Ethernet in Machines and Installations

System approach

FactoryCast HMI active Web services

FactoryCast HMI active Web services

The FactoryCast HMI Web services are integrated in PLC Web servers modules on Premium and Quantum PLC platforms.

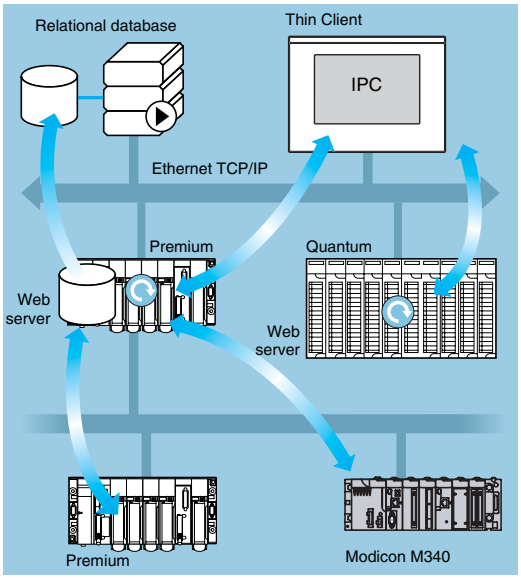
These modules have the following Ethernet and Web services:
- Ethernet TCP/IP communication functions:
  - TCP/IP messaging service with Modbus TCP/IP and Uni-TE TCP/IP protocols
  - SNMP agent for standardized network management, which supports standard MIB II and private Transparent Ready MIB.
- FactoryCast configurable Web services:
  - "Rack Viewer" PLC diagnostics functions, see page 43622/3
  - “Data Editor” for PLC data monitoring, see page 43622/3
  - “Alarm Viewer” for PLC alarm display, see page 43623/2
  - “Graphic Data Editor” for online graphical PLC data monitoring, see page 43623/2
  - Hosting and displaying user defined Web pages, see page 43623/3.

FactoryCast HMI modules also provide the following specialized HMI Web services:
- Dedicated Real-time Database managed in the module, combining PLC data acquisition and management of local internal variables
- Data processing.function with arithmetic and logical calculations
- Database logging function with direct connection to the SQL Server, MySQL and Oracle relational databases for data archiving or tracking
- E-mail notification for alarms and reports
- SOAP/XML client/server interface, see page 48373/5
- Recipe management
- Web based HMI interface with actives Web pages support.

By simply setting parameters, the FactoryCast HMI application development software can be used to set up these functions in an intuitive and user-friendly way. A simulation mode, which is integrated in the software, can be used to test the operation of the FactoryCast HMI application without the need for a physical connection to a module and a PLC, thereby simplifying application debugging.

Architectures

FactoryCast HMI Web servers can be integrated in various architectures:
- Installations that require a flexible and distributed HMI solution
- Combined architectures supplementing conventional SCADA systems
- Architectures where a direct link is required between automation systems and information management levels (IT link).



Flexible and distributed Web based HMI solution

The use of Web-based technologies means that FactoryCast HMI can replace conventional HMI or SCADA solutions in applications where architectures require a flexible multistation HMI, thus providing a temporary "nomadic" remote control function.

These architectures consist of:
- Several PLCs networked on Ethernet, eqyuipped with FactoryCast HMI Web server modules ....
- One or more PC terminals simply equipped with a Web browser thus providing a “Thin Client” interface (license free)
- If necessary, a relational database in which FactoryCast HMI can archive data directly from the automation system.

FactoryCast HMI modules read PLC data and execute HMI services (E-mail, interpreted calculations, connection to relational databases, updating Web pages) at source in the PLC, without affecting the PLC program or the scan time.

This solution provides:
- A reliable HMI application, which is executed at source in a robust PLC device.
- An integrated multistation interface and remote access that is easy and cost-effective to set up ("Thin Client" terminal)
- An HMI application that is easy to maintain (the application is housed in a single location on the server side)
- Preventive maintenance via E-mail
- Greater availability of the data archiving done directly from PLC source.

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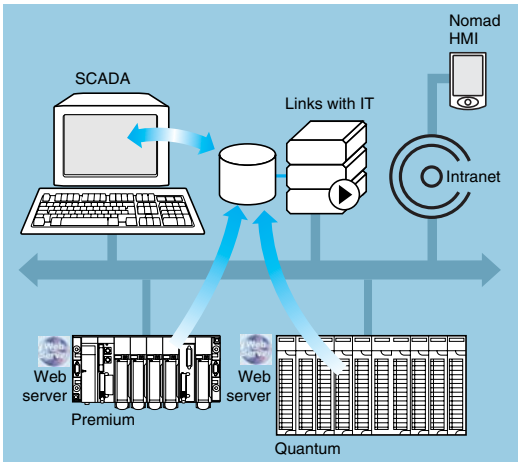
FactoryCast HMI active Web services

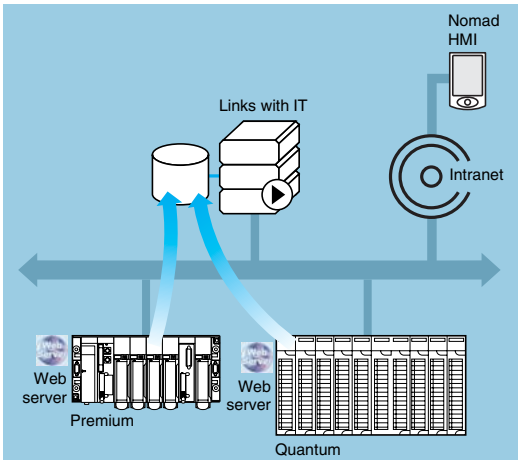


Architectures (continued)

Combined architectures

In this type of architecture, FactoryCast HMI supplements conventional SCADA systems such as Vijeo Look or Monitor Pro .SCADA meets the requirement for centralizing information for global supervision from a central site.

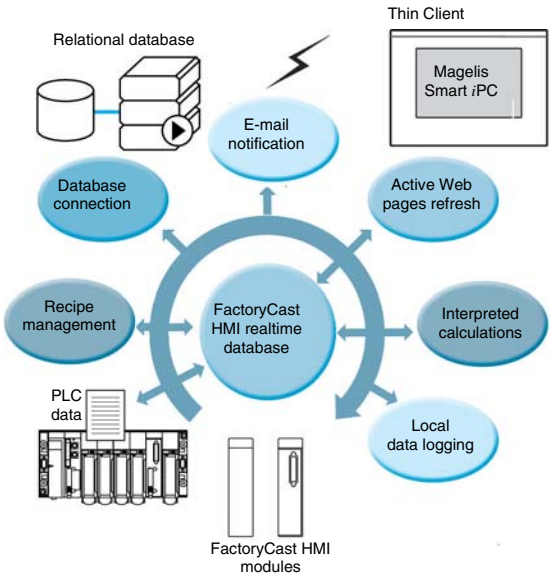
Combining a FactoryCast HMI solution and a conventional SCADA solution enables:
- Simplification of the SCADA application by locating some of the SCADA processing function at source, at PLC level
- Increased availability of the traceability function due to the direct connection between FactoryCast HMI modules and relational databases
- Powerful “ready to use” remote diagnostics capacities
- “Nomadic” client stations to be connected to the Intranet or Internet via “Thin Client” PC or PDA devices.



Direct links with the information management levels

In this type of architecture FactoryCast HMI eliminates the need for intermediate devices (software or hardware gateways), which are expensive to install and maintain, by establishing a direct links between the automation levels and the global information management levels (MES, ERP, etc).
The PLC manages the following links which allow a "collaborative" automation system to be set up, making it: easier to share data in real time:
- Directly archives information from the automation system in relational databases, which allows a “collaborative” automation system to be set up, making it easier to share data in real-time
- Directly interacts with IT applications through SOAP/XML client/server interface.

This solution results in:
- Simplified architectures
- Lower installation, development and maintenance costs
- Increased reliability of information (the data is collected at source)
- Increased interoperability with IT applcations
- Greater availability of data archiving.



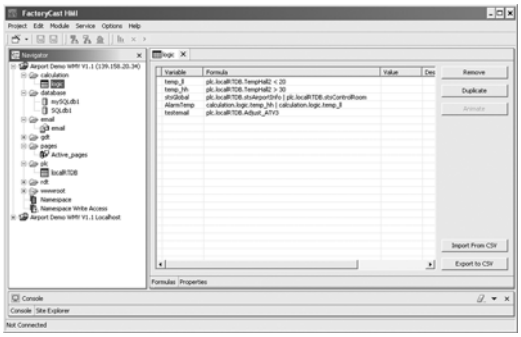
Specialized HMI services

PLC data acquisition and real_time database

With an internal architecture similar to that of an HMI/SCADA system, FactoryCast HMI modules manage its own variable database in real-time, independently of the PLC program. It is this variable database that is used to execute various functions, including internal processing, archiving, alarm, E-mail, etc.
Variables in this real-time database are updated using the automation system PLC data acquisition service.
This service becomes operational once the following parameters have been set in the FactoryCast HMI software:
- Direct import of PLC variable/symbol databases (no double entry).
- Definition of the frequency of acquisition (period at which the variables are updated).

Note: *A FactoryCast HMI application running in a Premium configured FactoryCast HMI module can access also the remote PLC variables in the architecture transparently on the network (X-Way/Uni-TE transparent protocols).*

Characteristics:
- Maximum number of I/O variables per application: 1000 variables from PLCs
- Maximum number of internal variables per application: 100
- Acquisition frequency: 500 ms, minimum.

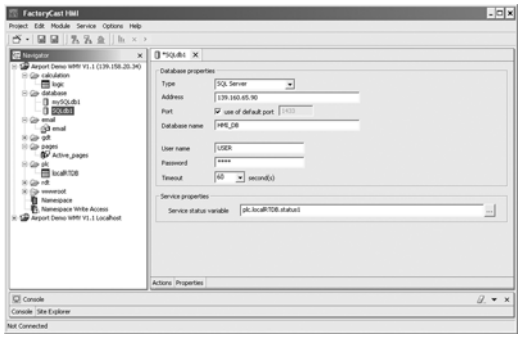


Specialized HMI services (continued)

Calculation functions

The FactoryCast HMI server can carry out various arithmetic and logical operations on a combination of variables from the HMI database. These calculations include, for example, scaling, formatting, logic processing for event triggering, etc.

This calculation function can be used for local data processing independently of the PLC CPU processor and is provided in the form of spreadsheets where the formulae are defined in cells. The spreadsheets are interpreted and processed by the server. The result of each formula is associated with a new internal variable. The processing of each spreadsheet is initiated by a trigger.



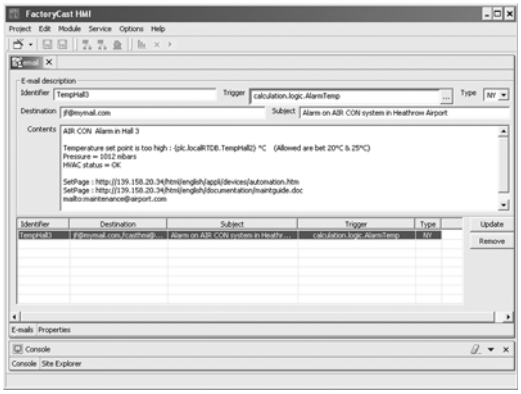
Connection to relational databases

The FactoryCast HMI module can be connected directly and completely autonomously to the following remote relational databases:
- SQL Server
- MySQL
- Oracle

This connection enables all internal or process data to be archived directly form the FactoryCast HMI module without any intermediary system (hardware of software).

The data can be archived (written) periodically and/or on a specific event. These variables can either be from PLCs (I/O bits, internal bits, internal words and registers) or local to the module. The FactoryCast HMI "Roll Over" function checks the size of tables by managing the maximum number of records. This circular data archiving function automatically deletes the oldest data and can be accessed by simply setting parameters in the FactoryCast HMI software.

Characteristics:
- Number of databases that can be connected: 3
- Number of tables that can be written per database: 10, maximum
- Number of columns per table: 50, maximum
- Type of database supported: Oracle, SQL Server and MySQL
- Automatic table creation: The FactoryCast HMI server automatically creates a table in the database if one does not already exist



E-mail notification

The FactoryCast HMI module can, on a specific event, send E-mail completely autonomously to a predefined list of E-mail addresses. This function is executed independently of the PLC program.

The event that triggers the E-mail may be associated with the following:
- A PLC variable (I/O, internal variable)
- An alarm, a threshold overshoot
- A machine or process state
- An operator action, etc.

When an E-mail is sent, it is relayed through an SMTP *(Simple Mail Transfer Protocol)* server to a destination E-mail address. The E-mail service is compatible with all SMTP servers. A return address can be defined should delivery to the destination address fail.

This E-mail notification is very efficient for advanced remote diagnostic, maintenance, data alarming and reporting. The text of the E-mail can contains information such as real-time process values integrated in the message of the mail useful for reporting additional live information to the end user and also hyperlinks to other Web pages or documents (maintenance guide, schematics, etc) in the module or to other Web sites to serve as a guide to the end user.

Characteristics:
- Configuration of the SMTP server: Compatible with all SMTP servers
- Maximum number of E-mail: 100
- Contents of E-mail messages: Free text with embedded dynamic values and hyperlinks (unlimited).

Specialized HMI services (continued)

Local data logging

FactoryCast HMI modules can process data into a file internally in its flash memory. This file can be either:
- exported via FTP
- attached to an E-Mail.

This feature is particularly useful for stand alone installations or substations which are not connected to an intranet or for data storage backup.

SOAP/XML client/server interface

For total interoperability purpose, FactoryCast HMI implements SOAP/XML Web service as a:
- Server function so that it can answer to SOAP requests generated by any client application (MES, ERP, SAP, SCADA or third party application running on ●NET or Java environment)
- Client function so that it can take the initiative to send SOAP requests to a SOAP server application (another FactoryCast module or an ERP, MES, IT program to exchange data.

See page 48373/5.

Recipe management

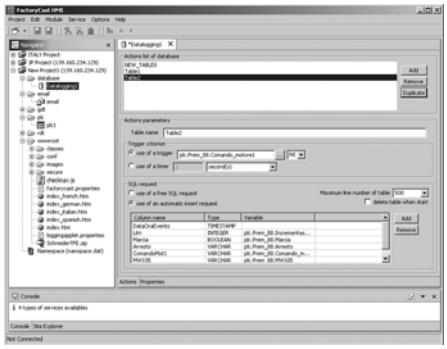
The recipe function allows FactoryCast HMI application to read “Recipe” files automatically on process event or operator command and apply the recipe values by writing them in a sigle shot to the PLC memory.

This function brings great flexibility in operations providing capability to simply execute production changes by modifying manufacturing or process set points and parameters.

Characteristics:
- “Recipe” files are described in XML format (SOAP/XML format)
- “Recipe” files can be stored locally in the module or on a remote system
- “Recipe” files contain a consistent set of values conforming a recipe template, values which are written in the PLC memory.

Web based HMI interface

The memory of FactoryCast HMI Web server is open to hosting user defined Web pages in order to provide a graphical HMI interface.
Its Active Web server provides a dynamic refresh of the Web pages generated by the server itself.
FactoryCast HMI supports two types of Web pages:
- HTML pages animated in real-time with graphical Java objects which are useful for creating graphical human machine interface (FactoryCast HMI comes with a complete graphic objects Java library).
- Active Web pages dynamically generated by the server itself with integration of PLC variables values inside the HTML code (PLC “tags”) which can be used for reporting purpose. These active pages consisting in pure HTML code are fully compatible either with “thin client” terminal devices such as Pocket PC, PDA, or with any standard PC.



FactoryCast HMI application development software

FactoryCast HMI application development software, referenced TLX CD FCHMI V1M, provides multiproject management and complete control of FactoryCast HMI applications, during both the development and the debugging phases, thanks to the online mode and simulation mode (operational when the system is offline).

This software enables the intuitive and user-friendly setup of HMI functions by simply setting parameters using a tree structure of the application and can be used for complete management of the Web site:
- Setting parameters for HMI functions.
- Management of the Web site.
- Simulation mode.

See page 48297/5 for consult product data sheet.