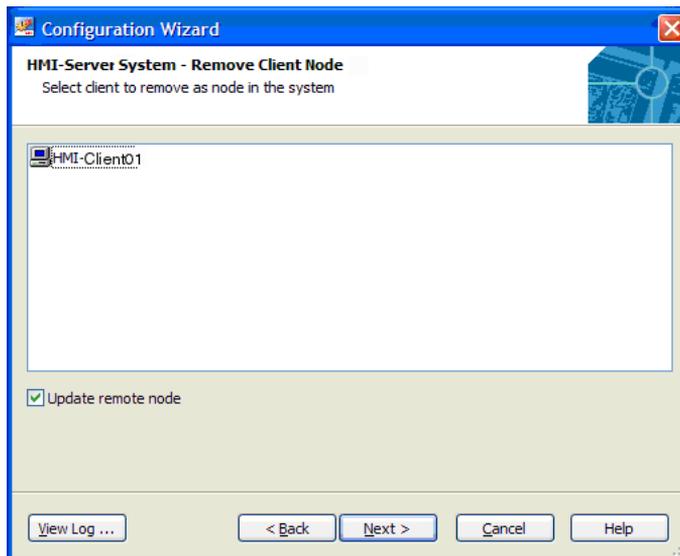


Figure 94. Limiting the CPU utilization

## Handling of infected files

Automatically moving infected files to a separate quarantine folder, which is the default action when McAfee finds an infected file that it can't clean, might lead to system failure. Instead, manual action is required to ensure that the system is stopped in a controlled way. The settings shown in [Figure 95](#) were used in the test.



*Figure 95. Configuring response to detected viruses*

## AutoUpdate

AutoUpdate is a feature that can be used to ensure that the latest McAfee DAT files are downloaded and installed on every machine. However, enabling this feature requires a direct connection between the automation system network and the Internet. Enabling AutoUpdate on machines connected to the automation system network is therefore not a standard practice.

For a more secure and reliable application of DAT files, a central management and update deployment host can be set up on a corporate intranet. This allows a system administrator to have control over when updates are made, and an opportunity to test the updates before they are deployed. The white paper “IS Security Considerations for Automation Systems” provides general guidelines for how this could be arranged.

For the test, AutoUpdate was not configured. No central management tools were tested.

## Folders Excluded from On-access Scanning

The folders and file types that need to be excluded from on-access scanning depend on which Base products are installed.

The tests were run using the following exclusions:

*Table 8. 3Folders Excluded from On-access Scanning*

Product	Path
Operate IT	\OperateITData* \OperateITTemp*
Engineering Studio	\Program Files\Common Files\ABB Industrial IT\MSSQL\$EBINSTANCE\Data
Control IT	\ABB Industrial IT Data

# Section 8 PLC Connect Graphic Elements

## General Information

### Description

This chapter covers how to build PLC Connect Graphic Elements.

### Objectives

On completion of this chapter you will be able to:

- Configure PLC Connect Graphic Elements.

### Reference Documentation

Use the PLC Connect Online Help:

Contents tab:

Welcome > Graphic Elements and Dialogs >  
> Basic Process Object Icons and  
> Basic Process Object Icons > Status Icons and  
> Optimized Process Icons

Select your icon type and view the example.

Use the manuals:

PLC Connect Documentation: Configuration Manual.

Industrial IT Documentation: Engineering - Graphics.

## Graphic Elements in additional Libraries

To be able to create PLC Connect Graphical Elements, some **General Objects** and **PLC Connect Controls** located in additional **Graphic Libraries** are to be used.

## Adding Graphic Libraries to Graphics Builder

Graphical Libraries can be added to Graphics Builder.

1. Select the **Tools** menu. See [Figure 96](#).
2. Select **Graphic Libraries**.
3. Select the libraries you want to add. See [Figure 97](#).
4. Click **OK**.



Figure 96. Adding Libraries

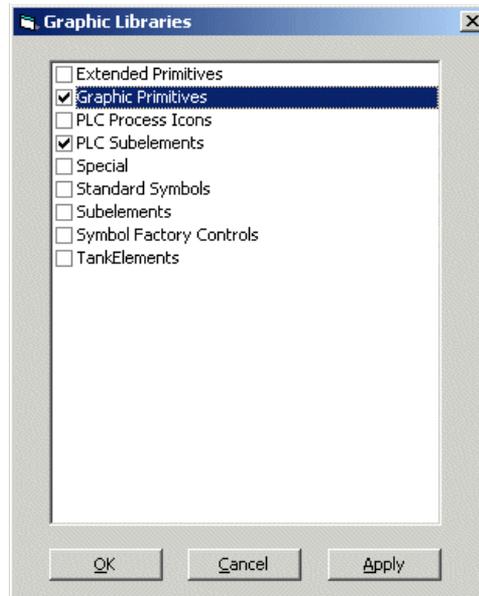


Figure 97. Adding Library Components

## Useful Controls in Graphic Libraries

For more information about the controls in the libraries, consult the Industrial IT Documentation: Engineering, and Graphics and PLC Connect Documentation: Configuration Manual.

### Libraries for PLC Connect

Two specially designed libraries for PLC Connect are described in separate sections.

The two libraries are:

- [Library of PLC Subelements](#) on page 154.
- [Library of PLC Process Icons](#) on page 178.

### Visual Basic Controls

The standard Visual Basic library: General, should mainly be used for static graphic, since it does not support the background code generation necessary for subscription and performance.

### Graphic Primitives

The Graphic Primitives library consists of controls for static graphics and value indication.

The PgErrorIndicator is used for OPC Status evaluation. See [Figure 98](#).

**Note:** Use the PgBar, not the AdvandBar control. The AdvantBar is obsolete.

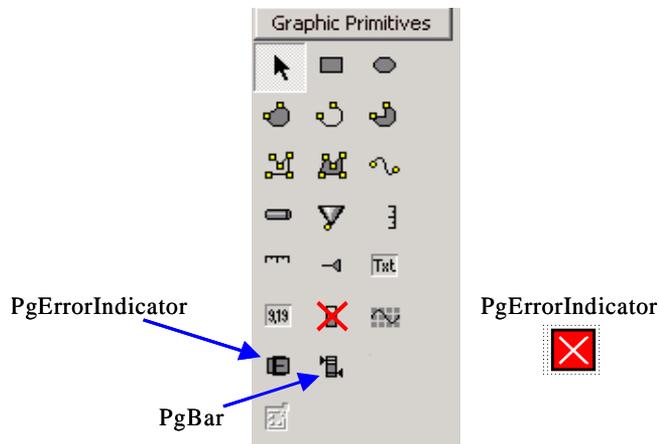


Figure 98. Controls in Graphic Primitives Library

### Special Library

The Special Library contains some controls used for more advanced functionality. The most useful control is the Aspect Link control. See [Figure 99](#).



Figure 99. Controls in Special Library

### Subelements

The SubElements library consists of buttons, indicators and input controls.

**Note:** Use these controls and not the standard VB controls for value input. The VB controls do not generate the background code needed for subscription and performance.

**Note:** Use the IBar, **not** the Bar control. The Bar is obsolete. See [Figure 100](#).

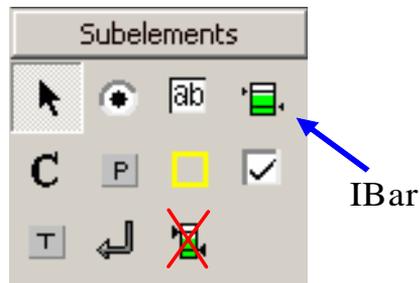


Figure 100. Controls in Subelements Library

### Tank Library

The library TankElements contains various controls for tank constructions. They have limited functionality. Icons are not displayed in the toolbox and colors and some other properties are not reachable and can therefore not be changed.

Tank images from Symbol Factory can preferably be used.

### Other Libraries

The libraries Extended Primitives and Standard Symbols, are not used in this course, but may be useful if you want to build your own Subelements.

## Library of PLC Subelements

The library of PLC Subelements contains PLC Connect Object controls with full functionality.

The difference between the Analog and the Simple Object controls are that the analog controls also displays a bar indicating an analog value of the object.

FanSimple			FanAnalog
PumpSimple			PumpAnalog
MotorSimple			MotorAnalog
MotorAdvance			Valve2Way
Valve3Way			ValveAnalog
ManIndication			AlarmState
WarningLevel			AlarmWarning
Tank			BinIndication

Figure 101. PLC Subelements

The ManIndication control is used to display if an object is in automatic or manual control mode.

The AlarmState control is used to indicate if the object has any active or unacknowledged alarms. For the behavior of the element see [The AlarmState Object](#) on page 155.

WarningLevel is used to indicate the warning conditions of an object, e.g. communication failure. For the behavior of the element see [The WarningLevel Object](#) on page 156.

AlarmWarning Combo is a status icon that can show both alarm and/or warning information for a process object. The icon can show the summarized alarm status and/or summarized warning level for a process object. For the behavior of this element see [The AlarmWarning Combo Object](#) on page 156.

The Tank object is a complete tank with a Bar Graph.

The BinIndication is used to indicate the status of a Boolean signal.

### The AlarmState Object

AlarmState is a status icon that can show the summarized alarm status for a process object. It will show the top priority alarm for the signals in a process object. When cleared the next alarm in priority order will be displayed. The priority is used when a summarized alarm status is shown for the signals in a process object. A single process signal can only be in one state at a time. See [Figure 102](#).

Priority	Appearance	Description
1 (Top)		Auto Disabled. Alarm auto disabled by the system
2		Alarm active but not acknowledged
3		Alarm inactive but not acknowledged
4		Alarm active and acknowledged.
5 (Lowest)		Disabled. Alarm disabled by user
		No Alarm 2. (Invisible. Used at run-time when no alarm exists.)
		No Alarm 1. (Used at design-time when no alarm exists.)

Figure 102. AlarmState Appearance

### The WarningLevel Object

WarningLevel is a status icon that can show the summarized warning level for a process object. It will show the top priority warning for the signals in a process object. When cleared the next warning in priority order will be displayed.

If there is more than one warning for a signal, the top priority warning level will be displayed. The same is valid when a summarized warning level is shown for the signals in a process object. See [Figure 103](#).

Priority	Appearance	Description
1 (Top)		Communication with server error, that is, the client has lost communication with the server.
2		Communication with controller error, that is, communication between the communication server and the controller is down.
3		Uncertain value. Value is not updated by the communication server.
4		The signal is control disabled.
5 (Lowest)		The signal value is forced.
6		No warning 2. (Invisible. Normal state in run-time when no warning exists.)
7		No warning 1. (Used at design-time when no warning exists.)

Figure 103. WarningLevel Appearance

### The AlarmWarning Combo Object

AlarmWarningCombo is a status icon that can show both alarm and/or warning information for a process object.

The icon can show the summarized alarm status. When there are more than one alarm for the signals in a process object, the top priority alarm state is displayed, and/or a summarized warning level. When there are more than one warning for the signals in a process object, the top priority warning is displayed for the process object.

The AlarmWarning Combo is for example used in PLC Connect Faceplates. See [Figure 104](#).

Example Appearances	Description
	There is at least one alarm and at least one warning. (The warning is indicated with a yellow rectangle around the alarm indication).
	There is at least one alarm, but no warning. For the different alarm appearances, see <a href="#">Alarm States</a> .
	There is at least one warning, but no alarm. For the different warning appearances, see <a href="#">Warning Levels</a> .
	Invisible. (There are no alarm and no warning.)

Figure 104. AlarmWarning Combo Appearance

## Configuration of PLC Connect Graphic Elements

In this section a couple of examples are given to illustrate the usage of different PLC Connect Graphic Elements and Controls.

### Creating Graphic Element Aspects

1. Select an object type object in the **Object Type Structure**. See [Figure 105](#).
2. Right-click and select **New Aspect**.
3. Select **Graphic Element** aspect category and define a **Name**.

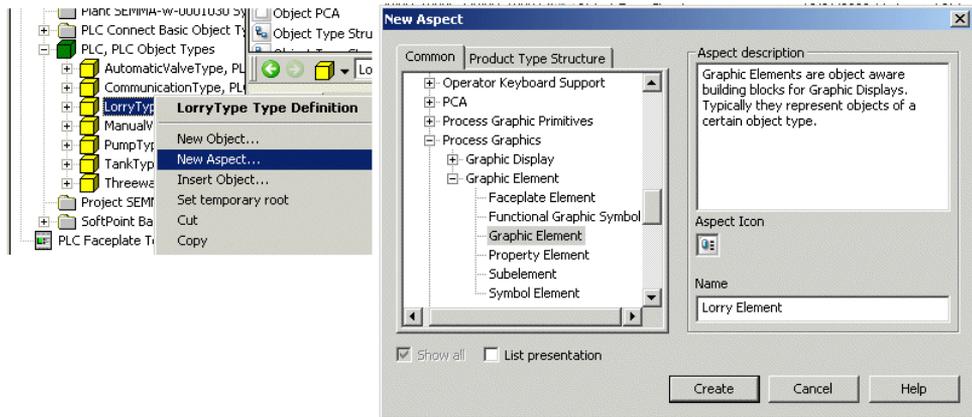


Figure 105. Create Graphic Element Aspect

## Increasing Performance of a Graphic Element

When there are many graphics in a Graphic Element aspect, performance can be increased by changing the **Windowless** property for the design window to **True**. This means that the Graphic Element aspect will have less functionality, and therefore update faster. Be careful **not** to do this for a Graphic Display aspect, since the loss of functionality make the aspect malfunction.

1. Click in an empty space in the design window to deselect any graphic element. The **design window** itself is to be selected. See [Figure 106](#).
2. In the Properties window, set the **BackStyle** property to **Transparent**. This will make the background of the Graphic Element aspect transparent when it's inserted into another graphic aspect.
3. Set the **Windowless** property to **True**.
4. Resize the design window to cover only the created graphic elements.
5. **Deploy** the aspect.

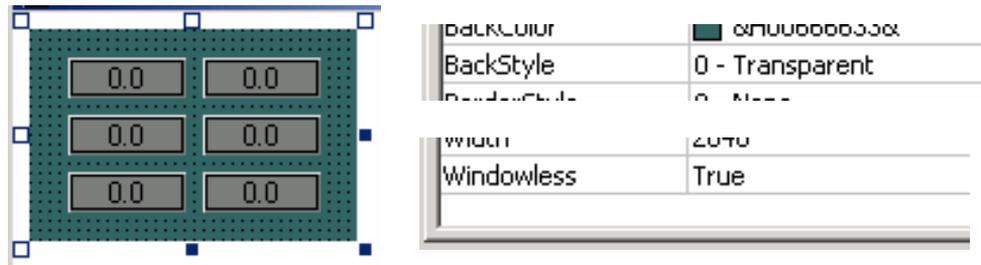


Figure 106. Increasing Performance of a Graphic Element

## Creating PLC Connect Graphical Objects

This section describes the methods for creation of some different Graphical Objects.

### Creating a Lorry Element

1. In Plant Explorer, select the **Object Type Structure**, and then the Lorry object type.
2. Create a **Graphic Element** aspect for the object type.
3. Select the created aspect and click **Edit**. The Graphics Builder is started.
4. Use the Symbol Factory Control to add a symbol of a lorry into the **Graphic Element**. See [Figure 107](#).
5. Select the created symbol, and then **View > Expression Builder**.
6. In the **Expression Builder**, connect the **Visible** property to the binary process signal corresponding to whether there is a tanker truck connected to the pipe or not. This means the tanker truck image will be shown when the signal value is TRUE, and hidden when it's FALSE.
7. Click in an empty space in the design window to deselect any graphic element. The design window itself is to be selected.
8. In the Properties window, set the **BackStyle** property to **Transparent**.
9. Set the **Windowless** property to **True**.

10. Resize the design window to cover only the created graphic element.
11. **Deploy** the aspect.

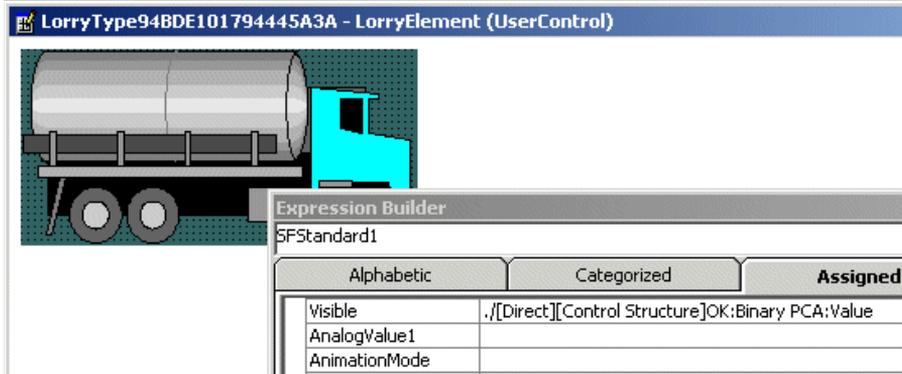


Figure 107. Connection string in Expression Builder

### Adding the PgErrorIndicator

The PgErrorIndicator is used for indication of OPC communication errors.

Because the Graphical Element for the Lorry contains no standard PLC Connect Object Control, the PgErrorIndicator has to be manually added to the Graphic Element.

The PgErrorIndicator is already implemented to all standard PLC Connect Objects in the PLC Subelements Library.

1. In the Toolbox of the **Graphic Primitives** you will reach the PgErrorIndicator. See [Figure 108](#). This control is normally **invisible** when it is added to a Graphical Element.  
You can make it temporary visible by changing the **AppError** Property to **Bad**. **Don't forget** to change back the property to **Good** before Deploying the Graphical Element.

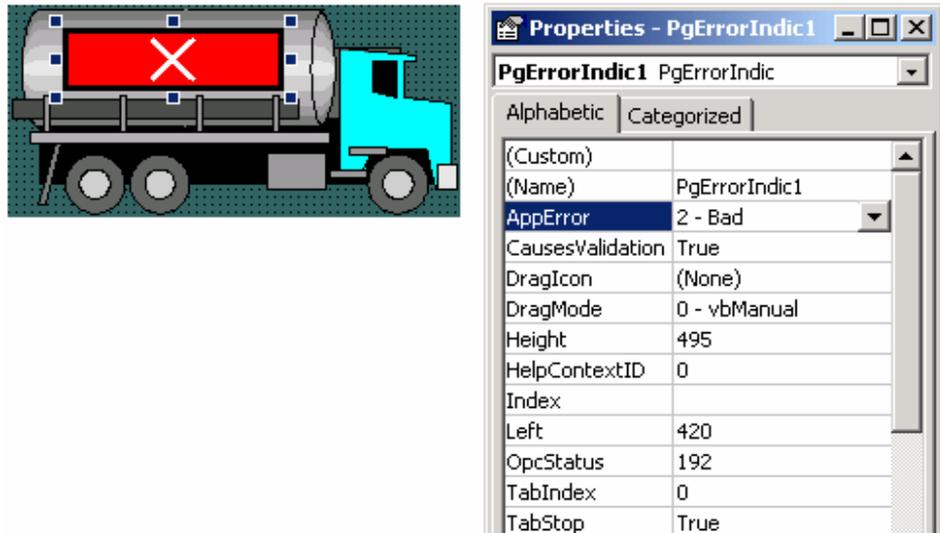


Figure 108. Properties of the PgErrorIndicator

2. In **Expression Builder**, link the property of the **OpcStatus** to the **QualityCode** of the signal. This is done in the numbered order as described in the [Figure 109](#) below.

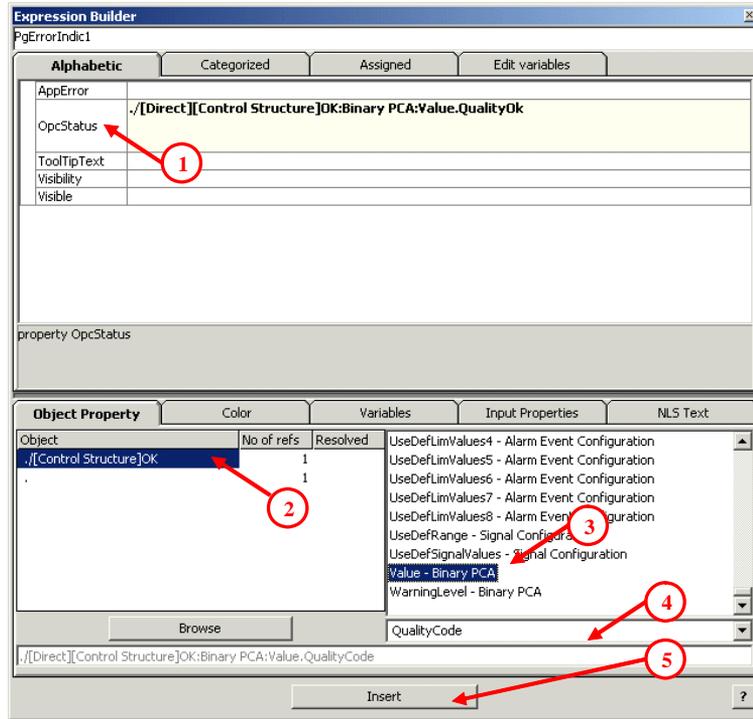
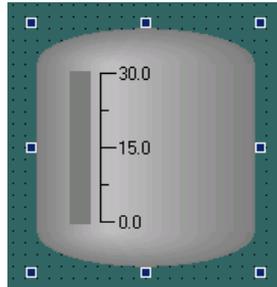


Figure 109. Linking OPCStatus to QualityCode

## Creating a Tank Element

This example describes how to create a tank element from scratch. In the PLC Subelements graphic library there is a complete tank element. See [Figure 110](#).



*Figure 110. PLC Subelements Tank Element*

### **Creating a Tank Symbol**

Creation of a Tank Body:

1. Select Graphic Primitives. See [Figure 111](#).
2. Click on the **Tank** icon (AdvantCone).
3. Draw a rectangle in the drawing area.
4. Use the yellow indication in the lower left part to **reshape** the figure.
5. Use the handles to **resize** the figure if necessary.

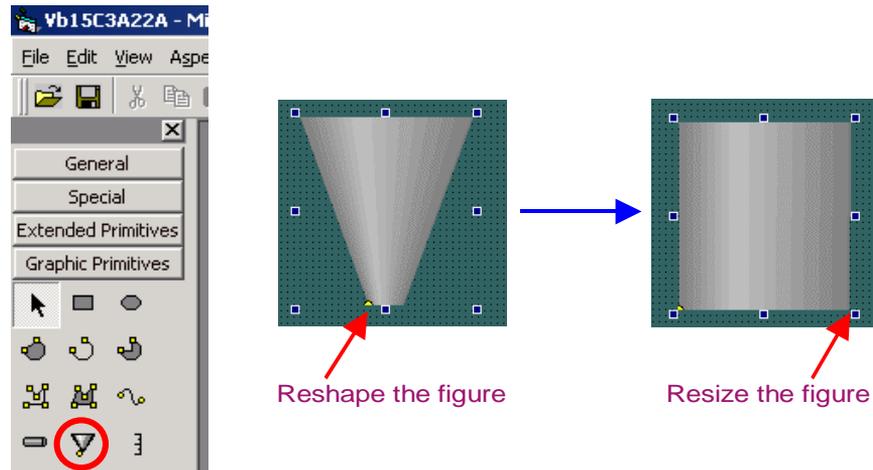


Figure 111. Creating Tank Body

#### Creation of Tank Top and Tank Bottom.

1. Click on the **Ellipse** icon (AdvantEllipse). See [Figure 112](#).
2. Draw a rectangle in the drawing area.
3. Use the handles to **resize** the figure to the same width as the tank body.
4. **Change** the following properties.  
FillStyle = 3D Vertical.  
LineWith = 0.
5. Use **Send To Back** to make it look nice.

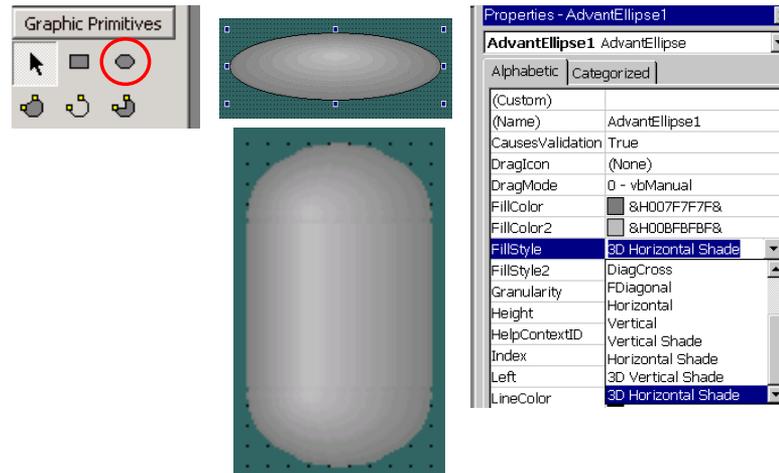


Figure 112. Tank Symbol Created

### Adding Bar Graph to Tank Element

Insert Graphic Primitives, a PGBar and an AdvantVscale. See [Figure 113](#).

**(Do not use AdvantBar.)**

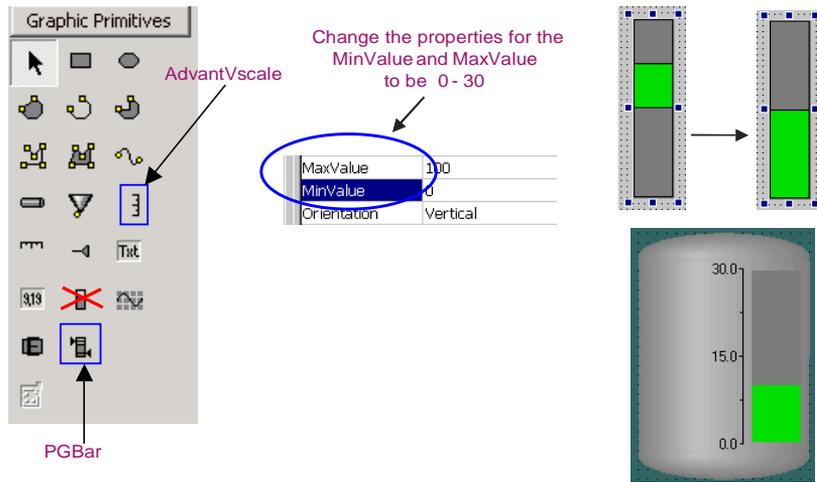


Figure 113. Bar Graph added to Tank Element

### Getting live data to the Tank Element

1. Select the Bar Graph.
2. Bring up the Expression Builder. See [Figure 114](#).
3. Select the value property in the upper part of the window.
4. Select this object (.) in the lower left part, and the signal Level in the lower right part, click insert and close the Expression Builder.

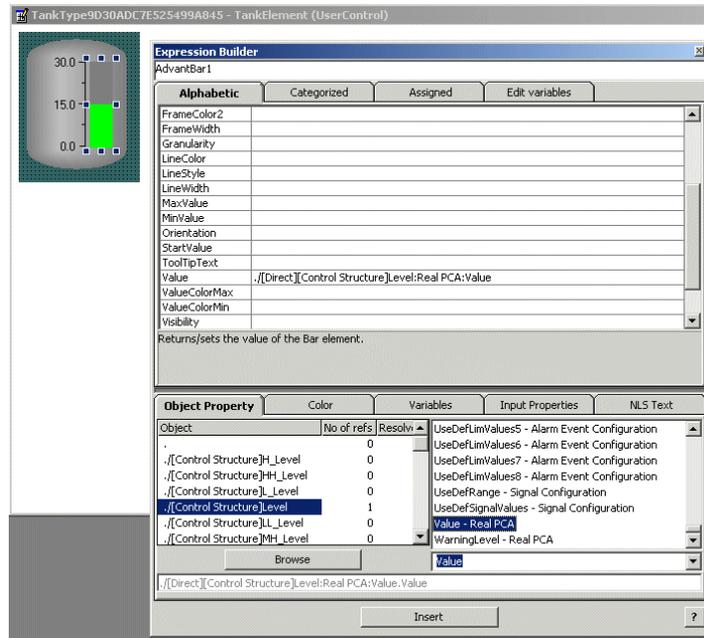


Figure 114. Connecting the Bar Graph

### Alarm and Warning Indicators

The PgErrorIndicator is in this example not implemented. Alarm and Warning Indicators and /or the PgErrorIndicator has to be added. This is described in the next section, [Creating a Valve Element](#).

## Creating a Valve Element

1. In Plant Explorer, select the **Object Type Structure**, and then your **Valve Object Type**.
2. Create an **AlarmStatus** aspect for the object type. The AlarmStatus aspect is required for alarm information to be propagated to the object type. **Do not rename this aspect.**

3. **Create a Graphic Element** aspect for the Valve Object Type and name it e.g. Valve Element. See [Figure 115](#).
  4. Select the created Graphic Element aspect and click **Edit**. The Graphics Builder is started.
- Add the graphic library PLC Subelements to the toolbox.
5. Select the PLC Subelements tab, and then create a **Valve2Way** element.
  6. Create an **AlarmState**, a **WarningLevel** and a **ManIndicator** element by **double-clicking** and place them next to the Valve Element.

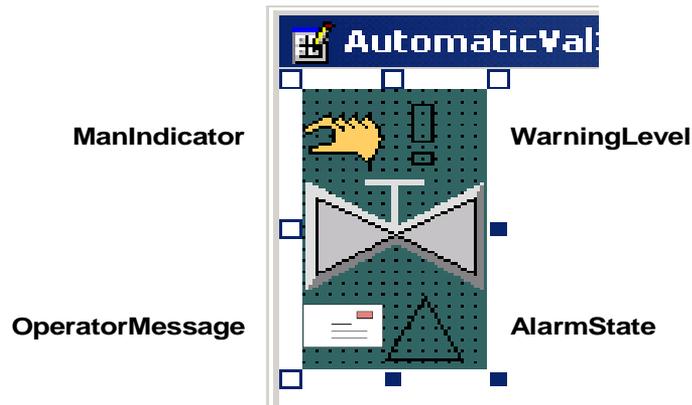


Figure 115. Creating a Valve Element

7. Add from the Library of Standard Symbols the **OperatorMessage** Icon and place it in the lower left corner of the Valve Element. You need to set the **Stretch** Property to **True**.
8. Select the **Valve Element**. Via the Properties window, **connect** the **AnswerOpenedRef** property to the process signal corresponding to whether the valve is opened or not.

Connect the **AnswerClosedRef** property to the process signal corresponding to whether the valve is closed or not. If desired, you need only connect one of the process signals.

Use the Direction property to set the direction of the valve (horizontal or vertical). See [Figure 116](#).

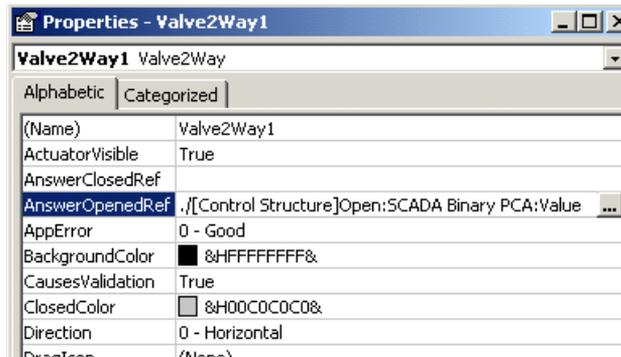


Figure 116. Answer Open connected

9. Select the **AlarmState** element. Via the Properties window, **connect** the **AlarmStateRef** property to the valve object type property **AlarmState** of AlarmStatus type.
10. Select the **WarningLevel** element. Via the Properties window, connect the **WarningLevelRef** property to the valve object type property **WarningLevel**.

11. Select the **ManIndication** element. Connect the **AnswerManRef** property.
  - Use the Inverted property if you need to invert the indication. See [Figure 117](#).

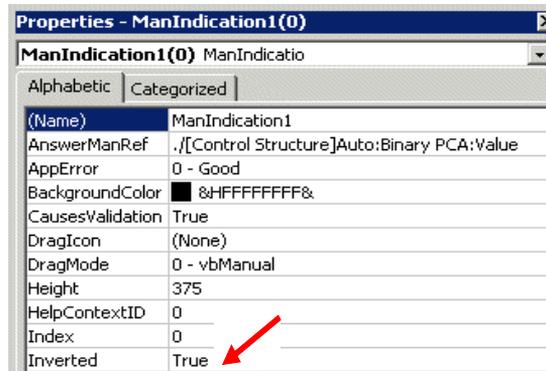


Figure 117. Inverted connection

12. Select the **OperatorMessage** icon and use **Expression Builder** to connect the **Visible** property to the variable **Operator Note:HoldsData**. See [Figure 118](#).

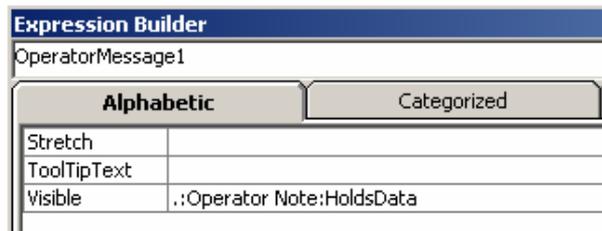


Figure 118. Connection of the property Visible

13. Click in an empty space in the design window to **deselect** any graphic element. The design window itself is to be selected. In the Properties window, set the **BackStyle** property to **Transparent**. Set the **Windowless** property to **True**.
14. **Resize** the design window to cover only the created graphic element.
15. **Deploy** the aspect.

## Creating a Pump Element

1. In Plant Explorer, select the **Object Type Structure**, and then the **Pump object type**. See [Figure 119](#).
2. Create an **AlarmStatus** aspect for the object type. The AlarmStatus aspect is required for alarm information to be propagated to the object type. **Don not** rename this aspect!
3. Create a **Graphic Element** aspect for the object type.
4. Select the created Graphic Element aspect and click **Edit**. The Graphics Builder is started. **Add** the graphic library **PLC Subelements** to the toolbox.
5. Select the PLC Subelements tab, and then create a **PumpSimple** element. See [Figure 119](#).
6. Create an **AlarmState**, **WarningLevel** and a **ManIndication** element by **double-clicking** and place them next to the valve element.  
If the Property for the **AppError** is set to **Bad**, it is easier to place the Indicators in suitable positions.  
Don not forget to set back the **AppError** too Good before you Deploy the Graphical Element.

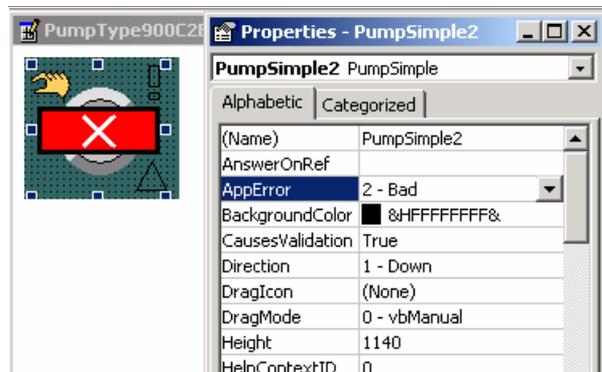


Figure 119. Creating a Pump Element

7. Select the pump element. Via the Properties window, connect the **AnswerOnRef** property to the process signal corresponding to whether the pump is on or not. Use the **Direction property** to set the direction of the valve (up, down, left or right).
8. Select the **AlarmState** element. Via the Properties window, connect the **AlarmStateRef** property to the pump object type property **AlarmState** of AlarmStatus type.
9. Select the **WarningLevel** element. Via the Properties window, connect the **WarningLevelRef** property to the pump object type property **WarningLevel**.
10. Select the **ManIndication** element. Connect the **AnswerManRef** property. Use the Inverted property if you need to invert the indication. See [Figure 120](#).

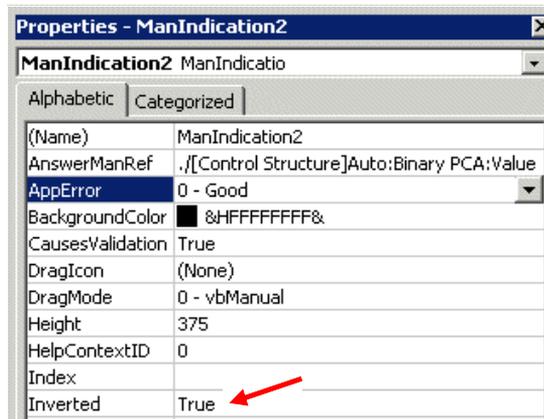


Figure 120. Inverted connection

11. Click in an empty space in the design window to **deselect** any graphic element. The design window itself is to be selected. In the Properties window, set the **BackStyle** property to **Transparent**. Set the **Windowless** property to **True**.
12. **Resize** the design window to cover only the created graphic element.
13. **Deploy** the aspect.

## Creating a 3-Way Valve Element

1. In Plant Explorer, select the **Object Type Structure**, and then the **ThreewaysValve** Object Type.
2. **Create** an **AlarmStatus** aspect for the object type. The AlarmStatus aspect is required for alarm information to be propagated to the object type. **Do not** rename this aspect!
3. Create a **Graphic Element** aspect for the object type.
4. Select the created Graphic Element aspect and click **Edit**. The Graphics Builder is started.
5. Add the graphic library **PLC Subelements** to the toolbox. Select the PLC Subelements tab, and then create a **Valve3Way** element. See [Figure 122](#).

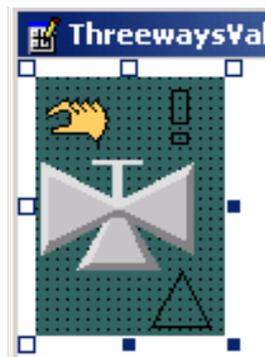


Figure 121. Creating a Valve3Way Element

Valve3Way is a process object icon used to represent a 3-way valve. The icon can indicate whether the valve is open or closed, and also in what way it is opened. See [Figure 122](#).

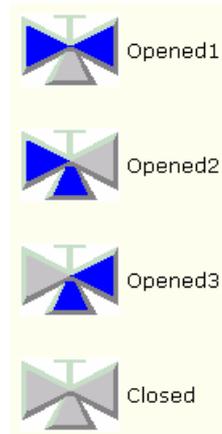


Figure 122. Icon indications for Valve3Way

6. Create an **AlarmState**, **WarningLevel** and a **ManIndication** element by **double-clicking** and place them next to the valve element. If the Property for the **AppError** is set to **Bad**, it is easier to place the Indicators in suitable positions. **Don not forget** to set back the **AppError** too Good before you Deploy the Graphical Element.
7. Select the **Valve3Way Element**. Via the Properties window, and connect the **AnswerOpened1Ref** property to the process signal corresponding to the signal indicating that the valve is open. See [Figure 123](#).

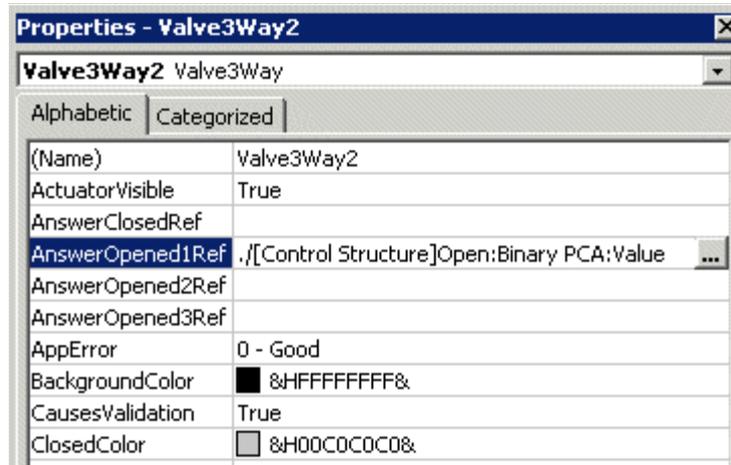


Figure 123. Creating a Valve3Way Element

8. To be able to display the “Drained Valve from Left Inlet,” the property **AnswerOpened2Ref** has to be connected to the inverted signal of Open. This is done in the Expression Builder by writing **NOT** in front of the expression. See Figure 124. Because the PLC Graphical Object is connected through the Expression Builder instead of the normal Property window, the **OpcStatus** **must also** be connected in the Expression Builder. This is done by connecting the **QualityCode** to the OpcStatus Property. (See Chapter 17.5.1.1)

Expression Builder	
Valve3Way2	
Alphabetic	Categorized
Assigned	Edit variables
ActuatorVisible	
AnswerClosedRef	
AnswerOpened1Ref	
AnswerOpened2Ref	NOT ./[Direct][Control Structure]Open:Binary PCA:Value
AnswerOpened3Ref	
AppError	
BackgroundColor	
ClosedColor	
Direction	
OpcStatus	./[Direct][Control Structure]Open:Binary PCA:Value.QualityCode
OpenedColor	

Figure 124. Connections in Expression Builder

9. Select the **AlarmState** element. Via the Properties window, connect the **AlarmStateRef** property to the ThreewaysValve Object Type property **AlarmState** of AlarmStatus type.
10. Select the **WarningLevel** element. Via the Properties window, connect the **WarningLevelRef** property to the ThreewaysValve Object Type property **WarningLevel**.
11. Select the **ManIndication** element. **Connect** the **AnswerManRef** property. Use the Inverted property if you need to invert the indication. See [Figure 125](#).

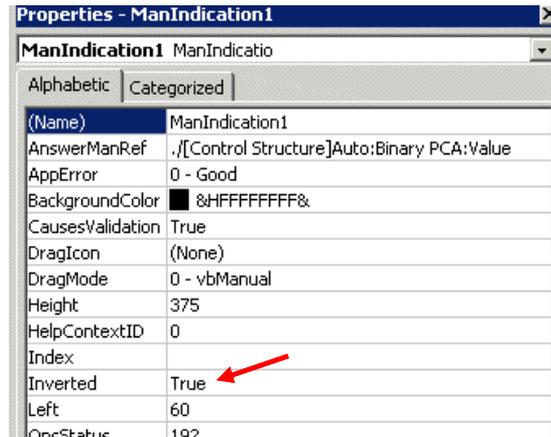


Figure 125. Inverted connection

12. Click in an empty space in the design window to deselect any graphic element. The design window itself is to be selected. In the Properties window, set the **BackStyle** property to **Transparent**. Set the **Windowless** property to **True**.
13. **Resize** the design window to cover only the created graphic element.
14. **Deploy** the aspect.

## Inserting PLC Connect Graphic Elements in Graphic Displays

1. Open a Graphic Display Aspect in Graphic Builder, e.g. Delivery Overview.
2. Find the Element Browser window and click Browse. See [Figure 126](#).
3. Select **Control Structure** and select your PLC Connect Process Object and click OK. See [Figure 126](#).
4. Select then your Graphic Element Aspect in the right pane and press **Add Element**. See [Figure 126](#).

5. The graphic element is now placed in your overview picture. It holds a reference to the Process Object. You can resize it, move it and set its properties. The Graphical Element should normally be click-able.
6. **Deploy.**

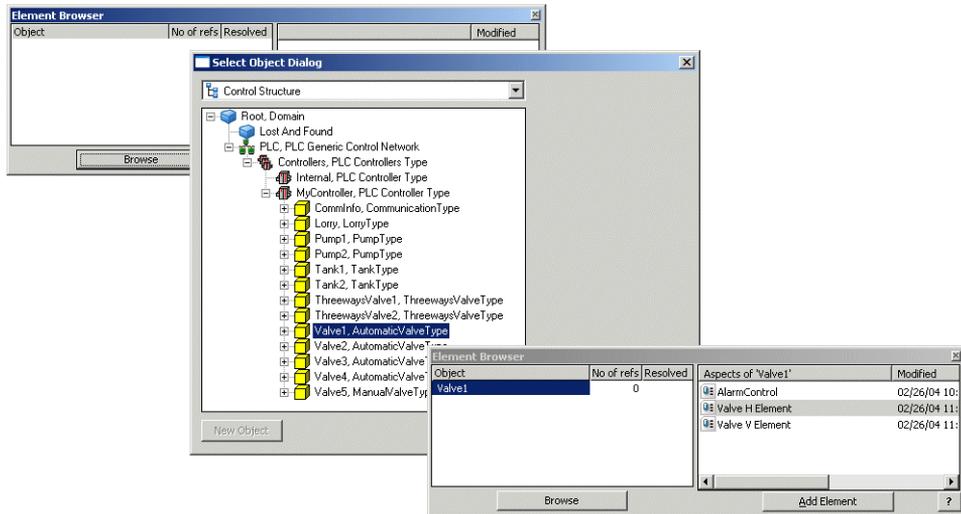


Figure 126. Inserting PLC Connect Element in Graphic Display

## Library of PLC Process Icons

The library of **PLC Process Icons** contains complete PLC Connect Object controls with full functionality. See [Figure 127](#).

They have extended functionality and better performance, but the graphical layout is more simplified compared to the controls in the library of PLC Subelements.



Figure 127. PLC Process Icons

**OPC Status** indication has to be manually implemented by use of **PgErrorIndicator** from the library of Graphic Primitives.

All Connection must be done in Expression Builder.

The StatusBox (see [Figure 127](#) and [Figure 128](#)) is used to visualize Alarm condition, Manual mode and Forced state. The fourth indicator can be used to indicate Local mode or any other information e.g. if Operator Notes holds data.



Figure 128. StatusBox

An example of how to use Process Icons from this library and how to connect the StatusBox is shown below.

More information is available in the manual: PLC Connect Documentation, Configuration Manual, Section 4.

## Three controls are used

In this example the following controls are used:

- ValveSimple.
- StatusBox.
- PgErrorIndicator.

See Figure 129.



Figure 129. Three controls are used

### ValveSimple

ValveSimple has two properties of interest, the **ValveActuator** and the **ValveIcon**. See Figure 130.

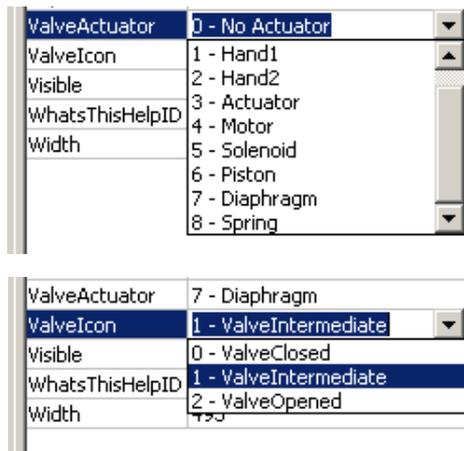


Figure 130. Two properties

The connection of the ValveIcon property is shown below in [Figure 131](#).

Expression Builder	
ValveSimple1	
Alphabetic	Categorized
ToolTipText	
ValveActuator	
ValveIcon	iif(./[Direct]][Control Structure]Open:Binary PCA:Value, 2, 0)
Visible	

*Figure 131. Connection of ValveIcon*

### **PgErrorIndicator**

The connection of the QualityCod for the PgErrorIndicator is shown in [Figure 132](#).

Expression Builder	
PgErrorIndic1	
Alphabetic	Categorized
AppError	
OpcStatus	./[Direct]][Control Structure]Open:Binary PCA:Value.QualityCode
ToolTipText	

*Figure 132. Connection of OpcStatus*

### **StatusBox**

The connection of the StatusBox is shown in [Figure 133](#).

Expression Builder	
StatusBox1	
Alphabetic	Categorized
EnableInput	
IndicationAlarm	iif(.:AlarmStatus:AlarmState >0, True, False)
IndicationAlarmColor	iif(.:AlarmStatus:AlarmState >=8, unackHighAlarm, highAlarmSymbol)
IndicationForced	./[Direct][Control Structure]Open:Binary PCA:IsForced
IndicationForcedColor	
IndicationLocal	.:Operator Note:HoldsData
IndicationLocalColor	
IndicationManual	NOT ./[Direct][Control Structure]Auto:Binary PCA:Value
IndicationManualColor	

Figure 133. Connection of StatusBox

The StatusBox can monitor the value of the **AlarmState** that is generated by the AlarmStatus Aspect.

- 0 = AlarmInactive
- 1 = AlarmDisabled
- 2 = AlarmActiveAck
- 4 = AlarmInactiveUnAck
- 8 = AlarmActiveUnAck
- 16 = AlarmAutoDisabled
- 32 = AlarmNotDefined

As an alternative, it is possible to configure the StatusBox to monitor the value of the **WarningLevel**.

- 0 = WarningComServerError
- 1 = WarningComPLCError
- 2 = WarningUncertain
- 3 = WarningControlDisabled
- 4 = WarningForced
- 5 = WarningNull
- 6 = WarningNotDefined

## Linking Properties to Graphic Elements

Sometime you need a property located on e.g. an ObjectIcon to be linked to the surrounding Graphic Element. This makes the property changeable when the Process Objects are instantiated.

In this example we want to link the property for the **HighLimit** of the PLC Connect Tank Object to the surrounding Graphic Element. See [Figure 134](#).

This Property is a **Double** (real), representing the max volume of the tank.

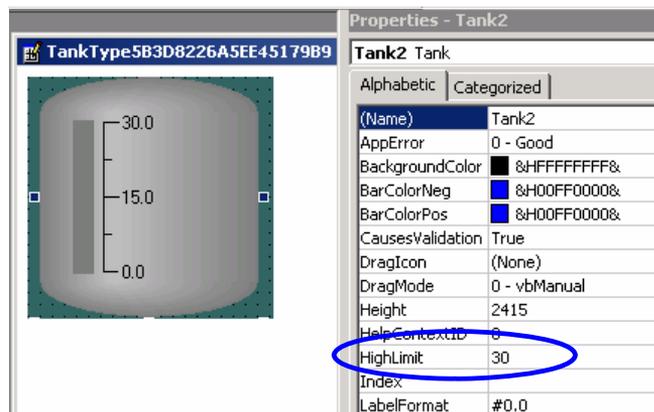


Figure 134. Property for HighLimit

## Using Expression Builder to link a Property

Linking Properties is done with the Expression Builder.

The Expression Builder opens up from the Toolbar. Adjust the window size of the Expression Builder, especially the height.

To link the property for the **HighLimit**, proceed as follow:

1. Select the tab for **Input Properties**. See [Figure 135](#).
2. Click the **Add** Button. See [Figure 135](#).
3. Enter a **Name** for the Input Property and select the Data Type, in this case a **Double**. See [Figure 135](#).

**Note!** You can not remove or change the Name or the Data Type after clicking on the Add Button in the next step. Select a Category (Appearance), enter a default value and a description and check Dynamic update.

- Click **Add** Button. See [Figure 135](#).

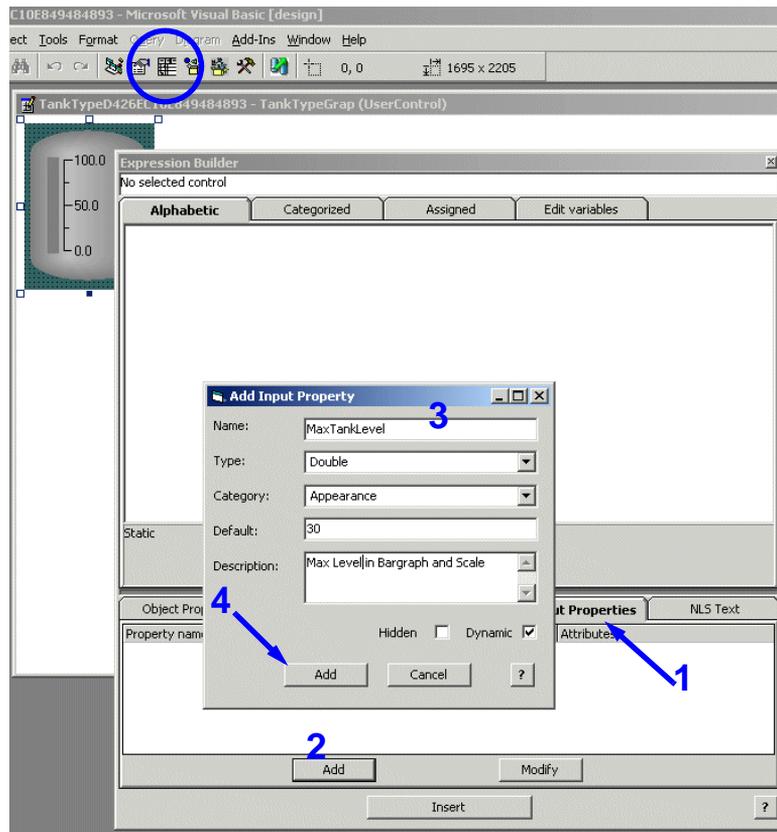


Figure 135. Define Input Property

- Select the **TankObject** and its properties will be displayed in the upper part of the Expression Builder.
- Click in the area for **HighLimit**. See [Figure 136](#).

7. Select the **Input Property**, in this case named MaxTankLevel. (Must be selected even if it is highlighted). See Figure 136.
8. Click **Insert** Button and the linked Input Property will appear in the area for the selected property. (Don't write the name manually). See Figure 136.
9. Click **Deploy** and the necessary code will automatically be generated. (The generated code is normally invisible).

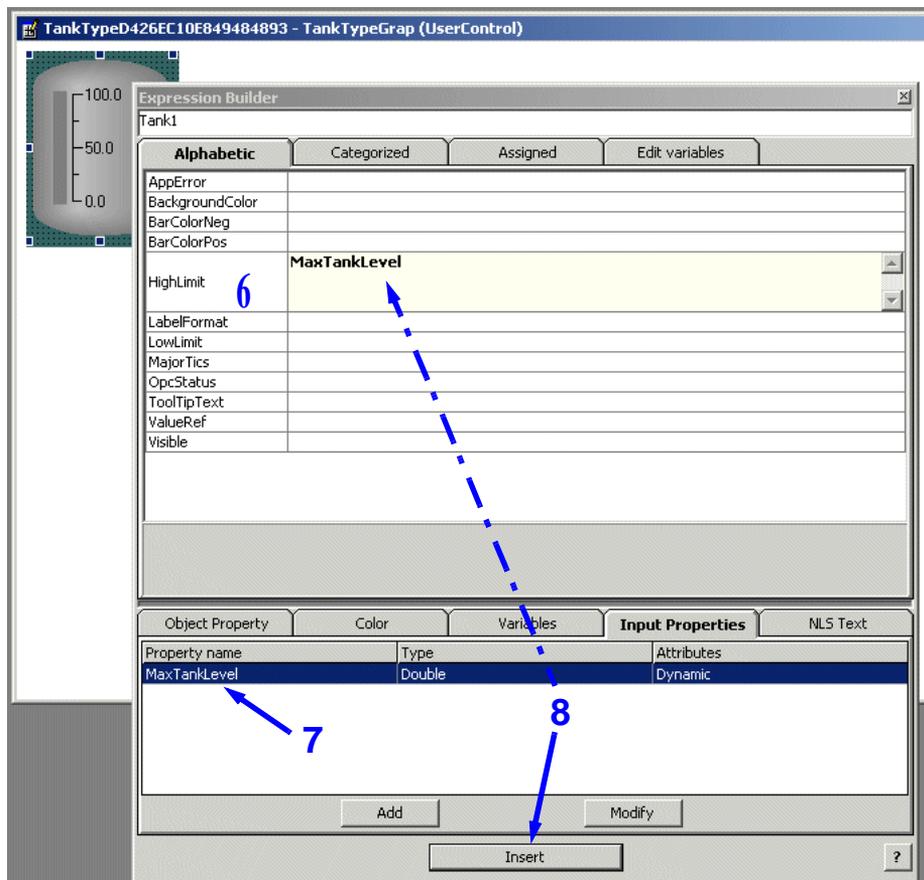


Figure 136. Linking Property

## Using the Linked Input Property

When inserting the Graphic Element in a Picture Display, the linked Property is now available and the MaxTankLevel Value is editable. See [Figure 137](#).

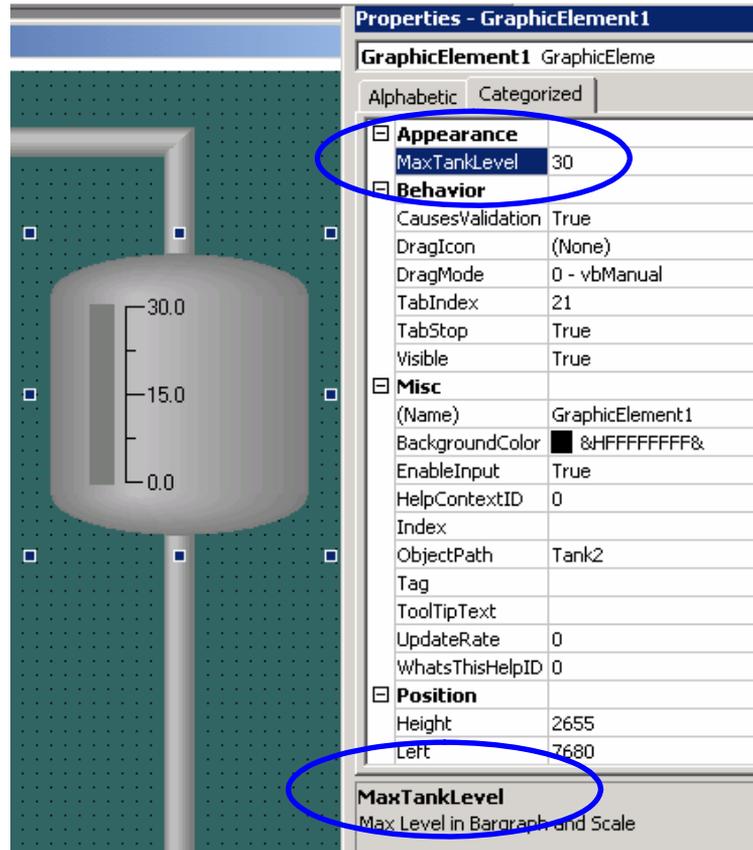


Figure 137. Setting the High Limit Value

## Creating New Graphical Libraries

The major steps when you need to create your own Graphical Library is described below:

1. In **Graphics Structure**, create new object as **Graphic Subelements** Object Type.
2. Copy from other libraries or create from scratch the **Subelements** you need.
3. If needed, add **ToolBoxBitmap** while editing the Subelements (w = 16, h = 15 pixels).
4. To implement the new library into the Tool Box of the Graphics Builder, a registry key has to be deleted.  
Start **RegEdt32**.  
**Locate** HKEY\_CURRENT\_USER > Software\Microsoft\VisualBasic\6.0  
**Delete** the Tool entry.



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