azbil

Specification

Rel. 330

PROCESS DATABASE PREXION

Relational Production Information Control System

PREXION™ with Smart Client MIB

1. Introduction

PREXION automatically collects process and production data from various plant monitoring and control systems, provides long-term data storage as history data, and creates an open production information control environment. The data collected and stored by PREXION can thus be easily networked and used on departmental PCs throughout the facility. PREXION provides the following variety of data handling functions to ensure data collection in a manner appropriate for the target process.

Continuous history

The continuous history function collects data at predefined intervals.

Event history

- **User-defined events**

  Interrupt processing is used to collect data such as lot and batch results for user-defined events.

- **Standard events**

  Data is collected from process alarms, operator operations, and messages from Azbil Corporation's control systems*.

*: Advanced-PS™, Harmonas-DEO™

Lot history management (option)

The lot history management function takes the raw data for each user-defined event (normally each manufacturing process) collected by the User-Defined Event function and compiles it into a single lot result. It is possible to list the actual collected data for the lot and also to create a ledger of the actual results for each lot, either automatically or manually.

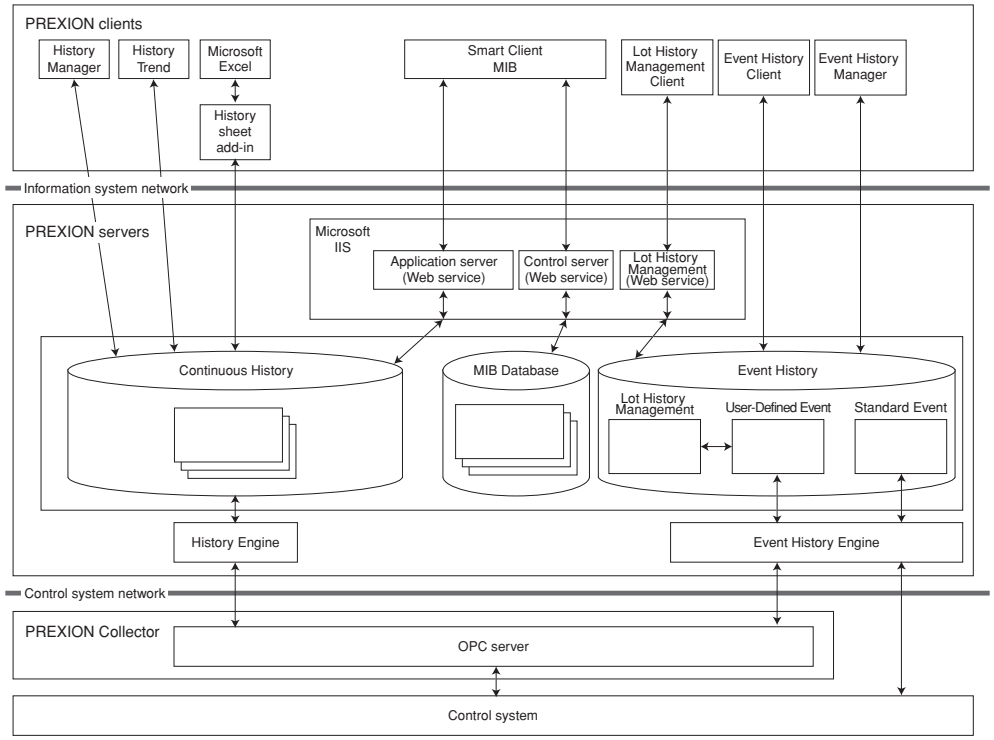
Broadly speaking, PREXION consists of the three components shown in the functional configuration diagram in Figure 1.

- PREXION collector (Data collection)
- PREXION servers (Data management)
- PREXION clients (Data utilization)

The PREXION collector (hereinafter Collector) functions as the interface with various monitoring and control systems, and collects process data from those systems.

PREXION servers attach a time stamp to process data collected by the Collector and store the data as history data. PREXION servers then retrieve the data in response to requests by PREXION clients.

PREXION clients provide the middleware used to access data stored on the PREXION servers and the application software that uses the PREXION data. The application software includes History Trend, Event History Client, Lot History Management Client, and Smart Client MIB. Clients allow users of PREXION to easily access their data via an intranet, public line, or dedicated line from an office or headquarters located far from the instrument room.



OPC: OLE for Process Control
IIS: Internet Information Service

Figure 1. PREXION Functional Configuration Diagram

2. Overview of Functions

2.1. PREXION Collector

The Collector gathers process and production data from the control system. It supports both periodic data collection for continuous history as well as data collection triggered by user-defined events related to lot or batch processing. The PREXION Collector is an OPC server which is compliant with OPC Data Access Specification 2.0. The following collectors are available for control systems:

- TDCS™3000 Rel. 430
- Advanced-PS (APS5000)
- Harmonas-DEO
- CENTUM XL (via ECGW3)
- CENTUM CS (via ACG)
- EX-5000 (via GWU)

It is also possible to create a collector other than those above in order to collect data from various control systems. The PREXION Collector and PREXION servers are connected by OPC. Therefore, for any control system equipped with an OPC server, PREXION's design allows a PREXION server to collect data without using our PREXION Collector. OPC servers available from other companies include the following:

- Exaopc
- OPC interface operating with HIS of CS1000/CS3000
- CIEMAC DS OPC server
- DeviceXPlorer 2007

2.2. PREXION Servers

2.2.1. Continuous History

PREXION servers attach a time stamp on data collected by the Collector and store the data as historical data in table format in a relational database. PREXION servers allow data that does not exist in the control system to be registered as calculated items.

In order to utilize data not dependent on the collection cycle for periodic data collection, data services with the following intervals and data reduction calculations are available:

- Stored (raw) value or interpolated value
- Snapshot or average value at user-specified intervals
- Maximum or minimum value at user-specified intervals
- Total value at user-specified intervals
- Differential value (optionally with roll-over compensation) at user-specified intervals

Should a higher application require real-time data, the latest data scans can be used as real-time data.

The PREXION server can classify the collected data items into directories and sub-directories such as plant/area/unit or line/process/equipment. Data management can therefore utilize a classification scheme that matches that of the actual equipment. This lets data users rapidly access the required data using an interface similar to that of Windows Explorer. In addition, a keyword search of English names (descriptors) of the data is possible.

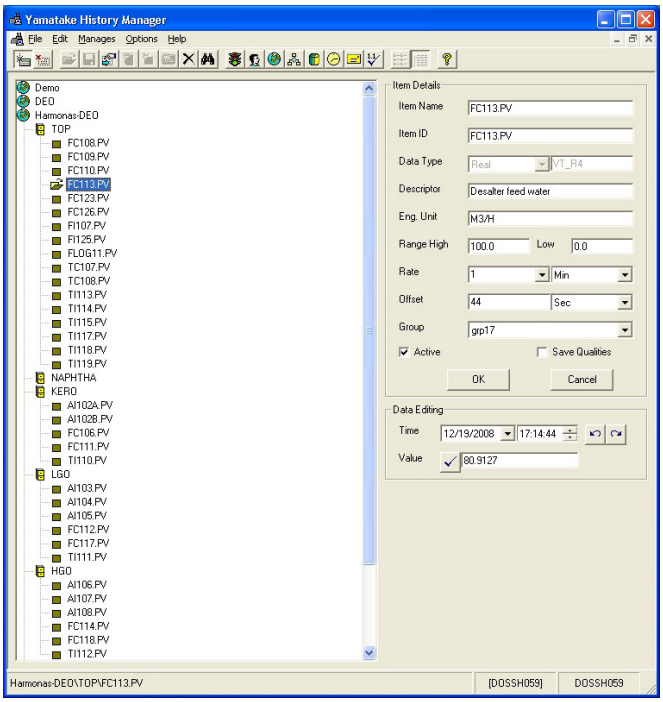


Figure 2. History Manager

Interpolated data can be added to the historical data managed by the PREXION servers, and stored data values can be corrected. If data values are corrected, a correction history record retains information about which data was changed, and when, and from what to what. Only system administrators can correct data.

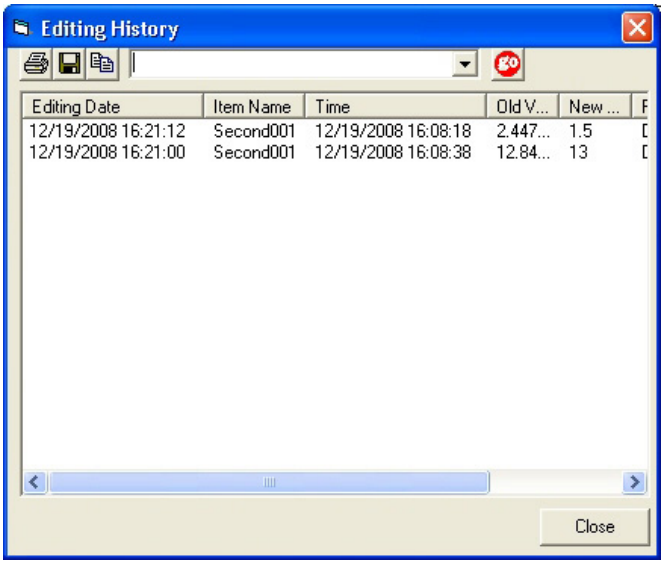


Figure 3. Data Editing History

PREXION data can be automatically archived and/or archived to external media. The time period of historical data is shown in the archive settings window, allowing the required data file to be found quickly even when it is archived on external media.

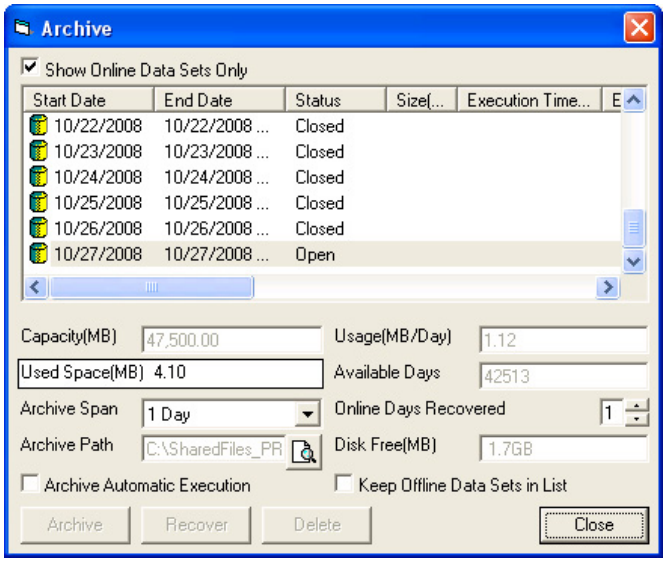


Figure 4. Archive Settings Window

When PREXION collects data from an existing control system, tags can be collected and stored in a single batch process based on text files produced by the tag database of the control system.

Column (field) names are automatically read for settings in the text file (see Figure 5), so that the column pertaining to the setting can be easily set.

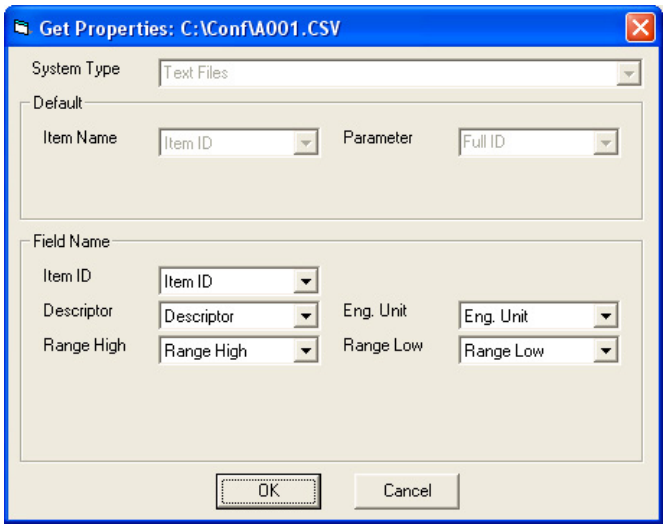


Figure 5. Item Batch Registration Window

File export of history data

PREXION servers can output the history data managed by PREXION in the following file formats:

- CSV file
- Text file

Since CSV files and text files can be output from a PREXION server or a networked machine, when the production control system requires process data, operation data can be easily supplied using the file export function.

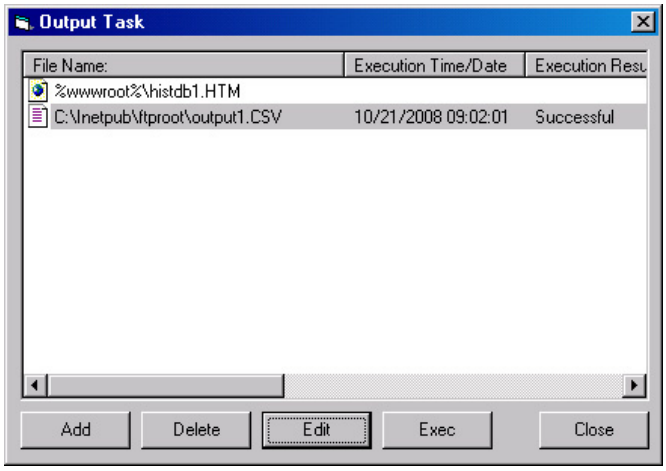


Figure 6. Output File List Window

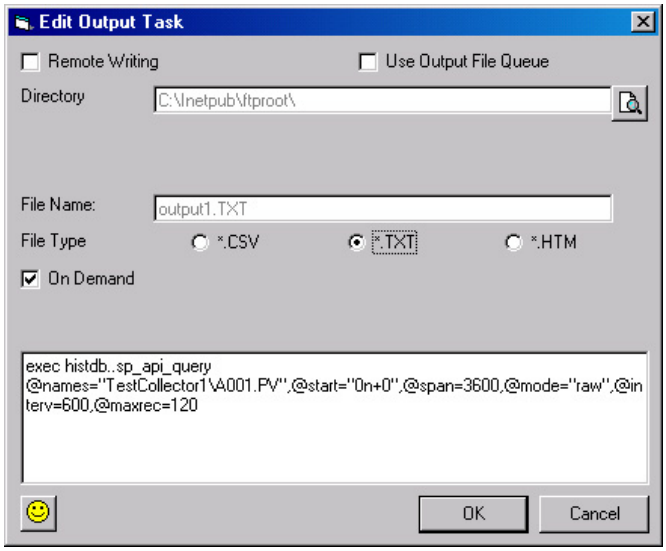


Figure 7. Edit Output Task Window

2.2.2. User-Defined Event

The User-Defined Event function works as follows. First, a control system flag is set as the event trigger. The preset data (tag) is collected only when the event trigger flag is turned ON. When it is ON, two types of collection are available: snapshot (one time) and periodic.

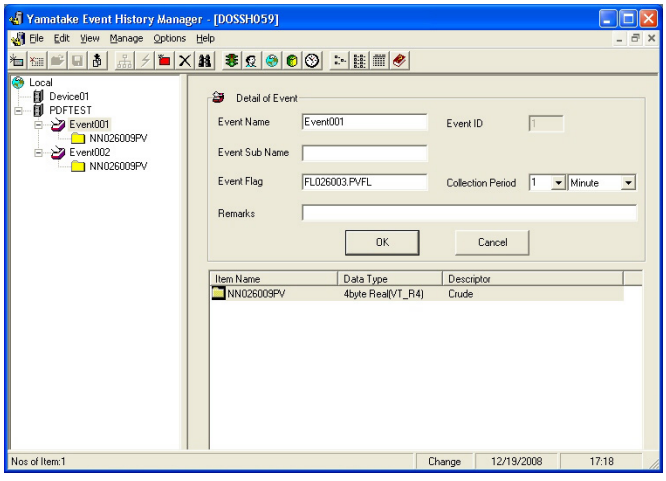


Figure 8. Event History Manager

2.2.3. Standard Events

The Standard Events function automatically collects operator operations, messages, and process alarms issued by Azbil Corporation's control systems* and places them into secure long-term storage.

*: Advanced-PS, Harmonas-DEO

2.2.4. Lot History Management

The Lot History Management function compiles the actual data for each user-defined event (normally each process) collected by the User-Defined Event function as one production result using a lot ID or batch number as a key. The function is available only for user-defined events using snapshot (one time only) collection.

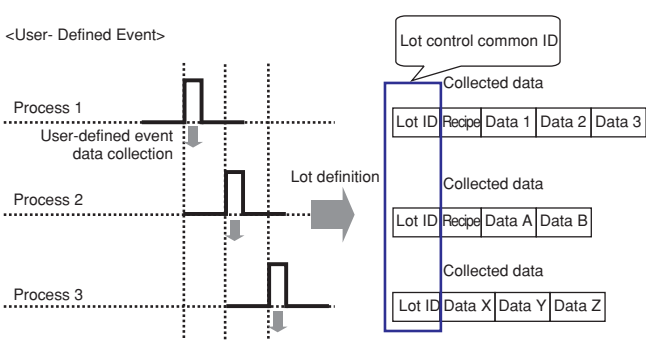


Figure 9. Lot History Collection Image

The data for each process is based on the settings for user-defined events. The contents of a lot can be defined by combining user-defined events, as shown below.

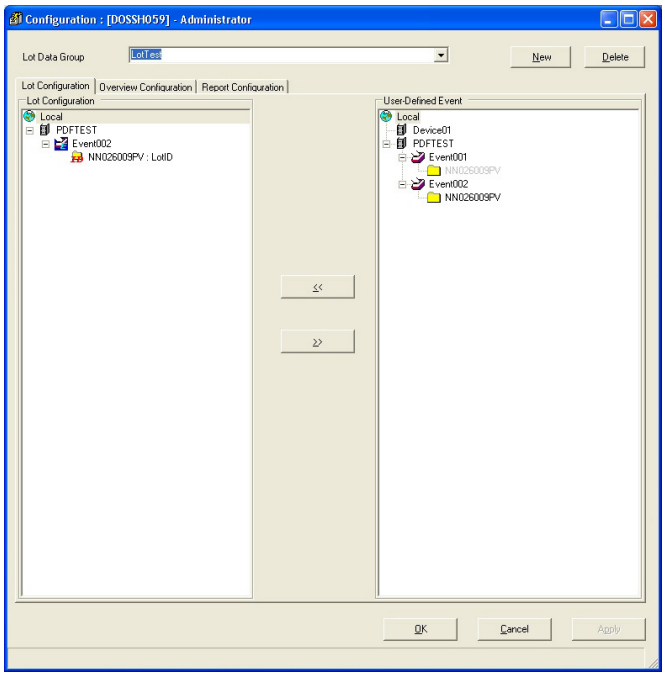


Figure 10. Lot History Management Configuration Window

2.3. PREXION Clients

PREXION clients provide the environment in which the data managed by PREXION is used.

2.3.1. Trend

• Basic functions of Trend

Trend is an application used to display history data from PREXION in the form of a graph. Many of its functions, such as scrolling through time and zooming, can be operated mainly with the mouse. Operation is designed to be intuitive. For example, moving a tag between windows when displaying multiple trend windows, as shown below, is accomplished simply by dragging the tag to the desired window. Since time can be scrolled for each tag in a displayed graph, it is easy to compare data from different times. When the current time is set as the display time, the data is automatically updated with the latest collected data. Sample functions include scrolling, hair line cursor, and zooming.

An analysis function can be invoked in Trend with a single click. Also, double-clicking the desired portion on distribution and control graphs opens the current Trend. The analysis function includes:

- Correlation and regression analysis
- Histograms
- Control charts

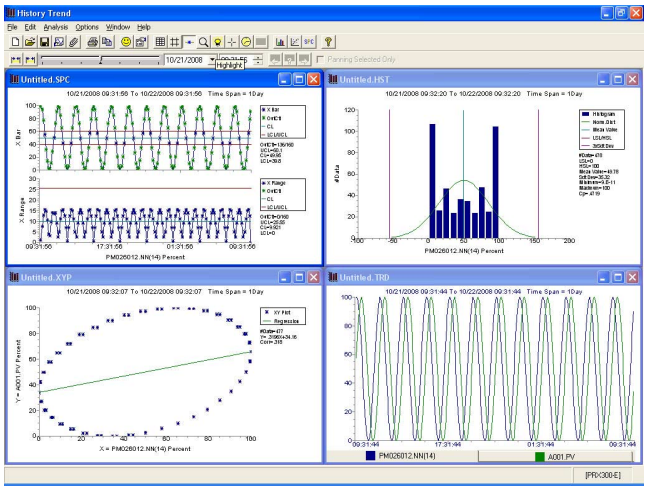


Figure 11. Analysis Functions

• Linking graphs and event data

A Trend graph can be displayed based on (user-defined) events for lot or batch processing, process alarms, messages, events on Azbil Corporation's DCS, or event data from a batch event issued by the batch suite.

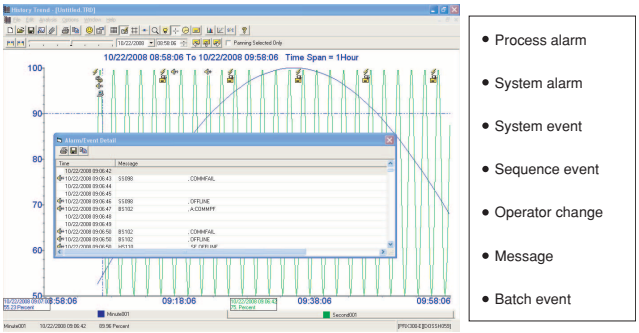


Figure 12. Linking the Trend Graph and Event Data

It is possible to check which events occurred during operation by monitoring the Trend curve. It is also possible to display the Trend graph using a process alarm, operator operation, or batch process event as a key. This supports operation analysis, problem analysis when manufacturing nonstandard products, and the like.

2.3.2. History Link (Microsoft Excel interface)

History Link allows the user to access PREXION history data from within Microsoft Excel. To obtain PREXION history data from within Excel, simply call up the history query builder from the menu. In this way, PREXION history data can be easily used in Excel. Since data can be updated automatically in Excel, a simple real-time monitoring application can also be easily executed with only a basic knowledge of Excel.

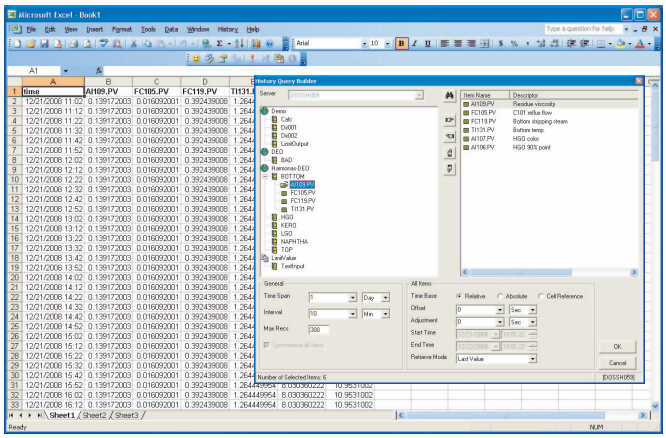
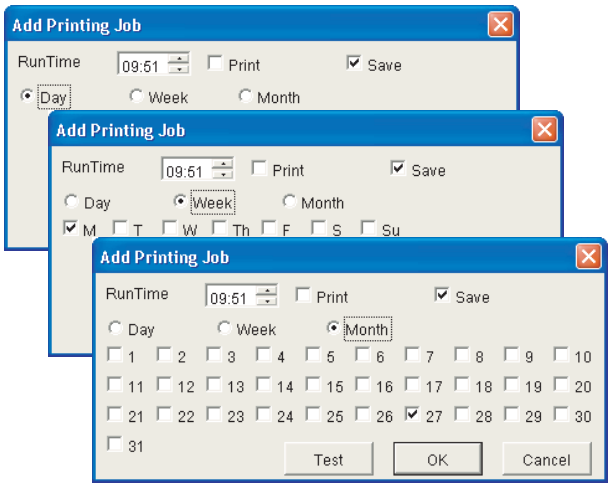


Figure 13. Obtaining Data in Microsoft Excel

2.3.3. Print Job

Print Job is the task scheduler that prints the ledgers created with Microsoft Excel and stores the ledgers in files. As shown in Figure 14, this function schedules the printing of ledgers created by Microsoft Excel as well as the saving of the ledgers as files after printing. The file names of saved files are appended with the date and time they were created.



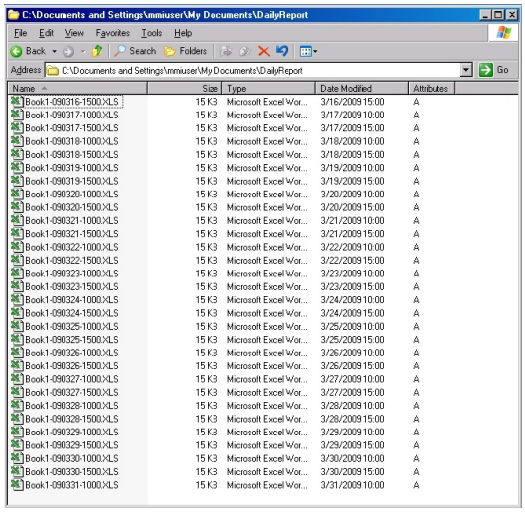


Figure 14. Ledger Output Files

2.3.4. History Query Builder

History Query Builder allows the target data to be obtained by simply specifying data characteristics such as the tag name and time.

With History Query Builder, a variety of search modes (see Fig ure 15) support various ways of using the data, such as collecting raw data or analyzing operation results that include averaged values. The query builder can be called from within Trend, Microsoft Excel, and History Page clients.

- Stored (raw) value
- Final value
- Interpolated value
- Average
- Maximum
- Standard deviation
- Minimum
- Total
- Differential value
- Integrated value
- Variation range
- Number of items

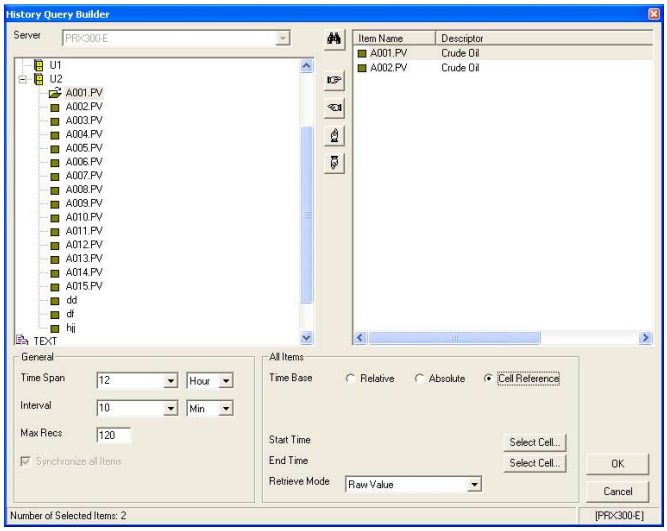


Figure 15. History Query Builder

2.3.5. Search and Report of Lot History

Data which is summarized as a lot history can be searched by setting search conditions such as lot ID, recipe, period, and history data details.
Lots that meet the search conditions are listed as shown in Figure 16. Using this list, a detailed report of a selected lot can be displayed in Microsoft Excel. Free-form reports can also be created on Microsoft Excel sheets. Moreover, graphs for required items can be displayed (from start to end).
In addition, upon completion of a lot the PC used as a client for ledgers can automatically print a report or generate Microsoft Excel files.

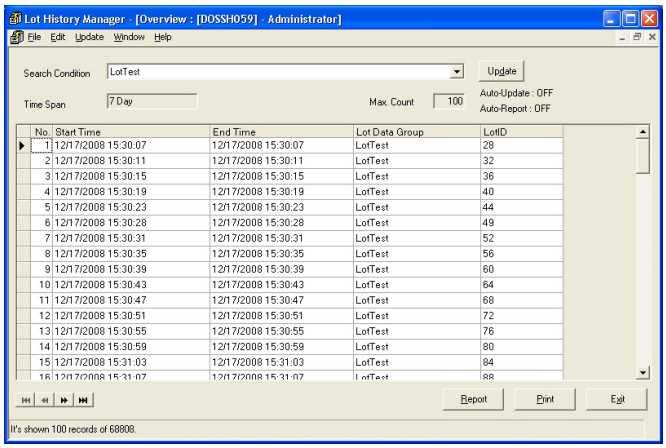


Figure 16. Lot History List

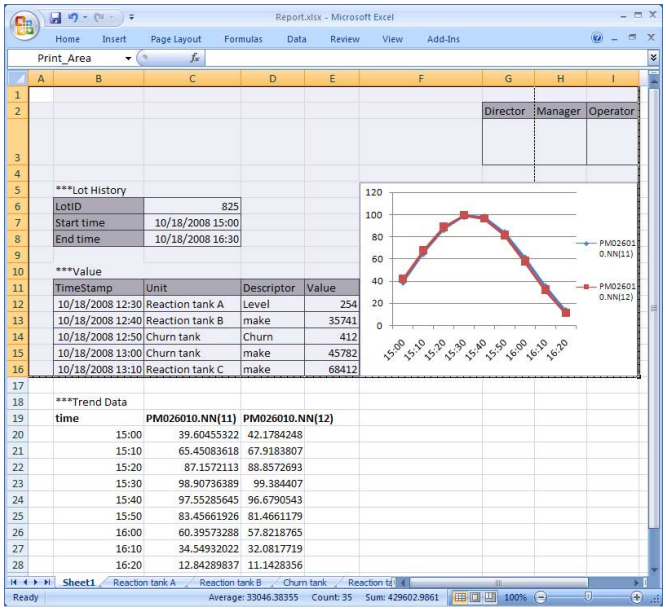


Figure 17. Lot History Ledger

2.4. Smart Client MIB

The Smart Client MIB helps the user visualize the status of operations, facilitating easy understanding of the data collected by PREXION. It is supported in Rel. 300 or later.

Main features

• Intuitive operation by drag & drop

By simply dragging & dropping items, the format of the display can be changed or related information can be added. For example, graphs related to a particular item (tag) can be displayed by dragging the numeric data or bar graph with the mouse and dropping it onto a Trend graph.

• Replay display

Past operation can be replayed using PREXION historical data, while at the same time displaying the current values for operation status.

• Visual engineering

Screens can be created using Microsoft Visio, without any knowledge of Visual Basic or scripts.

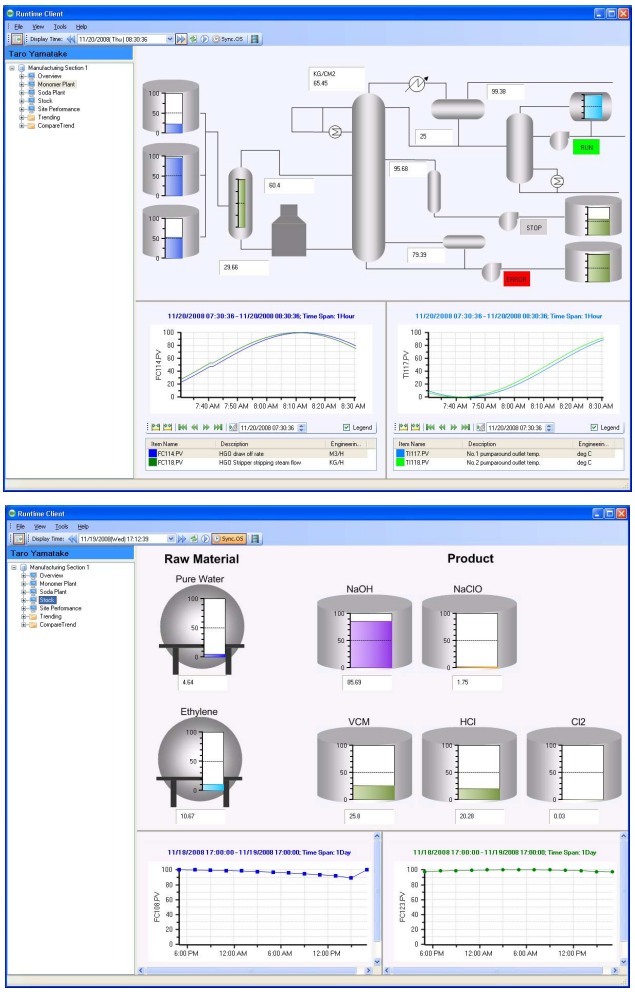


Figure 18. Samples of MIB Run Time

• Secure communication

Web-based communication using the http protocol ensures security for communication through the firewall between the server and client.

Basic Functions of Smart Client MIB

• Graphic Creation Function

Screens can be created using Microsoft Visio without the need for special knowledge about the application software. In that way data collected by PREXION can be displayed in various formats using the standard parts described below. Since each part is built into a Visio stencil, Visio can be used to create still images.

• **PREXION parts**

Parts that display the data collected by PREXION are as follows.

Data displayer

Displays numerical and character data obtained from PREXION. In addition to the data itself, the item (tag) name, units, and descriptor (English name) can also be displayed.

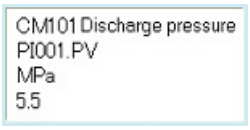


Figure 19. Data displayer with item information

State displayer

Shows a graph of the data obtained from PREXION. It can operate in the same way as the trend display for a continuous history client.

Figure 20. State displayer

Trend displayer

Shows a graph of the data obtained from PREXION. It can operate in the same way as the trend display for a continuous history client.

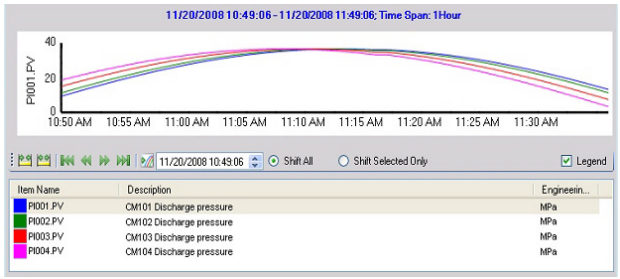


Figure 21. Trend displayer

Bar graph displayer

Shows a bar graph representing the numeric data obtained from PREXION. In addition to the graph, the item (tag) name, units, and descriptor (Japanese name) can be displayed.

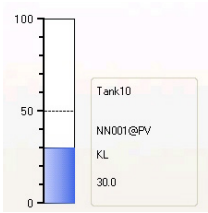


Figure 22. Bar graph displayer with item information

• **Standard parts**

Browser starter*

When the onscreen button is clicked, the default browser starts up and displays the webpage at the designated URL.

Web displayer*

Displays the webpage at the URL selected in the Smart Client MIB window.

*: Drag and drop operation is not supported.

• **Replay function**

For any item (tag) displayed on the graphic screen, the user can return to any time in the past and reproduce the past status of the item. The process behavior can also be checked by replaying the data starting from a past time. (A double-speed replay function is also available.) Moreover, the replayed period and replay speed can be stored in a file for future reference.

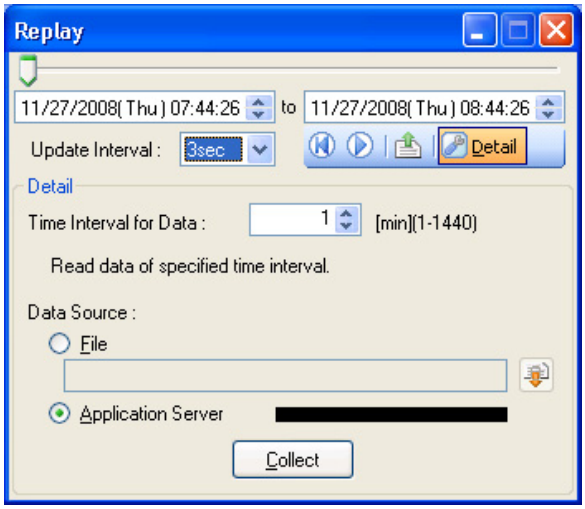


Figure 23. Configuration Window for Replay Function

• **Item batch change function**

For the same equipment or for multiple facilities, the data can be displayed in a single screen layout by simply shifting items (tags). The items (tags) on the screen can be grouped in a batch, which can be replaced with another group of items (tags) by changing the parts property set.

• **Popup display**

In addition to dividing windows to display smaller windows, the user can also create popup windows. Screens in a window can also be switched to popup display.

• **Modified menus depending on the job**

Since users can be grouped to control access, the client can display only those screens necessary for a particular job.

• **Central control of screen data by the server**

The server provides centralized control for created screens. It downloads the data needed to make additions and changes to the screens, so there is no need for maintenance on the client side.

3. System Configuration

3.1. System Configuration for Connection to a Multi-Vendor System

When connected to a multi-vendor control system, the data from each control system is collected by PREXION via the OPC server provided by the company, or via a gateway or HMI (human-machine interface).

Note: Although the PREXION client and Smart Client MIB are separately connected in the figure, both can coexist.

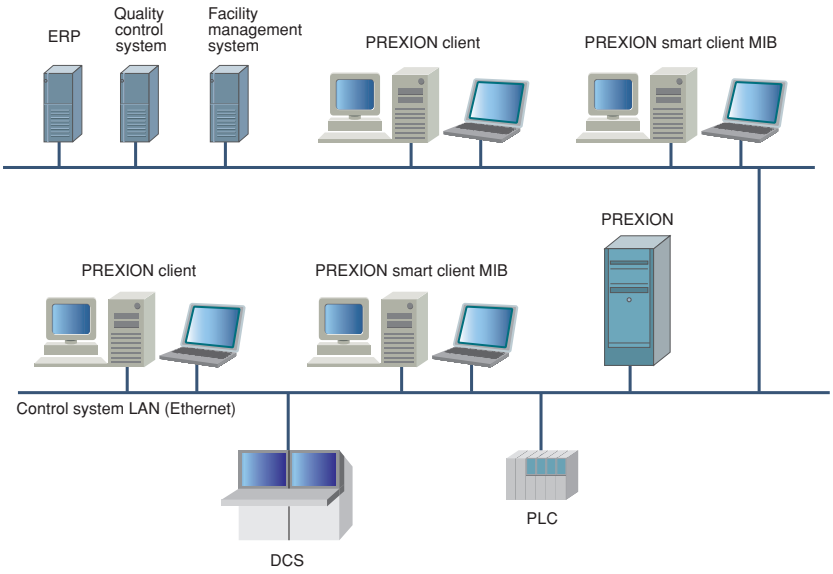


Figure 24. System Configuration (for connection to multi-vendor system)

4. Specifications

4.1. PREXION Server Platform Specifications

To operate the PREXION server, we provide a standard machine. The server cannot be running other applications.

Calculation of necessary hard disk capacity (for continuous history)

One numeric data item requires about 5.5 bytes. If a one-minute cycle includes 2000 items, for example, the required capacity for one day is:

$5.5 \times 60 \times 24 \times 2000 = 15.9$ MB

CPU-z620 Server

Item	Specifications
CPU	Intel Xeon 3.6 GHz
RAM	4 GB
Hard disk	500 GB RAID 1 (mirroring)
External medium	DVD-RAM (single sided 4.7 GB)
OS	Windows Server 2008 R2 SP1 (64bit)
Database	Microsoft SQL Server 2012
Recommended service life	Five years after delivery. After this period server replacement is required.

4.2. PREXION Client Platform Specifications

The PREXION client can coexist with other applications. Therefore, the client specifications shown below are for reference. Each client can be used alone.

Item	Specifications
OS	Windows Server 2003 SP2 Windows Server 2008 R2 SP1 (64bit) Windows XP Professional SP3 Windows 7 SP1 (32bit, 64bit)
CPU	Must meet the requirements of the OS.
RAM	
Hard disk free capcity	125 MB
Software Emvironment	Microsoft Excel 2010 SP1 (32bit, 64bit) , 2013 SP1 (32bit, 64bit) NET Framework 2.0 SP1/SP2, or 3.5 SP1

4.3. Smart Client MIB Platform Specifications

The Smart Client MIB can be installed alone on PCs on which PREXION client software is not installed. The Smart Client MIB can coexist with other applications.

Item	Specifications
OS	Windows Server 2003 SP2 Windows Server 2008 R2 SP1 (64bit) Windows XP Professional SP3 Windows 7 SP1 (32bit, 64bit)
CPU	Must meet the requirements of the OS.
RAM	
Hard disk free capcity	1 GB or more
Software Emvironment	.NET Framework 3.5 SP1
Graphic screen creation environment	Microsoft VISIO 2007 SP3, 2010 (32bit, 64bit), 2010 SP1 (32bit, 64bit), 2013 (32bit, 64bit)

4.4. PREXION Software Specifications

4.4.1. Continuous History

Item	Specifications
Collector connection modes	Local and system recovery function
Connected collector	OPC server compliant with DA (data access) 2.0
Max. process data collectors	20
Max. registerable items	Up to 38,400 real-number and integer data items can be registered for on-line collection by an OPC server. There is no set limit for calculated values or data items entered from text files.
Data collection cycle	One second to one day (may vary depending on the performance of the connected control system, OPC server, or gateway)
Types of data collectable from control system	Real, integer, character string, date-time, enumerated, boolean
PREXION data types	Real, integer, character string
Backup/recovery	Storage of configuration data and system recovery function.
Data storage format	Relational database tables
Save-to-server write rate	For continuous history, user-defined events, and lot history management combined, 1000 PPS (parameters per second) max.
Archiving and recovery	Off-line storage, recovery function, automatic archiving of history data
Data editing	Change and insertion functions for history data
Data export	Periodic data export to local and remote nodes in CSV/text format using FTP
Message function	Insertion and editing of character-string notes attached to specific time-stamped items on trend screens.
Write function	Changes data values via the server
API language	SQL stored procedures
Provided API function	Reads the latest values, reads history data, edits history, messaging, writing (output)
Network protocol	TCP/IP

4.4.2. User-Defined Event

Item	Specifications
Collector connection modes	Local and system recovery function
Connected collector	OPC server compliant with DA (data access) 2.0
Max. process data collectors	20
Max. No. of units	359
Max. items per collector	Depends on the OPC server specifications. While the upper-limit for number of items per collector depends on the OPC server specifications, and is influenced by the hardware specifications for the event history server, continuous history, and the event history load, the specified item collection cycle may be different due to overload. Ensure that total item registration (items per cycle) for continuous history and user-defined events does not exceed the upper limit (1000 PPS) as defined in the database writing specification.
Max. events per unit	100
Max. items per event	100
Max. registerable items	No limit
Data collection cycle	One second to 8 hours
Types of data collectable from control system	Real, integer, character string, date-time, enumerated, boolean
PREXION data types	4-byte real, 8-byte real, 2-byte integer, 4-byte integer, date-time, character string
Backup/recovery	Storage of configuration data and system recovery function.
Data storage format	Relational database tables
Save-to-server write capacity	For standard events and user-defined events combined, 100,000 items per day
Archiving and recovery	Off-line storage, recovery function, automatic archiving of history data
Data export	Periodic data export of history data with change and insertion function to local and remote nodes in CSV or text format using FTP.
Network protocol	TCP/IP

4.4.3. Standard Events

Item	Specifications
Collected DCS events*1	Process alarms, operator messages, process changes, SOE events, system status, system errors, status notifications
Collected DCS events*2	Process alarms, system alarms, system status, operator changes, messages, sequence events, expanded operator changes, batches, automatic sequences
PREXION data types	Depends on event type (fixed)
Data storage form	Relational database tables
Save-to-server write capacity	100,000 events per day, including standard events and user-defined events
Archiving and recovery	Off-line storage, recovery function, automatic archiving of history data
Data export	Periodic data export to local and remote nodes in CSV or text format using FTP

*1: In the case of Advanced-PS or TDCS3000 Rel.432.6 or later.
*2: For Harmonas-DEO Rel.200 or later.

4.4.4. Lot History Management

Item	Specifications
Max. number of results data groups	100
Max. events per results data group	100
Max. items per results data group	1000
PREXION data types	Determined by user-defined events
Save-to-server write rate	For continuous history, user-defined events, and lot history management combined, 1000 PPS (parameters per second) max.
Archiving and recovery	Lot results are included in event history archiving.

4.4.5. Smart Client MIB

Item	Specifications
Maximum number of registered users	100
Max. projects	20
Screen update cycle	One minute to one day
Replay interval*	24 hours
Max. parts displayed per screen	50

*: Replay of past periods depends on PREXION's on-line data cycle.

5. Licensing System

License class	License name	License model number	Description
Server	PREXION Server License Professional Edition R330 (Device CAL)	FNV-PRX33EPED	Up to five users. Licensed depending on the number of users.
	PREXION Server License Professional Edition R330 (User CAL)	FNV-PRX33EPEU	Up to five PCs. Licensed depending on the number of client PCs.
Client	PREXION Professional Client License 5 PC	FNV-PRX33EP5D	Adds five PCs. Smart client MIB is included.
	PREXION Professional Client License 5 User	FNV-PRX33EP5U	Adds five users. Smart client MIB is included.
	REXION Professional Client License 10 PC	FNV-PRX33EPAD	Adds ten PCs. Smart client MIB is included.
	PREXION Professional Client License 10 User	FNV-PRX33EPAU	Adds ten users. Smart client MIB is included.
Option	PREXION Lot Management License	FNV-PRXLOTME	Licensed for each PREXION server.

Please read the "Terms and Conditions" from the following URL before ordering or use:

http://www.azbil.com/products/bi/order.html

Specifications are subject to change without notice.

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