

# General Specification

GS 36J04A10-01E

NTPP001/NTPP002  
Exaquantum  
Plant Information  
Management System



## General

Exaquantum is a Plant Information Management System (PIMS) product that provides business benefits to users in the Hydrocarbons, Pulp & Paper, Power & Utilities, Chemicals and other industries. The main function of Exaquantum is the acquisition of data from all facets of a business and the subsequent transformation of that data into easily usable, high-value, widely-distributed information. The data then becomes an integral part of the set of tools used by the business in vital decision-making processes.

Exaquantum supports rapid plant-related deployment, making the software easy to implement within plant-specific operational environments. This allows information to be structured sensibly around the production calendars and shift patterns in the plant.

Exaquantum is the business intelligent gateway between the operational Process Control System (PCS) and the business Enterprise Resource Planning (ERP) system. It uses the latest, proven, Microsoft based open technology sets, designed to have low administration costs, and be robust to future IT trends.

Exaquantum comprises the following features:

- Process Control System Interface
- Real-time Database
- Data Manager
- Historian
- Configuration Tools
- Data Visualisation.

## Key Features

### Process Control System Interface

With generic OPC DA2.0 compliant software, Exaquantum enables easy access to PCS data. There are three different methods available, and they are described below.

### Data Access

This uses the OPC DA2.0 standard, the available OPC servers are:

- Yokogawa Exaopc, for CENTUM CS, CS 3000, CS 1000, CENTUM-XL, µXL
- Matrikon OPC server for Honeywell TDC3000, Foxboro IA series, Modbus.

### Alarms and Events Access

This uses the OPC A&E1.0 standard, the available OPC server is:

- Yokogawa Exaopc, for CENTUM CS, CS 3000, CS 1000, CENTUM-XL, µXL.

### Text Files

This allows the import and/or export of data using a pre-defined ASCII format.

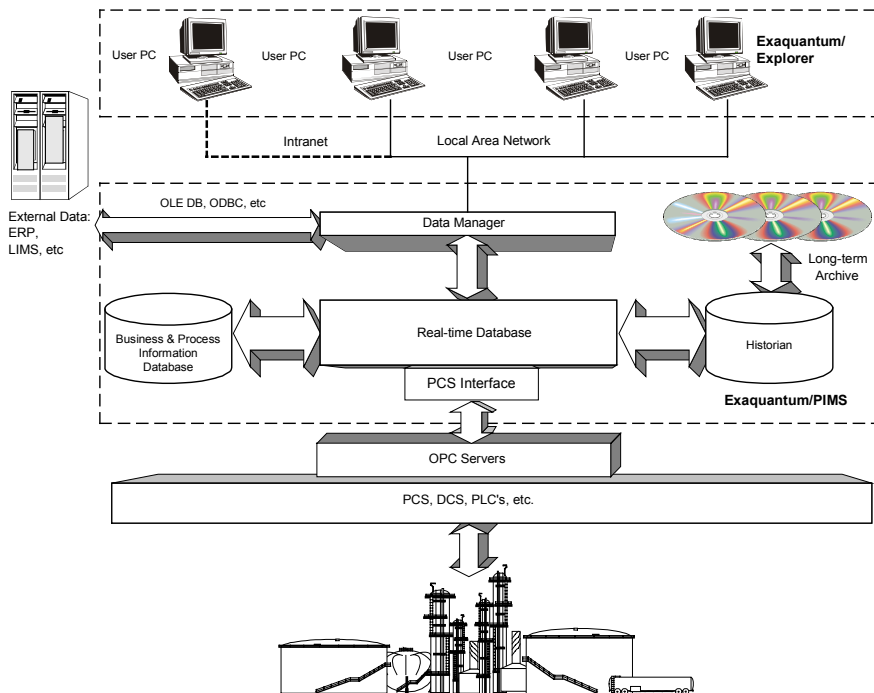


Figure: Exaquantum Overview

● **Real-time Database**

The Exaquantum Real-time Database (RTDB) is a business aware, tag-based environment that provides the first level for intelligent handling of raw data, ensuring optimised data enhancement. This is achieved through:

- **Use of Quality:** By propagation of quality data from the PCS to raw tag data, and on to calculations and the historian.
- **Aggregations:** Through standard functions (minimum, maximum, mean, standard deviation, summation and spot value) for all tags aggregated over set periods (hour, day, month or user-defined (custom)).
- **Calculations:** These can be implemented by supplying expressions in VB Scripting.
- **Function Block Templates:** These arrange the data into natural, logical structures, for easy reference and configuration. This allows tags to be grouped into user-defined function blocks.
- **Event Handling:** OPC data (and consequential Aggregation and Calculation updates) are handled as events. Other types of event are also monitored, and can trigger messages to external applications.

Exaquantum supports three types of tag:

- OPC: data generated outside Exaquantum from PCS and other application software
- Manual: data entered through the keyboard by a system user
- Calculated: data generated data within the RTDB.

Note: An Exaquantum tag is similar to a PCS data point, but also includes aggregation and reference data.

● **Data Manager**

This allows open access by other application software to and from the RTDB and historian through either OLE DB/ODBC or Exaquantum's application program interface.

● **Historian**

The main features of the high-performance Historian are:

- Historisation of data (storing Value, Timestamp and Quality)
- Powerful, efficient and fast data storage/retrieval
- Vast amounts of process data available online
- Secure long-term archiving (with fast retrieval times).

Exaquantum is entirely event based, and every event is a candidate for storage in the Historian. Event types are listed below.

Event Type	Source
OPC Data	Analogue, digital and reference values from the PCS
OPC Alarm & Event Data	From the PCS
OLE DB Data	From supported OLE DB compliant applications
API Data	From any VB or Excel based application
Manual Data	For example, from Exaquantum/Explorer Data Grid control.
Aggregation Data	Internally generated production calendar period boundaries
Calculation Data	Internally generated when a calculation parameter value changes

● **Configuration Tools**

A group of easy-to-use tools is provided for the configuration and administration of Exaquantum. They allow rapid configuration and system deployment. These tools comprise:

- **System Configuration Tools:** OPC Gateways Configuration and Production Calendar
- **Tag Configuration Tools:** Tag Template, Function Block Template, Tag Generation and Tag Editor, including the Expression Builder tool (for calculated tags)
- **Database Management:** archiving.

● **Data Visualisation**

Exaquantum supports the visualisation needs of many types of user, by providing the following applications:

**Exaquantum/Explorer**

For users whose requirement is to share standard, fixed, pre-configured or ad-hoc documents. These include trends, alarm/event views, data entry screens, mimics, and reports across a local network.

**Excel Add-In**

Allows Exaquantum data to be linked into Excel functionality.

**Reporting and Analysis Package**

These interfaces enable certain packages that support OLE DB/ODBC interfaces (e.g. Excel and Crystal Reports) to access Exaquantum data.

## ■ Business Benefits

The business benefits of making information available are both diverse, and industry-specific. Some of the typical benefits are described below.

### ● Information Distribution

Making such a large amount of data available on the desktops of many users increases efficiency. This increase is a result of easy, fast accessibility to the data itself, and the many different types of data to which users have access. When Internet access to data is also taken into account, the benefits are even more apparent.

### ● Enhancing PCS Data

Many data sources have limited scope for enhancing their own data. Exaquantum can enhance PCS data with a set of built-in aggregations. For example, users in some Hydrocarbon industries will find one hour averages more useful than raw data. Exaquantum can further enhance the raw and aggregated data with custom calculations.

### ● Enhancing Data From Several PCSs

Exaquantum is able to refine the data from disparate data sources into high-value business information, often known as Key Performance Indicators (KPIs). For example, tonnage of product can be calculated from a flow measured by a PCS and a density measurement from a Laboratory Management Information System (LIMS).

### ● Long Term History

The historian can easily cope with years of data. The long-term historisation of plant data allows many types of analysis. For example, the analysis of plant history can:

- Detect long term changes in plant behaviour, to aid in either the prevention, or explanation, of unplanned plant shutdown. Reduction of plant downtime can result in great cost saving.
- Aid the optimisation of plant settings for the most profitable operating mode, and monitor for deviations from these settings.
- Point to leaks and measurement errors in gas and liquid streams. For example, the flow meter on a main product stream may be inaccurate by several percent. The measurements from other flow meters on connected streams can be used to resolve an alternative, accurate measurement for the main product stream.
- Aid preventative maintenance scheduling and therefore maximise the value of parts. For example, monitoring bearing vibration, and forecasting the time when rapid breakdown of the bearing is likely to occur.

Example 1: A system can be set to automatic or manual mode. Analysis of plant history can prove the success of the control settings, and monitor their ongoing usage.

Example 2: A LIMS value may indicate a trend leading towards out-of-spec product. Operators and engineers have the opportunity to correct the trend before waste products are created.

### ● Event Triggered Batch Processing

Batch applications can be notified automatically of any steps or changes in the process. These changes may originate from direct process measurement, but they can also be the result of Exaquantum aggregations or calculations. Exaquantum is the standard route for any application that requires event notification from any PCS, thus minimising development costs.

### ● Time Resolved Event History

Exaquantum can read and historise event history from any data source that has a standard Alarm and Event OPC interface. Events from all data sources can also be presented in time order. For industries where unplanned shutdowns follow a complex series of consequential events, this facility is helpful in identifying the original cause of shutdown.

### ● An Integrated Platform

The Exaquantum philosophy of open access to data and information enables easy configuration and integration of application software. Typical data flows between applications are the passing of:

- Sample results from LIMS to Exaquantum, to enable calculation of KPIs
- Inventory and QA data from Exaquantum to ERP, to optimise planning and scheduling campaigns
- Condition monitoring data from Exaquantum to maintenance software, to automatically initiate repairs and optimise Planned Maintenance Management schedules.

## ■ System Specification

Item	Specification *
Maximum number of tags	20 000
Data update rate	2 000/sec
Number of users (installed)	Up to 64
Number of users (concurrent)	1 to 32
Number of Exaquantum servers in an installation	1
Number of connected OPC servers	8
Data item gathering interval (minimum)	1 sec
Data item data historisation interval (minimum)	1 sec

\* A suitable hardware platform and infrastructure (network) must be chosen to support the required sizing.

## ■ Operating Environment

The necessary hardware and software operating environments are detailed in the tables below. The specifications included are the minimum requirements. Consult your Yokogawa Representative for larger system requirements.

**Table: Hardware Operating Environment**

Component	Specification
Data Server (real-time database)	450 MHz Pentium II CPU RAM: <ul style="list-style-type: none"> <li>• 512 Mbytes for 10 000 tags</li> <li>• 1 Gbytes for more than 10 000 tags</li> </ul> 20 Gbytes disk
User PCs	233 MHz Pentium II CPU (333 MHz Pentium II CPU recommended) 64 Mbytes RAM 2 Gbytes disk CRT resolution: 1024x768 Colour: 65536

**Table: Software Operating Environment**

Hardware	Software Specification
Data Server	Exaquantum/PIMS Windows NT 4.0 Server (SP6A) for Intel
User PCs	Exaquantum/Explorer Windows NT 4.0 Workstation (SP6A) or Windows 95 (SR2) or Windows 98 (2 <sup>nd</sup> edition) Microsoft Excel or Office 2000/97-SR2 (recommended)

## ■ Models and Suffix Codes

### ● Exaquantum/PIMS

The Exaquantum licence covers tags up to the number specified by each suffix code, together with the specified number of concurrent users.

Model		Description
Model	NTPP001	Exaquantum Data Server Package
Suffix Codes	- S	Basic Software Licence
	1	New Order
	1	English Version
	-0001	1 000 tags/2 clients
	-0002	2 000 tags/4 clients
	-0003	3 000 tags/4 clients
	-0005	5 000 tags/4 clients
	-0007	7 500 tags/4 clients
	-0010	10 000 tags/10 clients
	-0020	20 000 tags/10 clients

### ● Exaquantum/Explorer

The maximum number of installed users is limited to twice the number of concurrent users.

Model		Description
Model	NTPP002	Exaquantum User Interface Package
Suffix Codes	- S	Basic Software Licence
	1	Always 1
	1	English Version
	-□ □	Additional clients. Enter the exact number of concurrent users required.

## ■ Trademarks

Exaquantum is a trademark of Yokogawa Electric Corporation.

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Exaopc is a trademark of Yokogawa Electric Corporation.

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