

General Specifications

Model NTPC022 Exaquantum Movements Monitoring



GS 36J40C12-01EN

■ SOLUTION

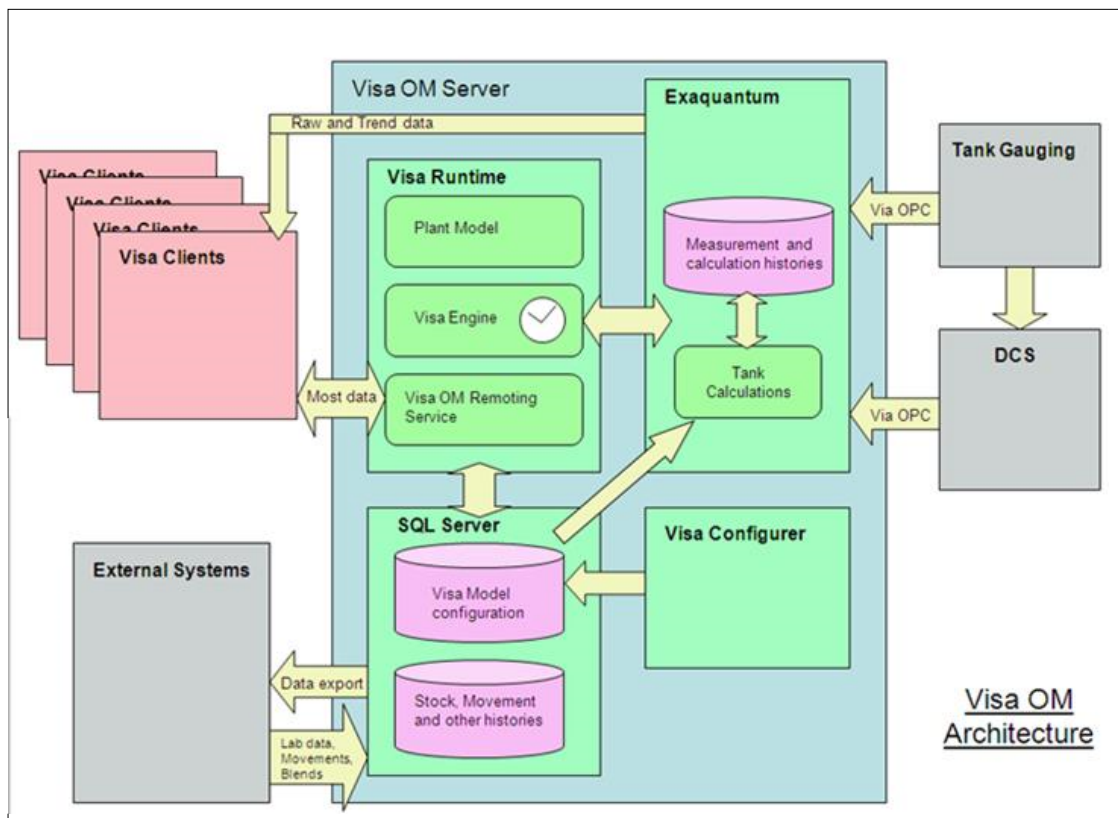
Exaquantum Movements Monitoring (Visa-OM) software provides intelligent data collection and supervision to support tank farm management activities, typically, but not exclusively, in oil refineries or petrochemical plants.

■ BENEFITS

- Improved inter-shift and inter-department communications
- Safer operation of the plant aided by the tank ranking and alarm system features
- Full records created of all movements carried out.
- Quantification of movements unable to be directly measured is provided
- Automatic identification of missing movements encourages early correction
- The need for complex daily stock reconciliation activities diminished.
- Better knowledge of the contents of tanks, and hence better judgment of processing strategies.
- Full integrated audit trail of plant activities provided.

■ KEY FEATURES

- Intelligence is founded upon a rich object model of the plant which can simply adapt to plant configuration changes.
- Model objects include tanks, pipelines, process units, valves, pumps, manifolds, jetties, gantries, etc.
- Intuitive, easy to use user interface which incorporates powerful context-sensitive navigational links between screens
- Built-in data reconciliation provides:
 - Missing movement detection
 - Quantification of movements not directly measured
 - Instrument failure detection
- Movement definition carried out via context sensitive screens for easy error free use.
- Supports blending as multiple grouped movements
- Provides material composition and property and crude tracking
- Intelligent movement and tank based alarm system
- Comprehensive event log and audit trail provided
- Security features allow operational powers to be split among multiple individuals and areas.
- Built in data historian for measurement and movement data.



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■ INTRODUCTION

It is designed to obtain tank level and flow rate data from automatic gauging systems, and to receive notifications of intended fluid movements from human operators or, if available, automatically. Armed with these two sets of information, Visa-OM is able to guide operators to the next control tasks which require their attention, warn them of potential problems through the alarm system, track the composition and properties of material as it moves around the site, record details of each individual movement, and report on current stock levels.

By the use of built-in data reconciliation calculations, Visa-OM can calculate and record quantities for movements even when no individual measurement can be used to directly determine this information.

Links to other systems for data import and export are provided and are typically used for obtaining supporting laboratory information or publishing stock and movement information.

In summary, by combining measurements and statuses, (which are mainly automatically entered) with movement expectations (which are mainly manually entered) Visa-OM interprets and thus enhances information about the physical refinery equipment, the materials contained and processed within it and the discrete movements by which the material is handled.

■ CAPABILITIES

Visa-OM is based on a client server architecture, a typical scenario is illustrated on the previous page. A typical installation would operate in a client-server configuration, as illustrated on the previous page. In this the major components of Visa-OM are all depicted as running on a single computer, the Visa-OM server.

They comprise the Exaquantum data acquisition and historization system, the Exaquantum/mPower plant model, the engine and Visa-OM remoting service, together with the supporting SQL Server database (It is also possible to run the Exaquantum component on a separate machine if desired). Users interact with the system and inspect the data via any number of client machines, each of which runs the Visa-OM client software.

Measurement data is obtained via OPC and is collected and pre-processed within Exaquantum. The pre-processing conditions the raw data by filtering and smoothing, and also carries out various tank specific calculations to provide full time histories of selected derived quantities such as volumes, masses and ullage.

The Exaquantum/mPower Engine performs all autonomous tasks such as mass balance calculations, movement progression activities, material mixing logic, data import and export, and provides the alarm system. The Plant Model provides a memory resident reflection of the entire operation so that most users' enquiries can be responded to without any need to access the database.

The Remoting service provides a .Net interface through which enquires and controls from the clients are received and acted upon.

External systems can introduce transactions such as movements, blends and lab data into a Visa-OM system simply by writing records directly into transfer tables contained within the SQL Server database. These entries are then processed by the engine to incorporate the transactions properly into the mainstream of Visa-OM.

Visa-OM publishes salient data in other sections of these transfer tables. Any external system is then able to read this data and use it as required.

The Configurer

Configuration is a specialized engineering function that normally occurs only at the start of the project.

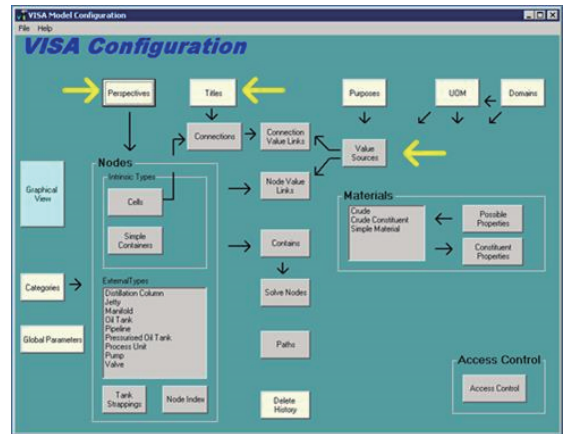
The Plant Model is defined at a basic level in terms of a network of nodes joined by connections. This model may match the physical layout of the plant, or it may represent it in a more abstract manner. In either case it is sensible to model only those items that are necessary to support the data available and the reporting required. It is also possible to create non-physical items to augment the model if convenient. This may result in great simplification when compared with the P&I diagrams.

A variety of node types are available to build up a model of the plant containing the required degree of sophistication. For example, an oil tank has additional properties and methods so that it knows how to calculate pumpable and standard volumes, contained mass, ullage, etc. from its knowledge of oil level, temperature, water level, strapping tables etc. Similarly, a pipeline is able to keep track of different segments of oil as they pass through and to predict their exit times, while a distillation column is able to calculate crude component compositions in its outlet streams from the known composition of its feed material.

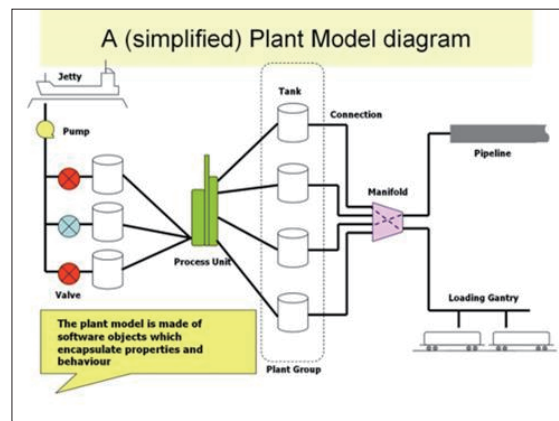
Each of the buttons on the main configuration form leads to another form through which the user enters the required configuration data. Alternatively, the majority of a configuration can be entered into a preformatted spreadsheet and then loaded directly into the Visa-OM plant model. This latter method would normally be used for anything other than a very small system.

When the model is completed it will have an understanding of:

- Which nodes are linked to which nodes by which connections
- Which nodes are contained by other nodes
- Which sub-areas should be used for mass balance solutions and to what extent
- What materials are available to be handled by the model
- How to find the measurement data that relates to the model.



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The Engine

The Exaquantum/mPower Engine is usually run in an unattended mode. It comprises four components each of which performs designated tasks at suitable intervals:

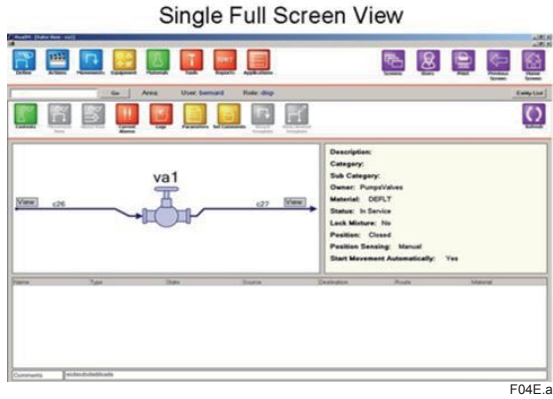
- The super-fast cycle runs every few seconds. It deals with data imports from external systems, detects valve position changes and responds to them, and watches over the actual starting and stopping of movements which are set to synchronize themselves to actual measurement changes.
- The fast cycle runs every 60 seconds. It handles the main transfer of data (in both directions) between the Exaquantum/mPower Layer and Exaquantum, and also hosts the alarm system.
- The medium cycle runs every 15 minutes and also when movements start and stop. It deals with mass balance calculations, movement progression, materials mixing and data export.
- The timed cycle runs once daily to carry out daily stock recording.

The Main User Interface

General

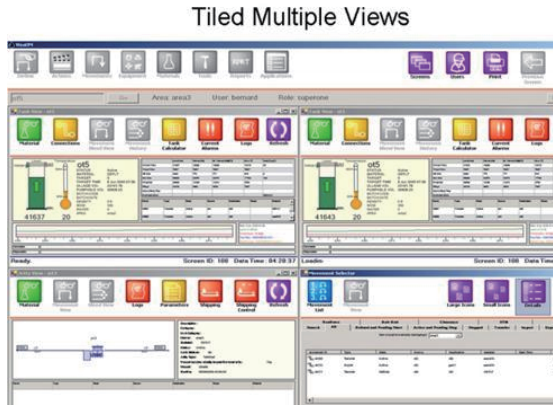
The user interface is a multi-window client application which is easy to use and intuitive in operation. Powerful context-sensitive navigation features are provided to make operation as simple as possible. The size of most “clickable” targets has been deliberately made large so as to enable touch screen use, and to obviate the need for adopting a normal seated position.

Screens can be viewed either in single mode, for example.



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or in tiled mode, with up to four screens being assembled into a single view.

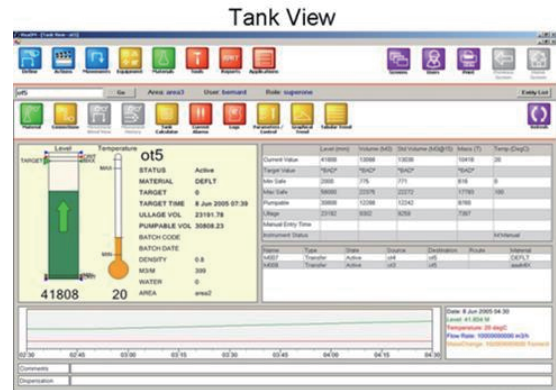


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A powerful human access control system makes it possible to restrict a user’s abilities both by function and by areas of the plant. A user logs on for a “role” which will have been set up at configuration time to provide precisely the powers which he needs to carry out his current duties.

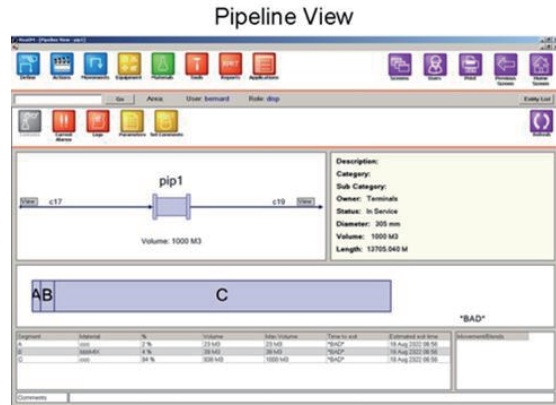
Physical Equipment

Each physical object within the plant model will have its own view, tuned according to the object type. For example, this is the tank view.



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While this is the pipeline view.



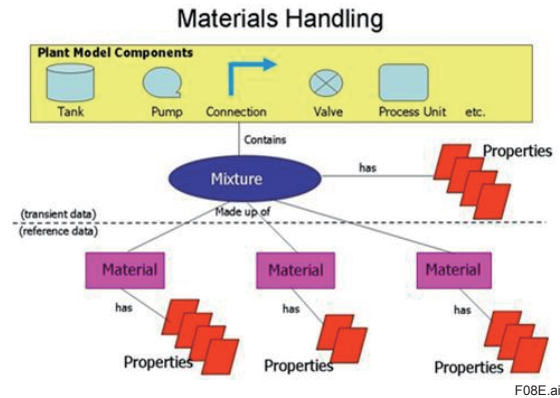
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Other views allow for simultaneous inspection of multiple items of similar equipment, control of equipment parameters, inspection of measurements in the form of trends, and substitution of manual values to cover for defective sensors or unmeasured items.

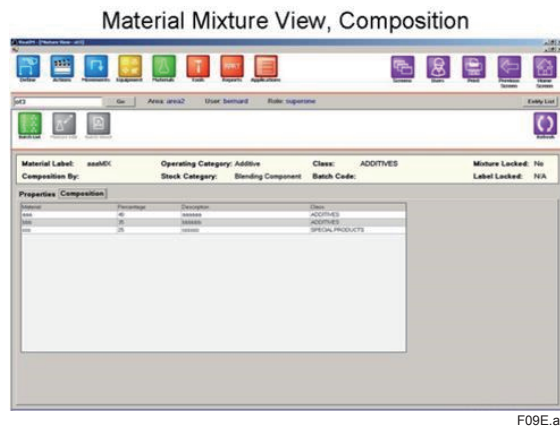
Materials

Materials are represented in Visa-OM as mixtures of predefined reference materials entered via the configurator.

For each mixture, the composition, in terms of percentages of these reference materials is calculated. Visa-OM also calculates material properties such as density, cloud point, viscosity etc., using both linear and non-linear mixing algorithms.



Tools are provided to view and manually adjust any of these values, or to set them directly from laboratory measurements. Tools are also provided to lodge quality control certificates and identity numbers against batches of material which are ready for use or sale.



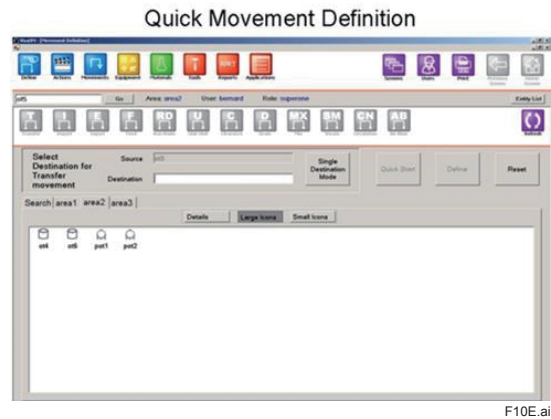
Movements

Movements are the objects used within Visa-OM to record the progress and final results of a discreet transfer of material within, to or from the plant.

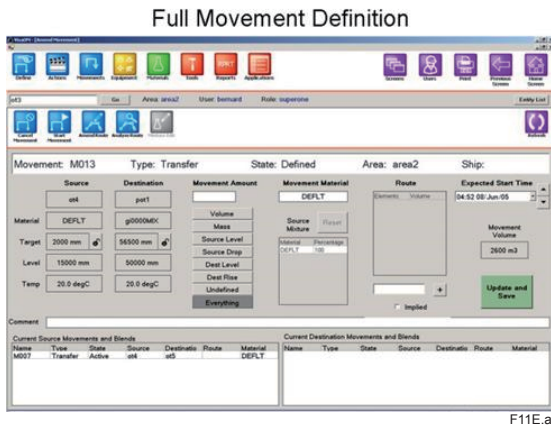
Typical information required to define a movement is:

- The source
- The destination
- How to end the movement
- The route taken by the movement

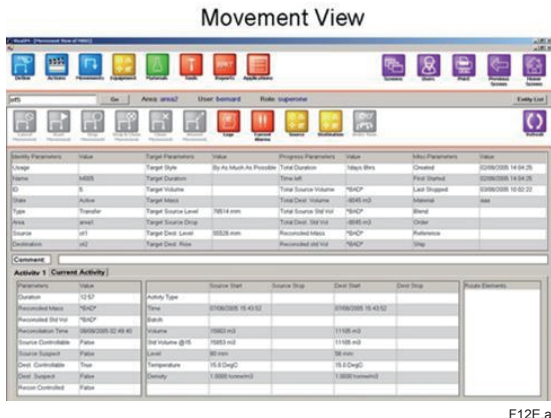
Different types of movement are supported. Source destination and type are established via a simple form.



While further detail can (optionally) be added in a second form.



The progress of any movement, or its final outcome, can be inspected in various ways, for example the following movement view.



Blends

Represented within Visa-OM as a group of individual movements which share the same destination. Blends can be defined, controlled and viewed as a single unit. Blends can be manually defined or inserted directly into Visa-OM by an external blending system.

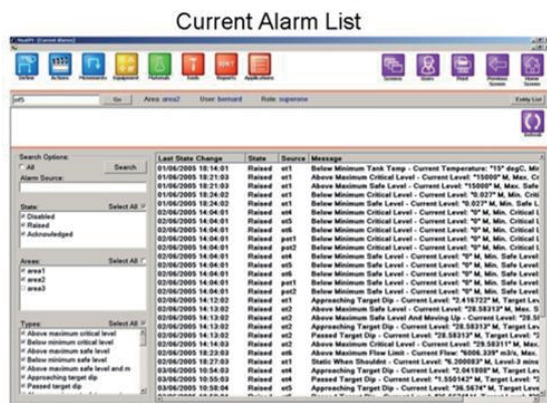
Alarms and Events

Alarms based fixed items such as maximum allowable tank levels or on more changeable criteria such as the expected direction of movement, are automatically generated and directed to the appropriate area of the plant for acknowledgement.



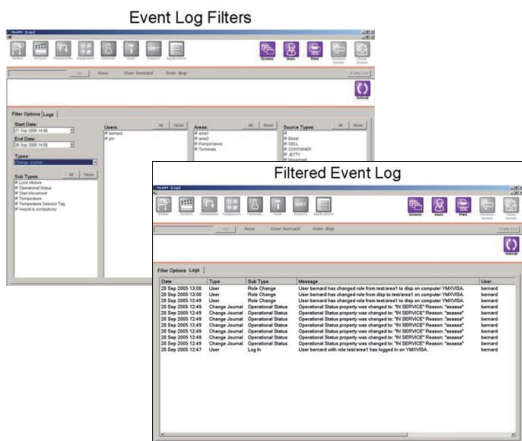
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The list of current alarms can also be inspected.



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As can logs of all other significant system events. These are able to be selected using powerful filters so as to create event lists in which different types of entry can be viewed in context as shown below.



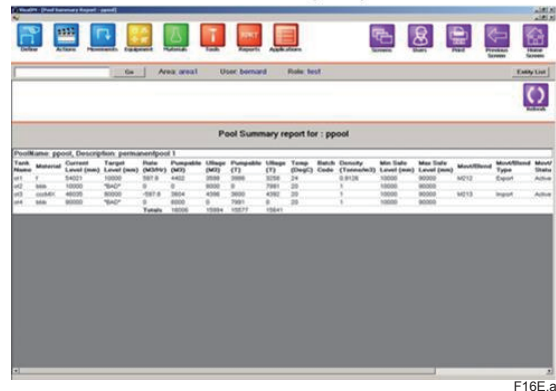
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Reporting and other functions

A number of self-configuring reports and other functions are also provided, including:

- The tank ranking table. This tabulates key tank data in designated plant areas in order of expected completion of current movements, and hence in order of need for operator intervention.
- Pool reports (illustrated). These summarize and total the levels, volumes, masses, rates of change, and ullages in pre-selected groups of tanks.
- The tank calculator (illustrated). This allows “what if” examination of individual tanks, in terms of conversions from level to volume and mass, and vice versa, for any temperature, water content, etc.
- The mass balance ranking table (illustrated). This provides simple views of the recent mass balance calculations, highlighting any problems found and directing an operator to corrective action.
- The missing movement report. This, making use of mass balance data, indicates to an operator where movements may have taken place without being made known to Visa-OM. The operator can select to retrospectively create movements to cover the material moved, thereby correcting the historical record.

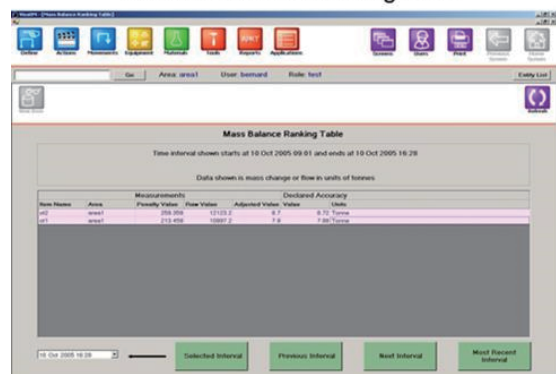
Pool Summary Report



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The Tank Calculator

The Mass Balance Ranking Table



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■ HARDWARE AND SOFTWARE REQUIREMENTS

Minimum Hardware and Software Specifications

Component	Minimum Hardware Specifications
Visa-OM Server	As listed in the Exaquantum R2.80 GS 36J04A10-01E for an Exaquantum Server
Visa-OM Web Server	As listed in the Exaquantum R2.80 GS 36J04A10-01E for an Exaquantum Web Server
Visa-OM Web Clients	As listed in the Exaquantum R2.80 GS 36J04A10-01E for an Exaquantum Web Client

Component	Software Specifications
Visa-OM Server	As listed in the Exaquantum R2.80 GS 36J04A10-01E for an Exaquantum Server
Visa-OM Web Server	As listed in the Exaquantum R2.80 GS 36J04A10-01E for an Exaquantum Web Server
Visa-OM Web Clients	As listed in the Exaquantum R2.80 GS 36J04A10-01E for an Exaquantum/Web Client

■ MODELS AND SUFFIX CODES

Visa-OM Product

	Model	Description
Suffix Codes	NTPC022	Visa-OM Product
	-S	Basic Software License
	1	New Order (with Media)
	1	Always 1
	-SV□□	Enter the number of Visa-OM Server Licenses (01 - 99)
	-RU□□	Enter the number of Refinery Unit (CDU, Reformer, etc.) Licenses (01 - 99)
Option Codes	-YYYY	Select an Option Code
	/T1□□	Enter number of additional 20 Tank Licenses (01 - 05) until a maximum of 200 Tanks is reached
	/T2□□	Enter number of additional 20 Tank Licenses (01 - 10) when a minimum of 200 Tanks have previously been ordered until a maximum of 400 Tanks is ordered
	/T4□□	Enter number of additional 20 Tank Licenses (01 - 10) once a minimum of 400 Tanks have previously been ordered
	/P□□	Enter number of Visa-OM per-seat Client Licenses (01 - 99)
	/C□□	Enter number of Visa-OM 2:1 concurrent Client Licenses (01 - 99)
	/RU□□	Enter number of additional Refinery Unit (CDU, reformer, etc.) Licenses (01 - 99)

Maintenance Service for Visa-OM

	Model	Description
Suffix Codes	NTMC022	Maintenance Service for Visa-OM
	-S	Annual Contract
	1	Always 1
	1	Always 1
	-SV□□	Enter the number of Visa-OM Server Licenses (01 - 99)
	-RU□□	Enter number of Refinery Unit (CDU, Reformer, etc.) Licenses (01 - 99)
Option Codes	-YYYY	Select an Option Code
	/T1□□	Enter number of additional 20 Tank Licenses (01 - 05) until a maximum of 200 Tanks is reached
	/T2□□	Enter number of additional 20 Tank Licenses (01 - 10) when a minimum of 200 Tanks have previously been ordered until a maximum of 400 Tanks is reached
	/T4□□	Enter number of additional 20 Tank Licenses (01 - 10) once a minimum of 400 Tanks have previously been ordered
	/P□□	Enter number of per-seat Client Licenses required (01 - 99)
	/C□□	Enter number of 2:1 Concurrent Client Licenses (01 - 99)
	/RU□□	Enter number of additional Refinery Unit (CDU, reformer, etc.) Licenses (01 - 99)

■ ORDERING INFORMATION

Specify model and suffix codes.

■ TRADEMARKS

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