General Specifications

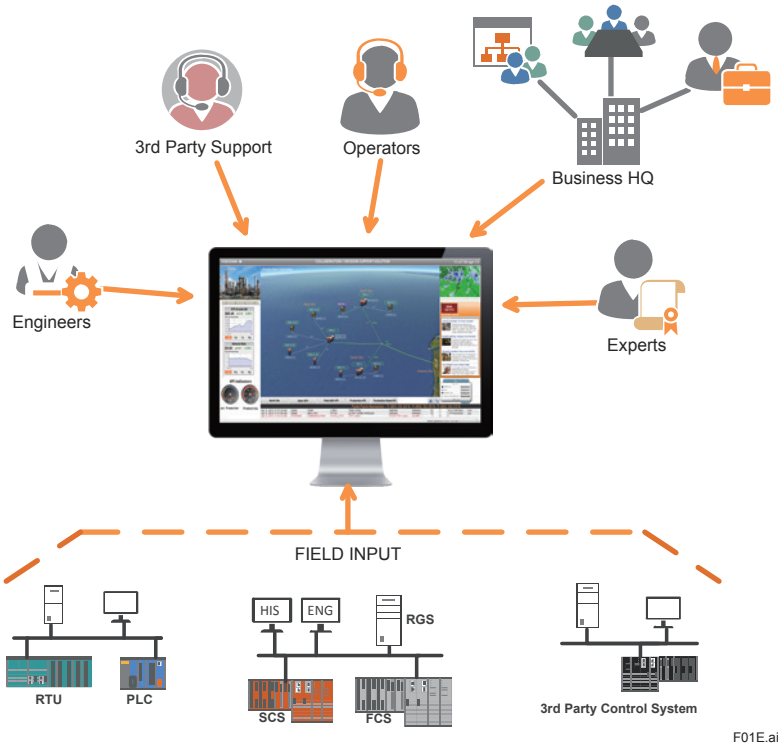
GS 50A01A10-01EN

■ GENERAL

FAST/TOOLS has been developed with over 40 years of experience by combining our expertise in Supervisory Control And Data Acquisition (SCADA) with requirements from users and industry leaders. The FAST/TOOLS package is a powerful, modern, flexible, distributed operations information and control software package. It implements a Web-based supervisory control human machine interface, OPC server/client functions, data acquisition from a variety of controllers and devices, alarm management and historical data management. Furthermore it is a leading system package for operations control and information integration with business systems and is available on a wide range of industry standard operating platforms. Many industries and utility companies with a need for data integration and data integrity use FAST/TOOLS from Yokogawa in their applications. FAST/TOOLS is also successful in critical applications due to its very reliable design, support of redundant and nonstop systems and its on-line configuration capabilities. These properties contribute to high efficiency and high quality production processes. FAST/TOOLS has been developed with a number of key issues in mind, one of which is to provide a system that can start small and which can easily grow with client needs, both in the short and long term. This philosophy protects against premature obsolescence. The consequence of being a hardware independent supplier means support of standard operating systems, standard network protocols, standard user interfaces and standard software development tools. FAST/TOOLS provides solution possibilities in a wide range of control execution applications with the following characteristics:

- Multiple Process Site environments
- PLC/RTU based control systems
- Wide area communication
- Intensive (mission critical) control performed by subsystems
- Relatively high content sequential (logic) control

These characteristics are often seen in for example Oil & Gas production and transport, infrastructure, utilities monitoring and control and high performance manufacturing applications. It also allows the flexibility of combining different types of systems to provide hybrid solutions, both on new and existing sites (green and brown field development).



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FAST/TOOLS is a user orientated environment. Information flows and architectures have been designed with information availability in mind. It supports a user environment based on web technologies and can be easily extended with new applications through the use of open interfaces. Secure login and a role-based authorization mechanism ensures that information is only available to the appropriate users.

Applications and process information can be rapidly deployed and is easily maintained centrally on the server. This so called “zero deployment” means that client applications can be start from any web-browser and the users get the application. There is no need to manage licenses. Benefits include faster application deliveries increased IT productivity, and widely accepted technology.

Other benefits of a user environment are:

- Information can be accessed anywhere an Internet connection is available.
- The information is ‘real-time’ (no waiting time for critical information).
- The information is more secure than it would be on a personal computer.
- Upgrades containing new functions and enhancements are free and automatically deployed there is no need to manually install software or license keys.

Today Web-technologies are used more and more. Instead of specific client programs, Web browser environments become a user interface, a HMI, to an application (see figure below).

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Figure Web Based Visualization

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The FAST/TOOLS Web HMI consists of a Web HMI Server and a Web HMI Client component that can either run separate from the FAST/TOOLS Server or be installed altogether with the FAST/TOOLS Server environment on a standalone node. Installing the Web HMI Server on a separate node has the advantage that load can be shared between the FAST/TOOLS Server and Web HMI Server.

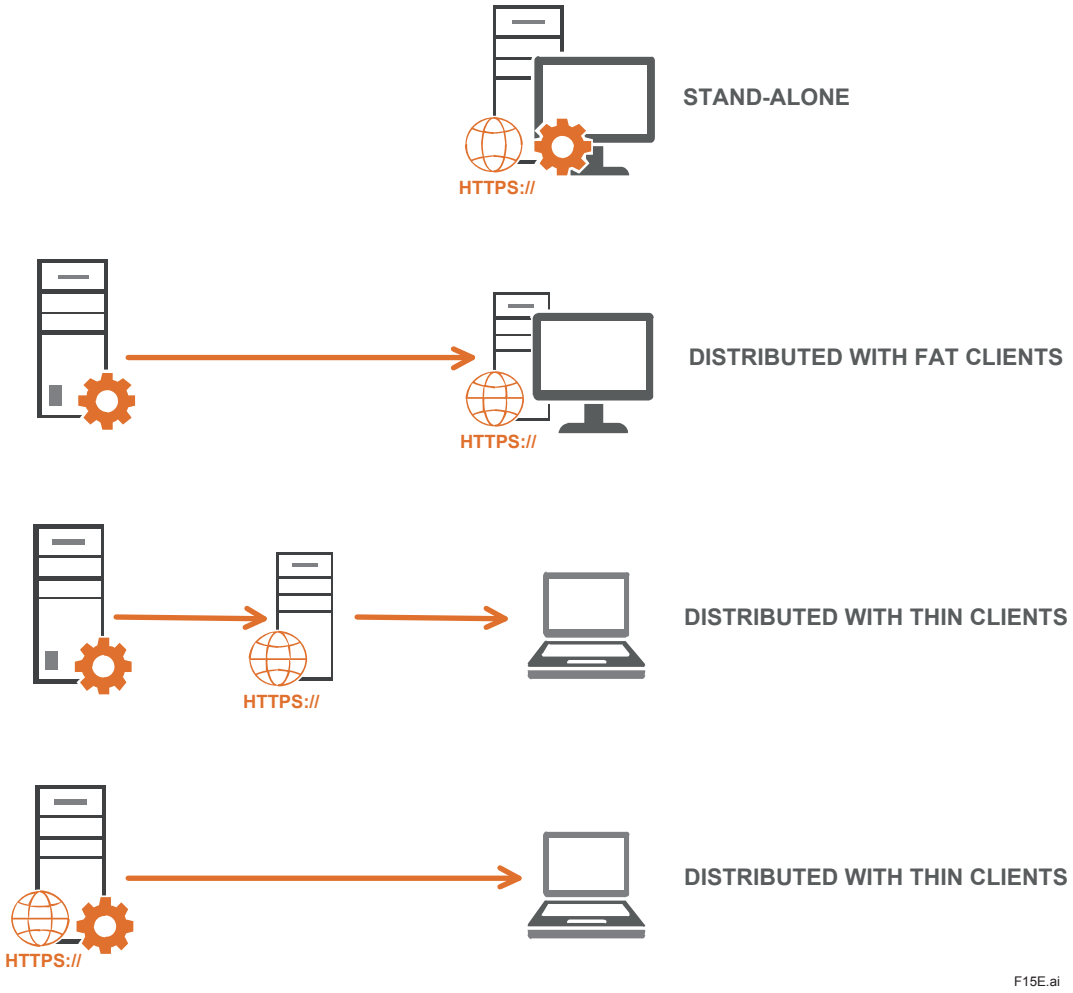

Figure System Software Distributions

For 24/7 operator stations, both Web HMI Server and Client are advised to be installed and maintained on the same machine as represented in the centre of the figure above.

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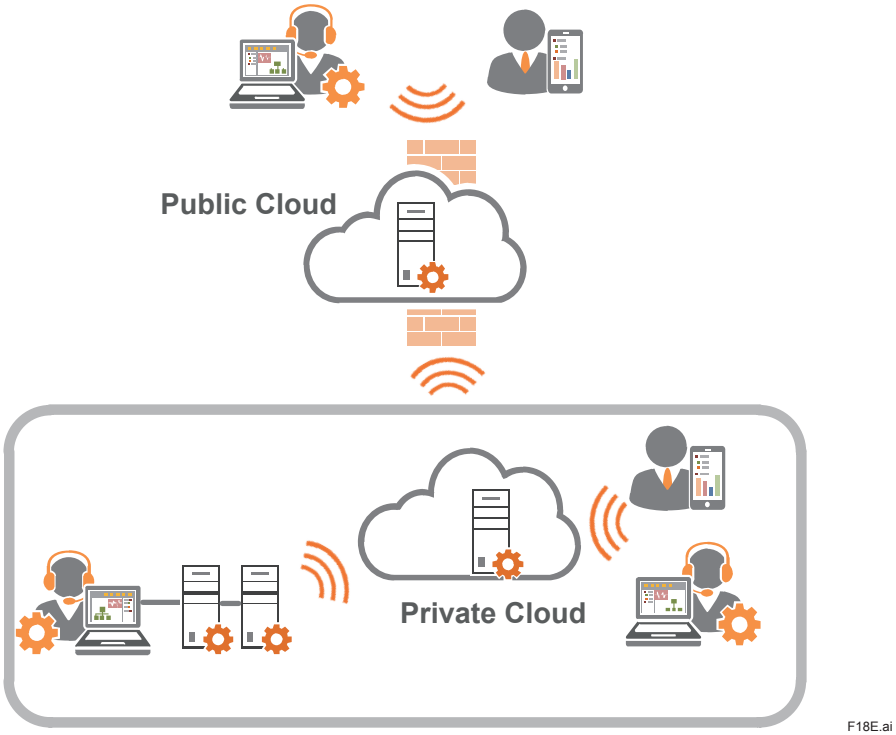

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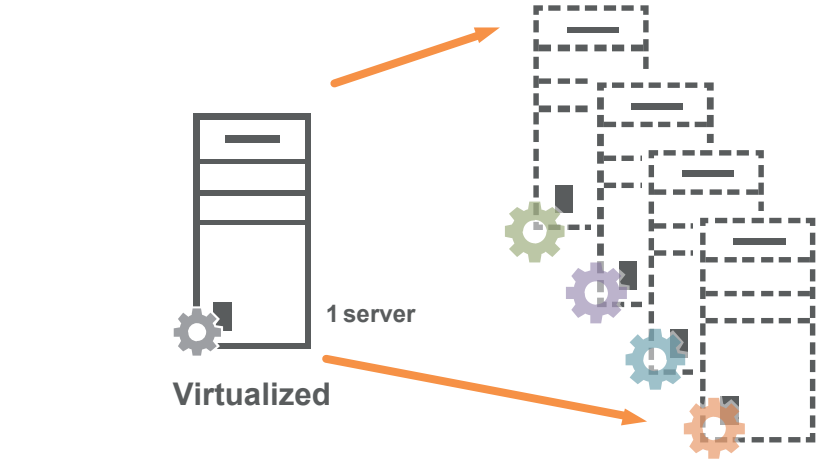

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Beyond traditional system software distributions, cloud computing & virtualization infrastructures are fully supported by the FAST/TOOLS software platform.

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■ SYSTEM SPECIFICATION

● FAST/TOOLS Software Modules

FAST/TOOLS is comprised of function specific software modules (specified in the table below) that connect to the communication data bus BUS/FAST. All FAST/TOOLS modules are event based and submit their events to BUS/FAST. BUS/FAST passes these events in a highly secure and reliable manner to modules that are subscribed to these events. The result is a very low CPU-load on any system during normal operations.

Tool name	Description
BUS/FAST	Basic networking support and secure communications
DATABASE/FAST	Real-time database with ISAM based file support and distributed Data Set Services
HISTORY/FAST	History scheduler
AUDIT/FAST	Audit trailing and Operator Log
ITEM/FAST	Real time item data handling
EQUIPMENT/FAST	I/O communication
ALARM/FAST	Alarm management and handling
PROCESS/FAST	Sequencing and Calculations
REPORT/FAST	Report generation
ACCESS/FAST	Open DataBase Connectivity (ODBC) interface, OPC server and client functionality
USER/FAST	Configuration & Presentation
INTEGRATION	Various utilities and application integration options.

The full FAST/TOOLS functionality can be installed on one system (stand-alone configuration) or distributed over many (dispersed) systems (distributed configuration). The minimal configuration of any FAST/TOOLS system is a standalone system with the following modules installed:

- BUS/FAST
- ITEM/FAST
- DATABASE/FAST
- EQUIPMENT/FAST
- ALARM/FAST
- PROCESS/FAST
- USER/FAST

Additionally any of the other modules can connect to the bus in order to enhance the functionality of FAST/TOOLS.

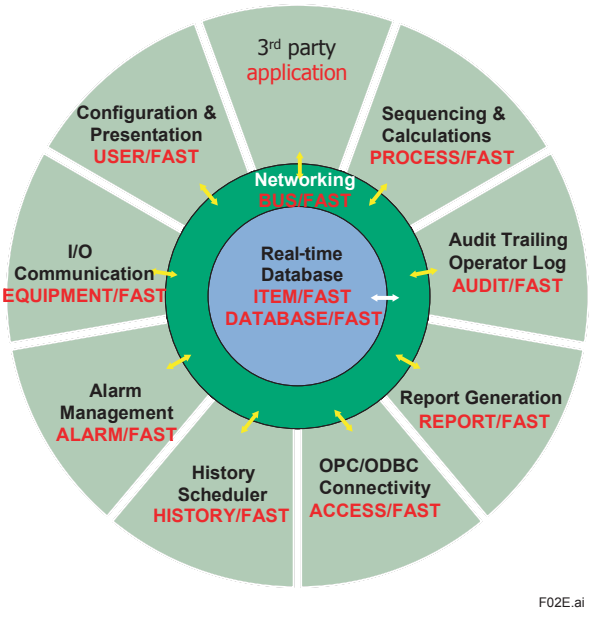

Figure FAST/TOOLS Modular Structure

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● FAST/TOOLS Functional Components

In addition to the software modules FAST/TOOLS defines four functional components within its software & system architecture which may be distributed across geographical dispersed locations to adapt to any specific application requirements:

Function	Description
SCADA Server	The SCADA Server is the core processing unit of the system. Within a distributed configuration it manages sets of data such as control objects (tags) and takes care of gathering data from the attached equipment in any distributed or stand-alone configuration.
Web HMI Server	A Web HMI Server delivers an operation and monitoring window (HMI) of data & information gathered and processed by SCADA servers to Web HMI Clients.
Web HMI Client	A Web HMI Client accesses a Web HMI Server to display process mimics, trends, alarm & events and other operating data. Furthermore each Web HMI client accommodates a full functional application engineering environment for both database and display configuration. A Web HMI Clients can run on the same computer as its Web HMI Server or on a different computer across LAN/WAN networks.

Each FAST/TOOLS system comprises at least of one SCADA Server, one Web HMI Server and one Web HMI Client component. These may be configured as a stand-alone or distributed system. The following table provides an overview of which of the specific FAST/TOOLS software modules are installed on each functional system component:

Module name	Component		
	SCADA Server	Web HMI Server	Web HMI Client (*1)
BUS/FAST	*	*	
DATABASE/FAST	*	*	
HISTORY/FAST	*		
AUDIT/FAST	*		
ITEM/FAST	*		
EQUIPMENT/FAST	*		
ALARM/FAST	*		
PROCESS/FAST	*		
REPORT/FAST	*		
ACCESS/FAST	*		
USER/FAST		*	
INTEGRATION	*	*	

*1: The Web HMI Client only requires a standard supported OS and a Web browser (See System Requirements). Only one time communication configuration to setup and by any new update new version of the Web HMI is available on the server.

● FAST/TOOLS System Dimensions

The table below shows the scalability and specifies the dimensional limits of FAST/TOOLS based systems.

Function	Specification	Remarks
SCADA Server	Up to 4095 Servers per control LAN (*1)	Consult Yokogawa when more SCADA servers are needed. (*1)
Web HMI Server	Up to 4095 Web HMI Servers per SCADA Server (*1)	Maximum number of Web HMI Servers that can access to one SCADA Server. (*1)
Web HMI Clients	Up to 500 Web HMI Clients per Web HMI Server	Maximum number of Web HMI Clients that may connect at the same time to one Web HMI Server, including the Web HMI client on the same computer
Web HMI Mobile Clients	Up to 500 Web HMI Mobile Clients per Web HMI Server	Maximum number of Web HMI Mobile Clients that may connect at the same time to one Web HMI Server, including the Web HMI Mobile client on the same computer
Domain	Up to 4095 nodes per domain	A domain is defined as a SCADA Server, Web HMI Servers, and Web HMI Clients. Only the SCADA Server and Web HMI Servers are counted as a node. Up to 4095 devices per EQP and up to 1000 - 'other processes' EQPs per server.
I/O devices and controllers	Up to 10000 per Server	
Item tags	Up to 16 million per domain	

*1: The total number of nodes (= computer stations) in one domain may not exceed 4095 (computer stations with only a Web HMI Client installed are not counted as a Node). One should always consider the physical boundaries (network bandwidth, disk speed and storage capacity) that can affect these numbers.

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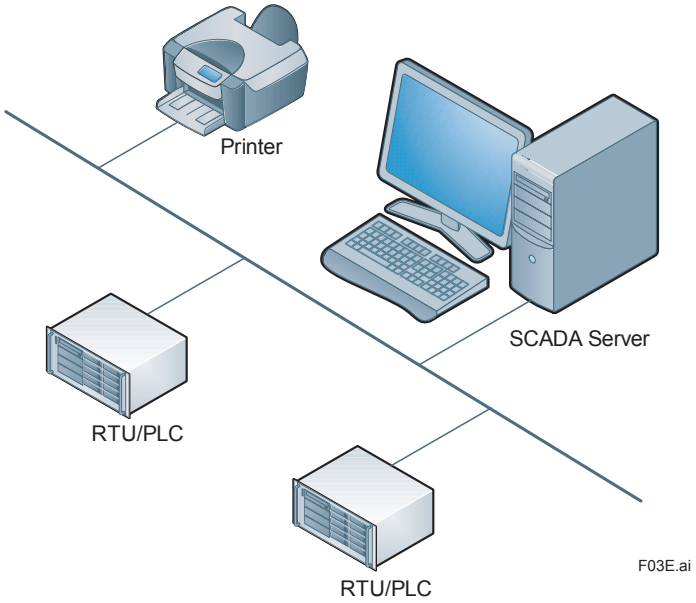
■ SYSTEM CONFIGURATIONS AND ARCHITECTURES

FAST/TOOLS has a true client/server architecture, which is not limited to stand-alone stations, and allows for distributed functionality.

Where system availability is a prime issue FAST/TOOLS can be configured to run in a redundant configuration. Several redundancy concepts are available as a standard, illustrating the flexibility of FAST/TOOLS. Examples are dual or triple server configurations, redundant networks between the SCADA system servers and clients and/or between SCADA system servers.

FAST/TOOLS supports at least any combination of the following architectures within the specified system dimension limits (see the SYSTEM SPECIFICATION section above).

● Stand-alone Concept



The 'Stand-alone' concept is based on running the complete SCADA data acquisition, supervisory control, engineering and operations environment on one computer. In terms of licensing this requires only one Windows based SCADA Server package (sized to the required number of items for its application). With reference to the 'Models and Suffix codes' section in this GS document the minimal license requirement for this architecture – assuming only the standard driver package for field I/O communications is required – is:

Item	Model (minimum license requirement)	Quantity	Product support	Quantity
SCADA Server	RVSVRN-S11-☐A or UNSVRN-S11-SA	1	SV5FTSUP-S11-BAS☐A or SV5FTSUP-S11-PRO☐A	1

☐: S= Single Platform, R= Dual-redundant Platform for Computer

This type of configuration may be used for relatively small applications where it is acceptable to have only one combined Server/HMI station for both operator supervision and engineering.

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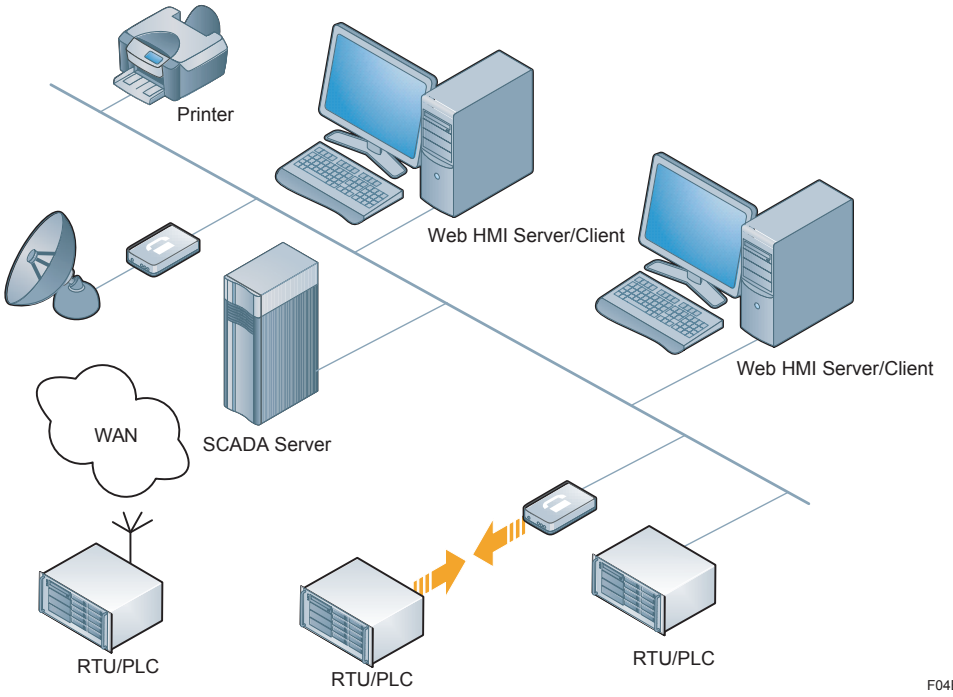
● Remote Web HMI Server/Client Concept



The 'Remote Web HMI Server/Client' concept allows for more scalability. It is based on running the SCADA data acquisition, applications and real-time database environment on a dedicated heavy duty SCADA server while running the engineering and operations environment on one or more dedicated operator/engineering computers. In terms of licensing the configuration as visualized above requires one Windows, Unix or Linux based SCADA Server package (sized to the required number of items for its application) and two Web HMI Server packages (including one client). With reference to the 'Models and Suffix codes' section in this GS document the minimal license requirement for this architecture – assuming only the standard driver package for field I/O communications is required – is:

Item	Model (minimum license requirement)	Quantity	Product support	Quantity
SCADA Server	RVSVRN-S11-☐A or UNSVRN-S11-SA	1	SV5FTSUP-S11-BAS☐A or SV5FTSUP-S11-PRO☐A	1
Web HMI Server/Client	HMIWEB-S11-☐01	2	SV5FTSUP-S11-BA☐WB or SV5FTSUP-S11-PR☐WB	2

☐: S= Single Platform, R= Dual-redundant Platform for Computer

This type of configuration may be used for fairly large applications with many RTU/PLC stations randomly located (possibly at long distances) around one central location.

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● Remote Web HMI Client Concept

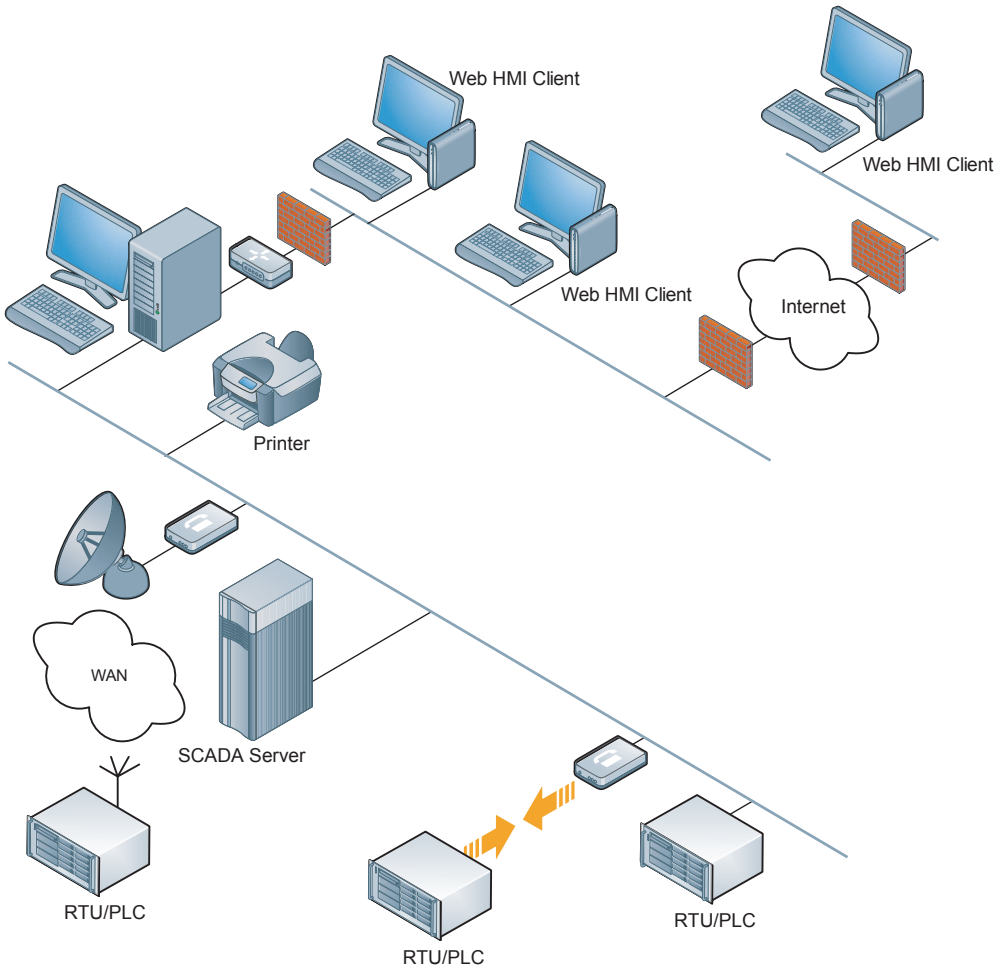

Figure Remote Web HMI Client

The 'Remote Web HMI Client' concept allows for enhanced HMI flexibility and negligible cost for maintaining remote clients across geographically dispersed locations. It is based on running the Web HMI Server on a dedicated computer serving its associated remote Web HMI Clients. These Web HMI Clients can be easily deployed on any computer device at any location over LAN, WAN and VPN networks. License registration is not required (zero deployment), and is initiated through a standard supported Web browser. In terms of licensing the configuration as visualized above requires one Windows or Linux based SCADA Server package (sized to the required number of items for its application) and one Web HMI Server package (including three client). With reference to the 'Models and Suffix codes' section in this GS document the minimal license requirement for this architecture – assuming only the standard driver package for field I/O communications is required – is:

Item	Model (minimum license requirement)	Quantity	Product support	Quantity
SCADA Server	RVSVRN-S11-☐A or UNSVRN-S11-SA	1	SV5FTSUP-S11-BAS☐A or SV5FTSUP-S11-PRO☐A	1
Web HMI Server/Client	HMIWEB-S11-☐04	1	SV5FTSUP-S11-BA☐WB or SV5FTSUP-S11-PA☐WB	4

☐: S= Single Platform, R= Dual-redundant Platform for Computer

This type of configuration may be used for applications when many 'light' and/or remote users need a real-time window into the process and its SCADA environment.

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● Host to Host Architecture

The FAST/TOOLS Web HMI consists of a Web HMI Server and a Web HMI Client that can either run separate from the FAST/TOOLS Server or be installed altogether with the FAST/TOOLS Server environment on a standalone node. Installing the Web HMI Server on a separate node has the advantage that load can be shared between the FAST/TOOLS Server and Web HMI Server.

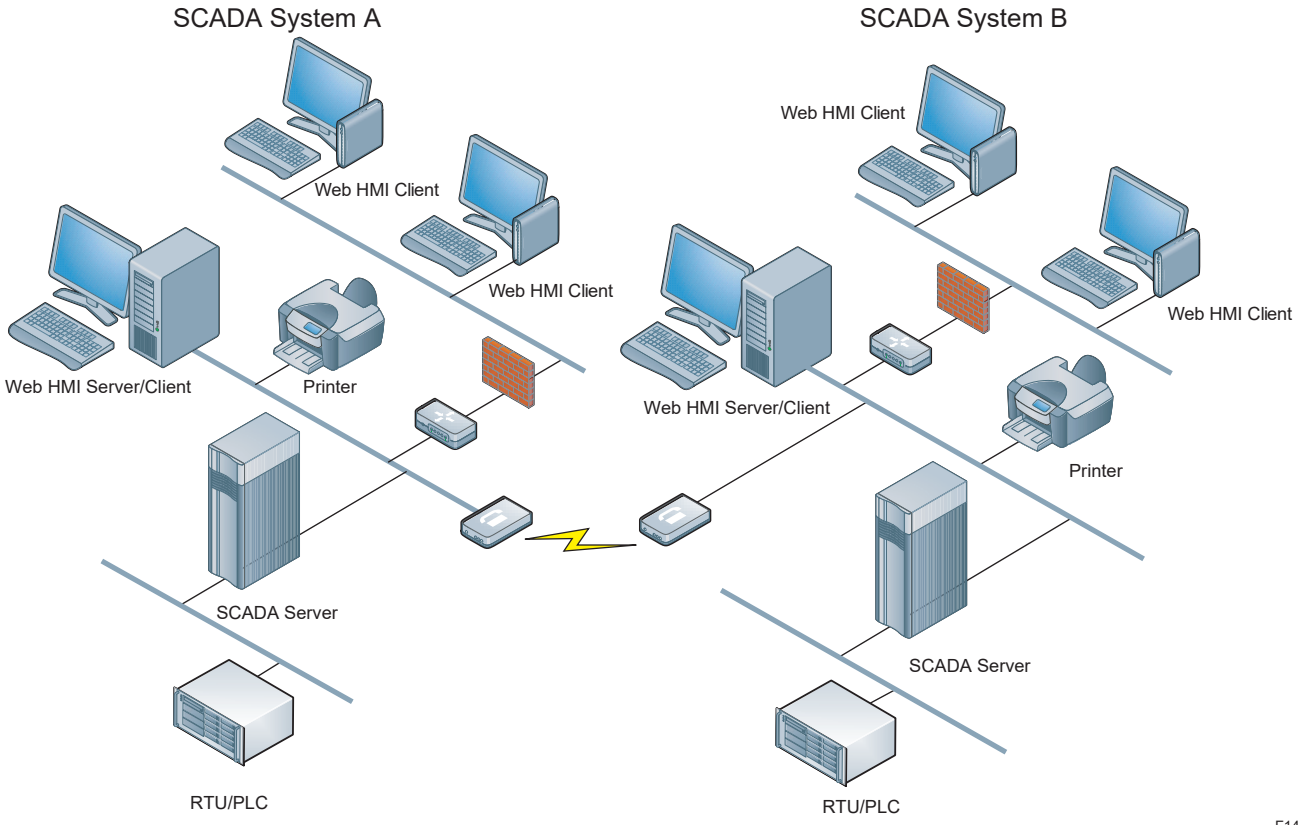

Figure Host to Host coupling

The 'Host to Host' concept (see figure above) allows for loosely coupling two or more autonomous FAST/TOOLS systems to exchange or synchronize 'real-time' data across independent system domains.
This type of configuration may be used for applications where several systems at a central or across dispersed process locations need to be fully independent in terms of maintainability and operations, while at the same time exchange key data with other (high level master) FAST/TOOLS SCADA Servers.

Secure Host to Host communication.
To support high levels of data and system security within FAST/TOOLS is there the possibility to encrypted host to host communication as a second level of defense and security besides IT based services such as the native integration with Active Directory Services. Communication encryption between two FAST/TOOLS Systems can be set between two FAST/TOOLS nodes or between the RGS and one FAST/TOOLS node.
FAST/TOOLS Host to Host security is based on industry standards that are also used for secure communication on the Internet, such as SSL, DTLS, TLS and public/private keys.
This provides an enhanced level of safety encrypted communication between the different FAST/TOOLS systems.
Encrypted network communication (AES-256) is supported for: Host Server, Web HMI Server, Web HMI Client and Enterprise Servers connections.

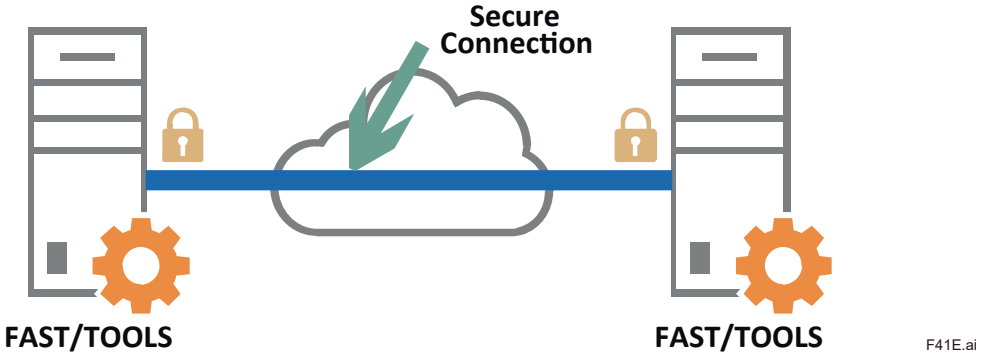

Figure Host to Host encryption between two nodes

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● Enterprise Architecture

For large scale geographically dispersed projects, there may be a hierarchy of individual Process Automation Systems, which in turn are each responsible for a specific region, and are managed by a higher level system. For these applications FAST/TOOLS provides a flexible, scalable architecture for Enterprise Automation Solutions, by supporting multi-level/multi-node configurations. It is possible to balance server functions over multiple machines, for example for data acquisition or for supporting many HMI clients. This architecture lends itself very well to Enterprise wide remote operations, - monitoring and - maintenance projects for dispersed production sites and supply chain infrastructures such as oil and gas fields, pipeline grids, water distribution, energy generation, etc.
In ISA-95, the functional levels of an Enterprise Control system are defined. Note that the levels presented in the sample architecture on the next page relate to a physical business model in which a company consists of a headquarters, regional offices and local offices. All these locations can contain systems which together form the Enterprise Architecture. This should not be confused with the automation levels defined in ISA-95, in which the logical information layers of a control system are defined. In the Enterprise Architecture, four major levels are identified (see sample architecture on the next page). Each level has its typical characteristics and usage.

Process level
The process level contains local DCS/SCADA/PLC systems or other automation control/monitoring equipment that directly interacts with the process. As an example a typical large gas production platform that is controlled by a DCS system and exchanging process information with the area level.

Area level
The area level supervises all processes within a graphical area to provide control over this area. It contains a FAST/TOOLS server node that is connected to all DCS and/or SCADA systems at the process level. A typical application at this level is to control the total amount of production within the area, and to supply production KPI’s.

Business unit level
The business unit level is typically responsible for all areas within the business unit. The business unit contains a FAST/TOOLS server node that exchanges KPI’s and other process data with the Area level. At the business unit level, users are expected to have access to data that is supportive in optimizing production of individual as well as interrelated assets.

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Corporate level
At the corporate level, all KPI's and other process data of all the business units are collected and aggregated providing a holistic view of the performance of the enterprise and its operational groups down to process level in real-time.

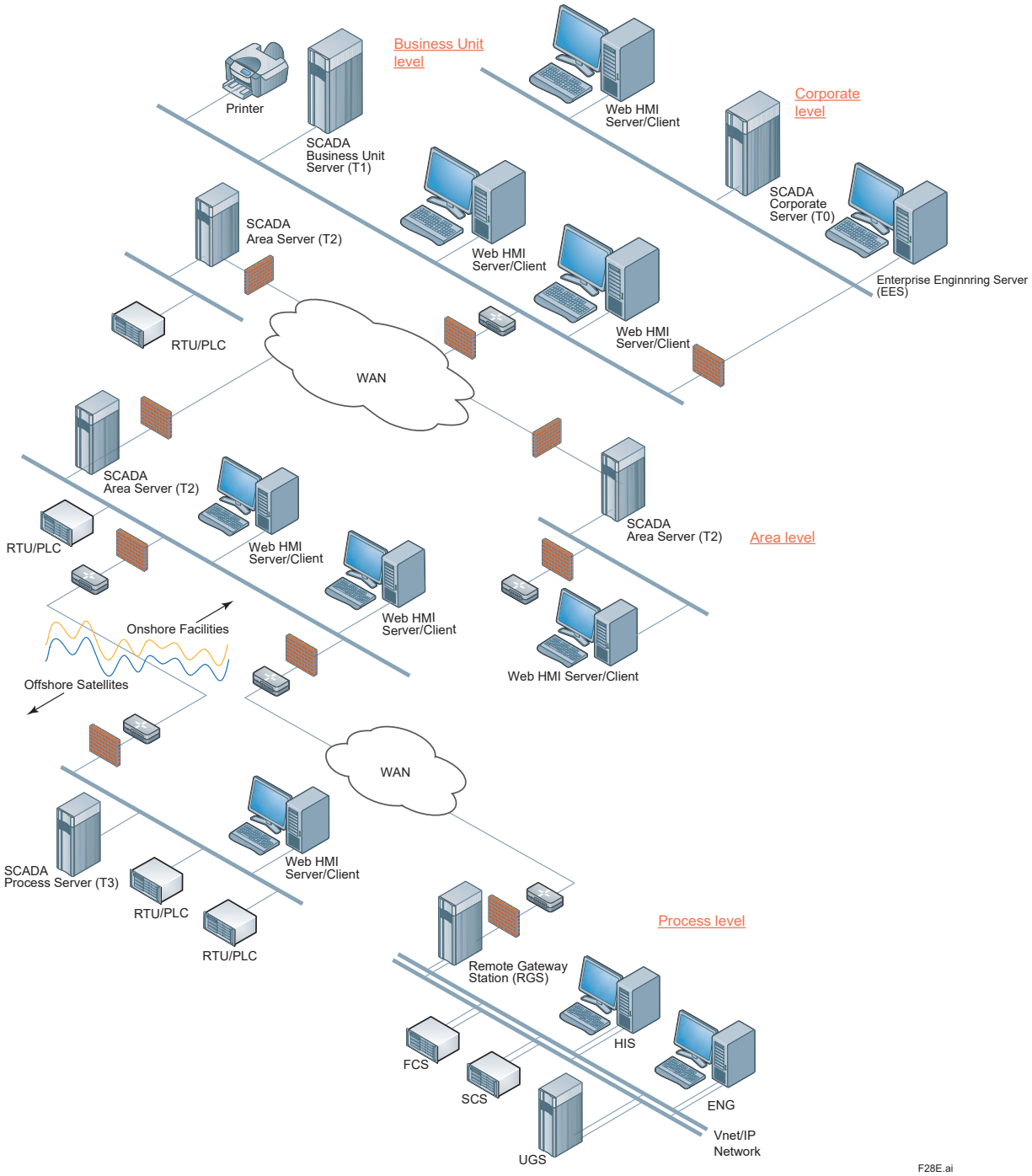

Figure Enterprise Architecture

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Item	Model	Quantity	Product support	Quantity
Enterprise Engneering Server (EES)	FTEES-S□1	1	SV5FTSUP-S11-BA□EE or SV5FTSUP-S11-PR□EE	1
SCADA Corporate Server (T0)	RVSVRN-S11-□K or UNSVRN-S11-SK	1	SV5FTSUP-S11-BAS□K or SV5FTSUP-S11-PRO□K	1
SCADA Business Unit Server (T1)	RVSVRN-S11-□J or UNSVRN-S11-SJ	1	SV5FTSUP-S11-BAS□J or SV5FTSUP-S11-PRO□J	1
SCADA Area Server (T2)	RVSVRN-S11-□G or UNSVRN-S11-SG	3	SV5FTSUP-S11-BAS□G or SV5FTSUP-S11-PRO□G	3
SCADA Process Server (T3)	RVSVRN-S11-□D or UNSVRN-S11-SD	1	SV5FTSUP-S11-BAS□D or SV5FTSUP-S11-PRO□D	1
Remote Gateway Server (RGS)	FTRGS-S1□1	1	SV5FTSUP-S11-BA□GW or SV5FTSUP-S11-PR□GW	1
Web HMI Server/Client	HMIWEB-S11-□01	7	SV5FTSUP-S11-BA□WB or SV5FTSUP-S11-PR□WB	7

□: S= Single Platform, R= Dual-redundant Platform for Computer

The above sample of a typical Enterprise Architecture provides an impression of the flexibility to compose fit for purpose enterprise wide automation system integrated architecture. This functionality is offered without compromising on the autonomous operation of the individual server nodes that can directly serve information from all levels to a single visualization environment.

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● Redundant configuration

FAST/TOOLS supports the following two redundancy schemes.

- High Availability Computing (HAC)
- Dual-redundant Platform for Computer

The following table shows the features for the both system.

	High Availability Computing	Dual-redundant Platform for Computer
Type	Active-Standby	Fault tolerant (Continuous synchronization on I/O level)
Data loss	Limited (*2)	No data loss
SW failure	Supported (Change over time)(*1)	Not supported
HW failure	Supported (Change over time)(*1)	Supported (within 1sec)
Sequence in operation	Interrupted during change-over	Continuable
Remote storage	Supported during change-over	Not supported
Disaster Recovery	Supported	Not Supported
Field I/O size	Medium/Large	Small

*1: Depending on network-bandwidth and number of items.
*2: Depending on field update frequency and data buffer protocol support.

High Availability Computing (HAC)

FAST/TOOLS supports full communication and application redundancy, independent of applied communications media and system server hardware. There are several features available in FAST/TOOLS for building high availability system configurations combined with advanced guidance tools for some typical set-ups.
The Hot-Standby software module will take care of handling Dual, Triple, Quad or even Six redundant servers and redundant hard drive configurations (RAID), independent of applied communications media, geographical distance, different domains, and system server hardware. And with watchdog and heartbeat functionalities to manage which server is active and which server is standby and how and when to switchover to the standby server.
For HAC configuration all the servers must have the same Package including all the Server Package options.
For Triple, Quad or higher, please contact Yokogawa Global SCADA Center for details.

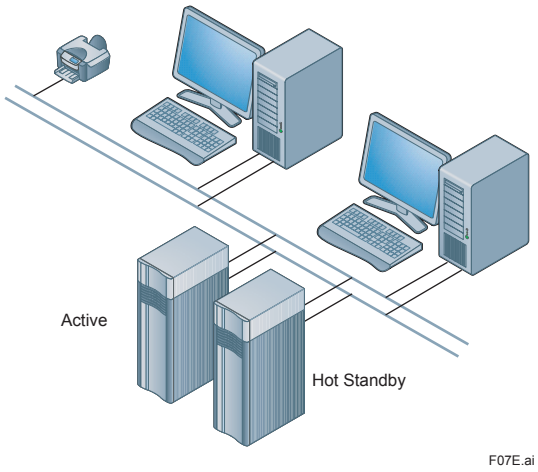

Figure Hot-Standby software Redundancy

Watchdog

This feature is only applicable for redundant server configurations. In this scenario one Watchdog process runs on each of the redundant servers. A Watchdog takes a number of inputs relating to the health the ‘active’ system as well as the current health of the ‘hot standby’ system. It decides whether the system is sufficiently healthy to carry on, or whether the redundant server should be brought online.

The Watchdog takes the following inputs as a basis for determining the health of the system:

- Current FAST/TOOLS health
- Current state of the network connection to the partner server
- Availability of network devices
- Results of custom scripts

For redundant server pairs twice the package and all the Server Package options must be ordered.

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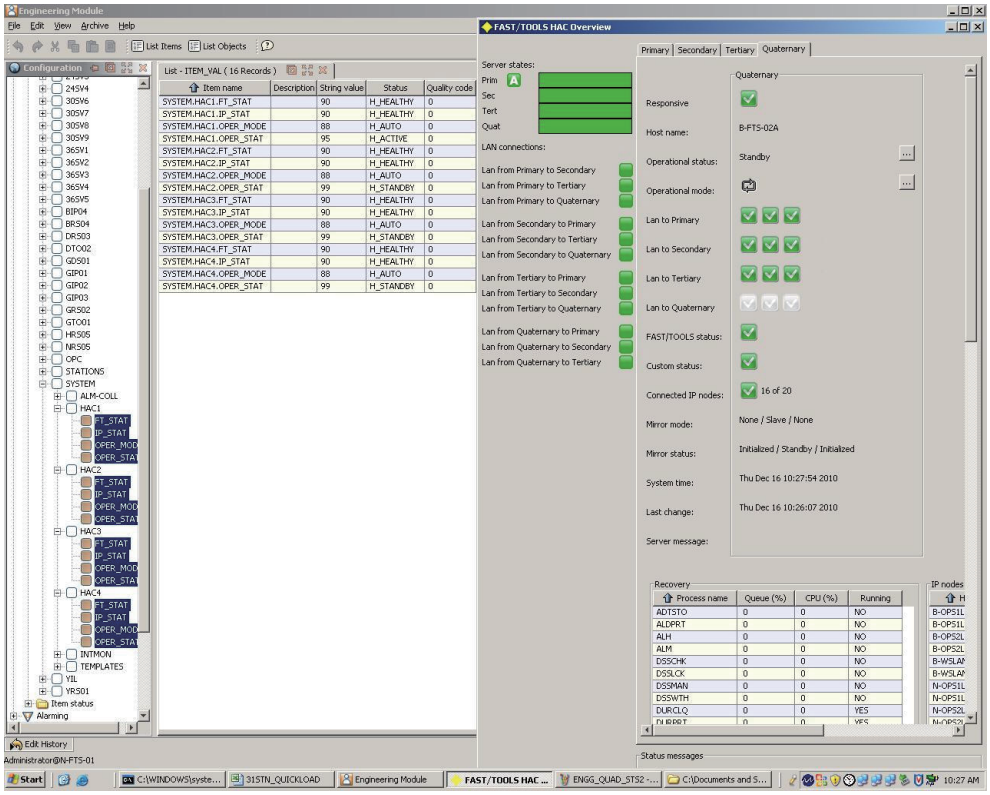

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The watchdog can support the following configurations:

- Up to 4 network interfaces
- Up to 20 IP device checks
- Provision for periodic checks using custom scripts as input to the health check

Active and Hot Standby

Once a redundant server combination is up and running, one server will be running FAST/TOOLS in its entirety, whilst the other server will be running a minimum set of FAST/TOOLS functions sufficient to monitor its own system and its associated redundant counter part. The server that is running the full real-time FAST/TOOLS environment is said to be the ACTIVE server and all SCADA functions will be handled by this machine. The other server that is running the minimum set is said to be the HOT STANDBY server and does not provide any SCADA functions (Note that only one server is allowed to be ACTIVE at any time).

Island situation

The ‘active’ server does not shut itself down in a bad health situation, but will be shut down by the ‘hot standby’ server. The only exception to this is when the server is in an island state. This means that the server detects that it has no connection to the partner, no connection to any other network devices and so is isolated from the rest of the world. In this case it has no connection to the field and no-one to shut it down, so the server will shut itself down in this case after a predefined timeout.

Initial status

When the redundant servers are initially started they will always start up as a HOT STANDBY server. The servers in a redundant configuration are of equal value, when the system starts initially and both servers are STANDBY the server that has been assigned as the PRIMARY server will become ACTIVE and the other (SECONDARY) server will remain in STANDBY mode.

Data synchronization

This mechanism secures - when one or the other server becomes active at any time - that the configuration and information on both servers is constantly synchronized, so that when the HOT STANDBY server takes over it does so with the latest configuration and information (mirror function).

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Dual-redundant Platform for Computer

FAST/TOOLS supports the Dual-redundant Platform.
The dual-redundant function consists of two computers which are regarded as a unit of “logical FAST/TOOLS” to archive a SCADA function.
Those two units of the FAST/TOOLS server share an identical Ethernet address, which provides other server transparent accesses to the data without considering which one of the redundant server is active or not.
In the dual-redundant configuration, one of the two server is active and the other server is on stand-by. For redundancy, two units of the server are connected via a dual-redundant control network.
Only the active server downloads the engineering data and equalizes them to the stand-by server via the dual-redundant control network.
When the active server fails, the active side automatically switches (i.e. fails over) to the stand-by server. Manual “switch over” is also available.
The fail/switch over takes place in less than a second, thus the components (e.g. other server and subsystem controllers) are not influenced.
Yokogawa has limited the models of computers to be used for the Dual-redundant Platform for Computer. Contact Yokogawa for more details of computer.
The reference data of performansce is described below.

	Items updates from controllers/PLCs/ RTUs	Items updates from server in graphic
Stand-alone Architecture	30,000 item/sec.	5,000 item/sec.
Remote Web HMI Server Architecture	30,000 item/sec.	15,000 item/sec.

Major impact factor to performance of FAST/TOOLS on the Dual-redundant Platform for Computer is load of communication between Server-Controllers and Server-Clients. To reduce load by tuning item update period may improve entire system performance. Contact Yokogawa for more details.

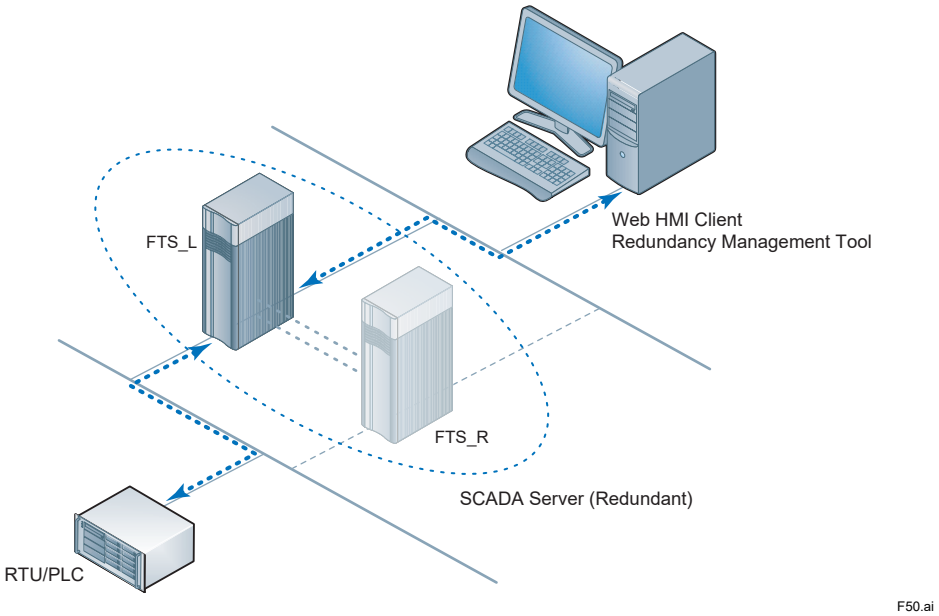

Figure Stand-alone Architecture

Item	Model (minimum license requirement)	Quantity	Product support	Quantity
SCADA Server (Redundant)	RVSVRN-S11-RA	1	SV5FTSUP-S11-BASRA or SV5FTSUP-S11-PRORA	1
Web HMI Server/Client	—	—	—	—

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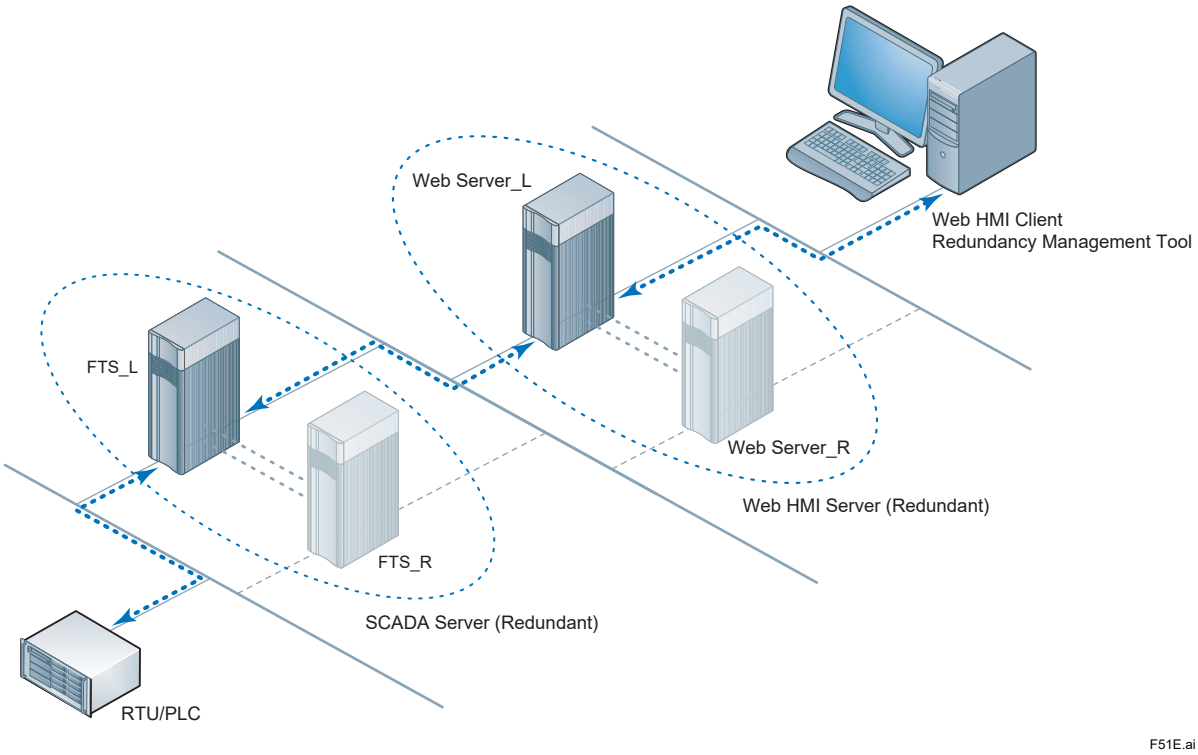

Figure Remote Web HMI Server Architecture

Item	Model (minimum license requirement)	Quantity	Product support	Quantity
SCADA Server (Redundant)	RVSVRN-S11-RA	1	SV5FTSUP-S11-BASRA or SV5FTSUP-S11-PRORA	1
Web HMI Server (Redundant)	HMIWEB-S11-R01	1	SV5FTSUP-S11-BARWB or SV5FTSUP-S11-PRRWB	1

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■ MAIN SYSTEM FUNCTIONS

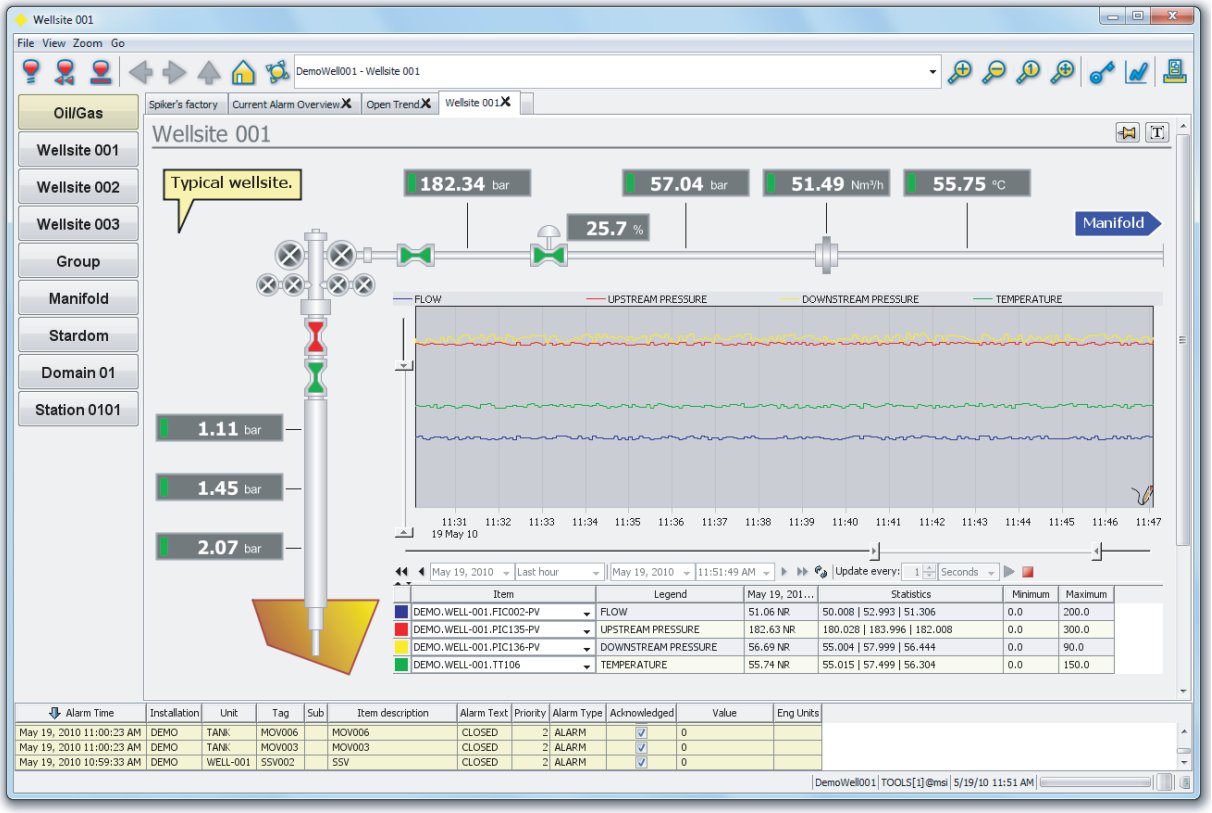
● Process Visualization and Supervision

Human Machine Interface
The FAST/TOOLS HMI is fully Web based and allows the operator to easily and intuitively navigate through the operator displays in a browser-like environment. The HMI is designed for intranet deployment and delivers the benefits of incorporating web technology.

Some of the main benefits are:

- Minimum specification of PC hardware
- Centralized administration of software installation and management
- Load sharing through remotely deployed displays and distributed client/server architecture

CDSS (Collaboration Decision Support Solution) facilitates a holistic view over all key aspects of a producing company's operations and can be utilized to monitor the main production facilities.
Mobile Client HMI from mobile devices like tablet computers, smart phones and tablets support HTML5.
ASPA (Alarm System Performance Analysis) Module for improvement the processes to avoid operator overload and reduces the risk of critical alarms being overlooked.



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The benefits for the operator are ease of use provided by the intuitive browser-like HMI standard that allows the grouping of FAST/TOOLS data into logical categories such as process mimics, alarm and event views, historical and real-time trending, faceplates and reports (which can be step less zoomed and panned in real-time). Furthermore the process mimics can contain multiple dynamic layers and visibility groups which become active and visible depending on user privileges, process conditions, zoom level, etc.

Although the FAST/TOOLS HMI is freely configurable to meet specific application needs the basic elements that can be enabled as part of the operator environment for supervision and control are:

- Layout
- Menu
- Toolbar
- Status line

The FAST/TOOLS HMI menu and toolbar accommodates for advanced display navigation through browser history, menu's and direct display call-ups.

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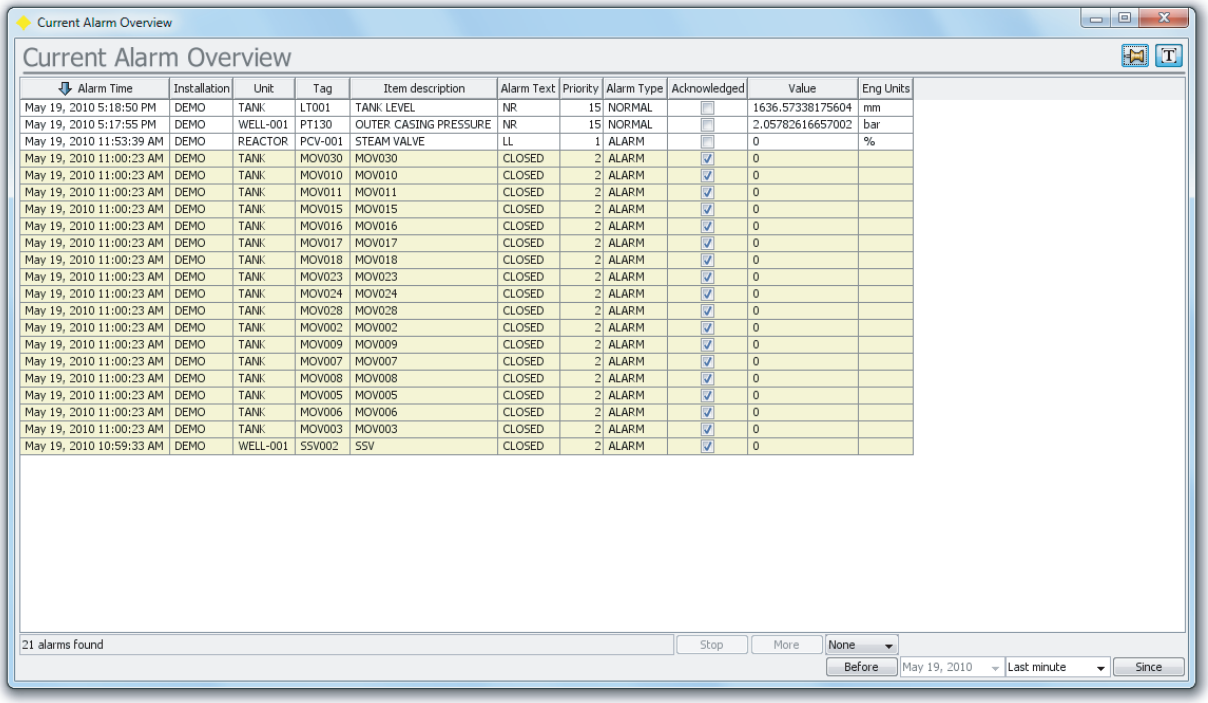
Alarm and Events
ALARM/FAST allows alarms to be presented on a number of different devices, like:

- Web HMI Servers & Clients
- Printers
- Paging systems (pagers, SMS, telephone)
- Acoustic devices (horns)

On Web HMI Servers & Clients the alarm presentation will, in most cases, be a real-time alarm table in a frame with scroll bars containing significant information for the operator. Additionally, graphical objects to which the alarms apply can be configured to change color, shape, position etc.



Alarm Time	Installation	Unit	Tag	Item description	Alarm Text	Priority	Alarm Type	Acknowledged	Value	Eng Units
May 19, 2010 5:18:50 PM	DEMO	TANK	LT001	TANK LEVEL	NR	15	NORMAL	☐	1636.57338175604	mm
May 19, 2010 5:17:55 PM	DEMO	WELL-001	PT130	OUTER CASING PRESSURE	NR	15	NORMAL	☐	2.05782616657002	bar
May 19, 2010 11:53:39 AM	DEMO	REACTOR	PCV-001	STEAM VALVE	LL	1	ALARM	☐	0	%
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV030	MOV030	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV010	MOV010	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV011	MOV011	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV015	MOV015	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV016	MOV016	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV017	MOV017	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV018	MOV018	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV023	MOV023	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV024	MOV024	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV028	MOV028	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV002	MOV002	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV009	MOV009	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV007	MOV007	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV008	MOV008	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV005	MOV005	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV006	MOV006	CLOSED	2	ALARM	☑	0	
May 19, 2010 11:00:23 AM	DEMO	TANK	MOV003	MOV003	CLOSED	2	ALARM	☑	0	
May 19, 2010 10:59:33 AM	DEMO	WELL-001	SSV002	SSV	CLOSED	2	ALARM	☑	0	

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In ALARM/FAST the alarm information can be customized for each device. Generally speaking the alarm text line will contain information regarding:

- Alarm priority (0-15)
- Alarm status (Alarm, Event, Acknowledged, reset, normal, etc)
- Date and time of the alarm (generated by FAST/TOOLS or via the timestamp received from the PLC or RTU, down to milliseconds)
- Item name, value, description and alarm description
- Alarm status text (Low, Low-Low, High, High-High, normal, underrange, overrange, offline, blocked, etc.)

Alarms are presented in two ways:

- Dynamically on display and/or printer (current alarms)
- Historical (chronological in time) on display and/or printer Historical alarms can be archived on disk or external storage.

Current alarms can be presented in a scalable frame with scrollbar controls that for example can be defined as a separate current alarm display or a three line banner at the bottom of the page. This overview is dynamic by nature; if an alarm no longer exists and is acknowledged (manually or automatically) then the alarm disappears from the screen. If there are no alarms active, this display or banner is empty. Every column of the alarm text line can be used to sort the alarm list so that current alarms can be sorted in:

- Priority base order
- Time base order
- Alarm status order
- Etc.

Every alarm status (Alarm, acknowledged alarm, repeated alarm, delayed alarm, normal, etc) can have its own distinct fore and background color or no background color. Furthermore definition of alarm line columns can be freely organized and represented.

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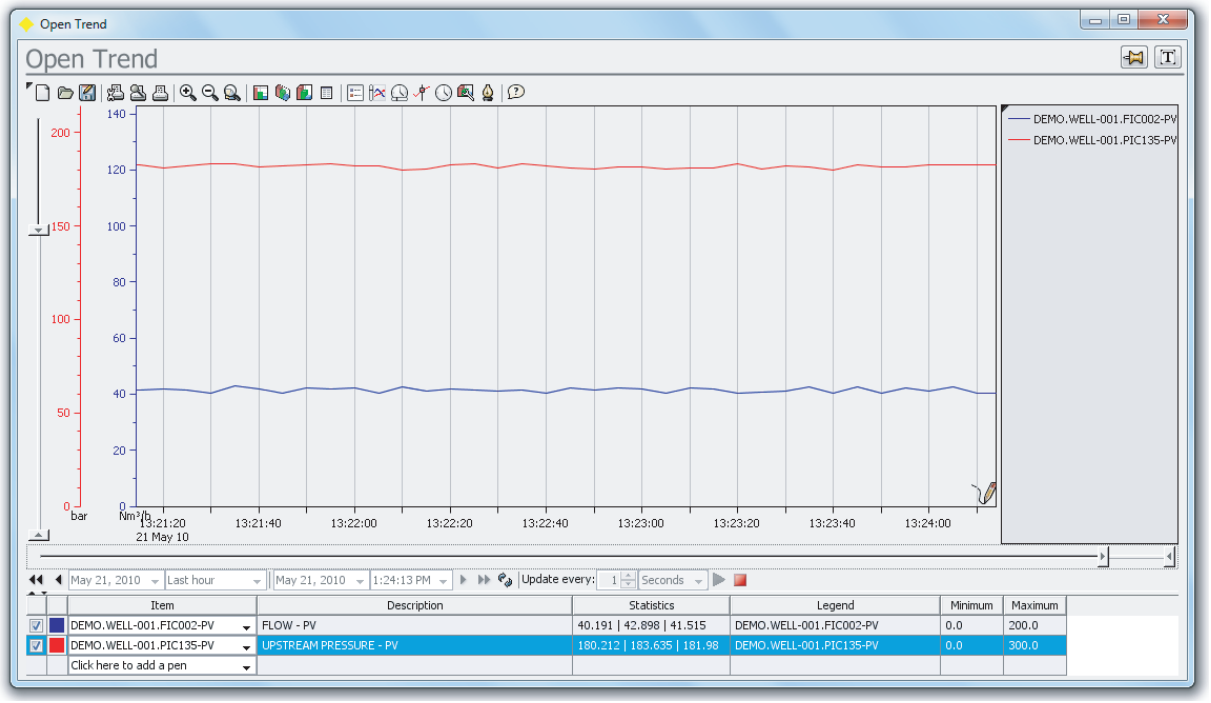
The historical alarm overview has the same functionality as described above for the current alarm overview. All status changes of alarms are represented in a fully scrollable historical alarm overview table with scroll bars and fast keys (page-up/down, etc.).

History and Trending
The FAST/TOOLS trend module provides trend visualization capabilities for all real-time and historical FAST/TOOLS data. The user interface is very intuitive and allows for fast open trend configuration.

Some of the main features are:

- 2D & 3D Rendering
- Full zoom capabilities and animation
- Historical & Real-Time trending
- Powerful sliders for various axis like value and time
- Easy time-range selection
- Max 50 pens
- Automatic selection of history groups
- Supports relative and shift related time intervals
- Free to configure legend (location, description & transparency)
- Export trending data in bitmap and CSV data files
- Reversing of time and value axis
- Complete flexibility of window decoration and layout
- XY plots
- DTS (Distributed Temperature Sensing) trend



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The two types of trends in FAST/TOOLS are:

- Real-time trends
- Historical trends

The FAST/TOOLS trend module has an extensive library of ready-to-use trend templates. You only have to couple the item to the pen and the trend is ready to run. Besides using the trend templates it is possible to customize or adjust the trends from the library.

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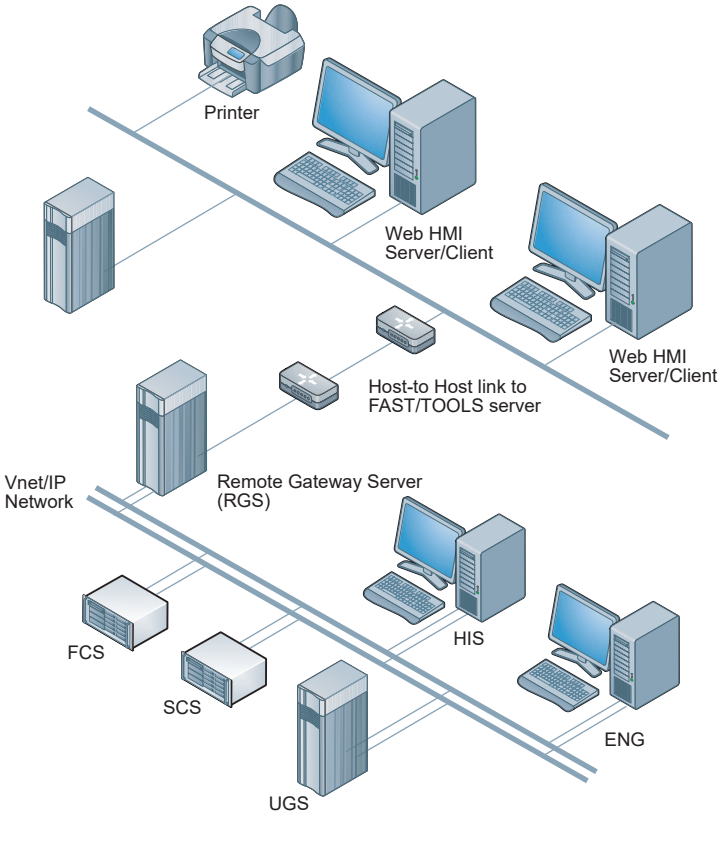
Some parameters you can set for a trend:

- The pen appearance (continuous line, dashed line, points)
- Start-time and stop-time (can be changed on-the-fly)
- Min and Max scaling value of the process variable that is trended
- The process variable to connect to a pen
- Starting and stopping the trending process
- The number of samples to show on the display
- A hairline can be activated to read value and time at a sampled point
- The sampling rate with which the trend screen is updated
- Different time scales by varying start- and end-time (can be changed on-the-fly)

Up to 50 pens can be assigned to values that can be plotted in time.
One of the more advanced features of the FAST/TOOLS Trend module is a build in option to synchronize the representation of trend data with the historical alarm statuses based on time/date. When moving the trend hairline across the historical or real-time trend time-line the associated alarms and their status at that specific point in time are displayed. Furthermore FAST/TOOLS trend module supports on-the-fly zooming and panning by the operator on any specific trend when this privilege is enabled.

● RGS (Remote Gateway Station)

The Remote Gateway Station (RGS) facilitates the integration between CENTUM VP and FAST/TOOLS.
RGS delivers an integrated automation solution, which supports a corporate wide automation strategy across multiple domains and geographies. This is achieved by providing access to Vnet/IP and managing the low bandwidth and intermitted communication requirements over remote network infrastructures at the top end from FAST/TOOLS.
Additional functions are provided for communication with CENTUM VP, which allows variable data and function block data to be read/write by FAST/TOOLS.



RGS Server connects to Vnet/IP just like a HIS or FCS, it serves as a gateway between CENTUM VP and FAST/TOOLS.

Models and Suffix Codes
Each RGS in the integrated system has to be licensed with a RGS node license.

Model: FTRGS (For HAC RGS configuration two licenses are required.)

For more information about the RGS see the General Specification no. GS 50A01A12-01EN.
FAST/TOOLS Support contract (model SV5FTSUP) is required in combination with the RGS node license.

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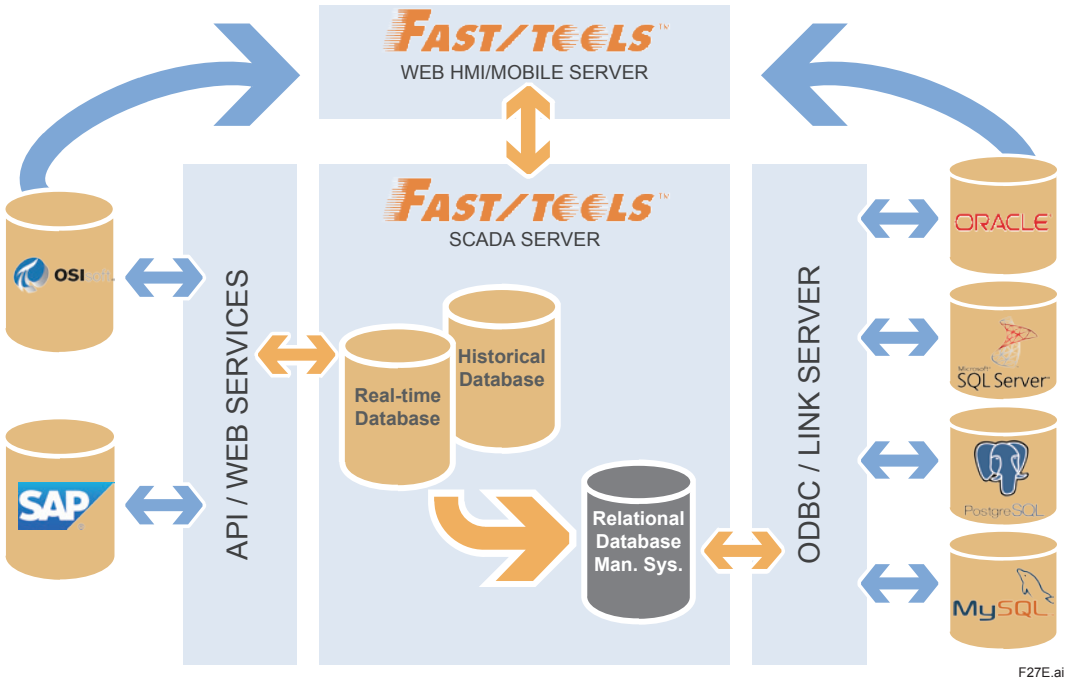
● Embedded RDBMS engine

Introduction
The current capabilities in FAST/TOOLS for getting data sets into foreign database systems is to use the ODBC interface which connects directly to the FAST/TOOLS Data Set Services (DSS) layer. This is a powerful feature for connecting FAST/TOOLS data into the familiar office environment. In practice however this can introduce a performance hit when complex queries are performed; particularly joins that do not use database keys, since the internal database is optimized for fast storage rather than for database queries.

Functionality
For customers that want to perform more complex queries that cross-section FAST/TOOLS data and want to integrate that data into their own RDBMS environments (MSSQL, ORACLE and alike), an embedded RDBMS engine is available as well. This function has two advantages over the traditional ODBC connection. Firstly data that needs to be exposed to the foreign database is first mapped to local database tables, hereby offloading FAST/TOOLS DSS from the queries that need to be executed on this data. Secondly the shape of these (pre-defined) tables can be defined (modified) at engineering time, ensuring that only relevant data is exposed to the customer's database and that it is organized in a way that best suits the application. The RDBMS engine contains a "distributor" module that runs on the same machine as the customer's database and provides an ODBC interface to the mapped tables, allowing them to be used as "linked server" tables in the customer's RDBMS system. This method improves data integration by allowing these tables to be queried and reported in the same way as native tables.



Data Read/Write
The RDBMS engine function supports reading of three types of data; data set records, historical data and current item data. The mapping of these types of data to the target tables is performed using a dialog in the engineering module. Insertions, modifications and deletions to data set records will result in changes to the corresponding mapped tables. For historical data the data will be polled from data set services at the specified intervals and used to populate the target tables. For item data, values will be aggregated, creating a new record containing the minimum, maximum, average and number of updates for the specified sampling period.

For writing data back from the RDBMS to FAST/TOOLS, a special table will be provided that allows the application to update the value, quality and status of predefined items. The RDBMS engine triggers on updates to this table to perform the writing of the item within FAST/TOOLS. This may be necessary if useful data is calculated externally by the customer RDBMS, but would then be subsequently useful to expose within the FAST/TOOLS environment.

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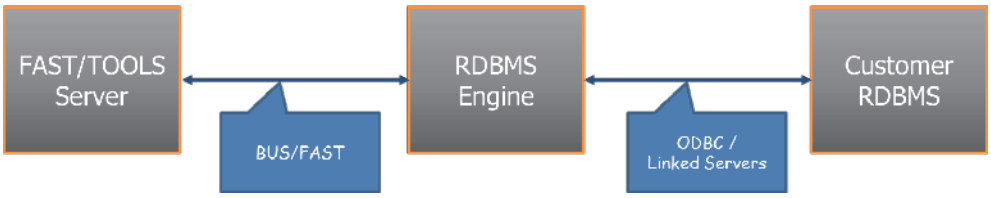
Data Security
There are a number of security aspects associated with this feature Firstly the data exposed through the RDBMS connector is only data that has been explicitly mapped at engineering time, including the items that can be written back by the application. Data that has not been mapped is simply not available to the application. Secondly since the tables are exposed through an ODBC interface that is not running on the FAST/TOOLS server, the database administrator is responsible for controlling user access to the linked tables (GRANT, DENY), without comprising FAST/TOOLS data.

Set-up options
There are several setup options to fit any specific customer and performance requirements. In the picture below each functional module operates independently and could be deployed on any combination between one and three physical (or virtual) machines.



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For example, all three modules may run on one machine, or each may have its own dedicated machine (server or PC). Another possibility is to run the RDBMS engine (Exposure Module) on the same physical system as the existing customer RDBMS system, which may be a good solution if the additional load of this functionality does not impact the existing RDBMS server in a way that would compromise its existing purposes. Importantly, the communication between each of these three modules should be transparent once configuration of the connections between them is completed.

A connection between the FAST/TOOLS server (left-hand module) and its RDBMS engine (middle module) is established via FAST/TOOLS internal secure domain and media independent communications infrastructure BUS/FAST in a manner similar to make connections between FAST/TOOLS servers in a distributed architecture.

The right-hand module represents the existing customer RDBMS system that the customer may wish to use in order to access the FAST/TOOLS data stored within the embedded RDBMS engine.

In case the FAST/TOOLS server and its RDBMS engine are not running on the same physical server and network connection is lost all data will be redirected to a preservation location on the local disk so that it may be send properly once the connection has been restored.

● OPC Unified Architecture (UA)

FAST/TOOLS provides an embedded OPC Unified Architecture (UA) environment. The OPC Unified Architecture is the latest of the OPC standard featuring a cohesive, secure and reliable cross-platform framework for access to real-time and historical data and events. It retains all the functions of the ‘classic’ OPC including: data access alarm and conditions, history access, which effectively reduces the cost of system integration.

FAST/TOOLS supports both Server (DA/A&C/HDA) and Client (DA) for OPC Unified Architecture (UA). The OPC UA Server enables a simple and effective solution for users requiring communication to upper layer management systems. OPC UA technology uses proven security concepts that offer protection against unauthorised access, against sabotage, the modification of process data and against careless operation. The OPC UA security concepts contain user and application authentication, the signing of messages and the encryption of the transmitted data itself.

The OPC UA feature allows users to leverage FAST/TOOLS extensive library of protocol drivers to connect new or existing equipment to a secure, reliable management network.

FAST/TOOLS also supports the ‘classic’ OPC Server and Client including tunneled OPC for distributed communication (DCOM) links over the network infrastructure. The OPC Tunneling provides a secure and robust interface in a distributed manner avoiding common known OPC issues across domains.

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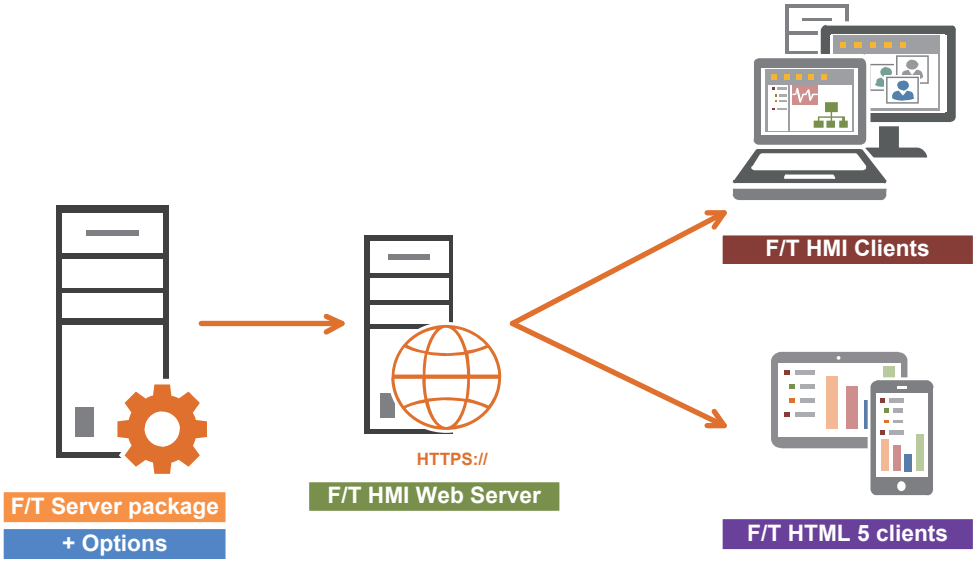
● Mobile Client HMI

For access to HMI graphics of the FAST/TOOLS system from mobile devices like tablet computers, smart phones and tablets support for HTML5 is available. Typically these devices do not support the Java VM to run the native FAST/TOOLS HMI applets and have a different form factor than a board display.



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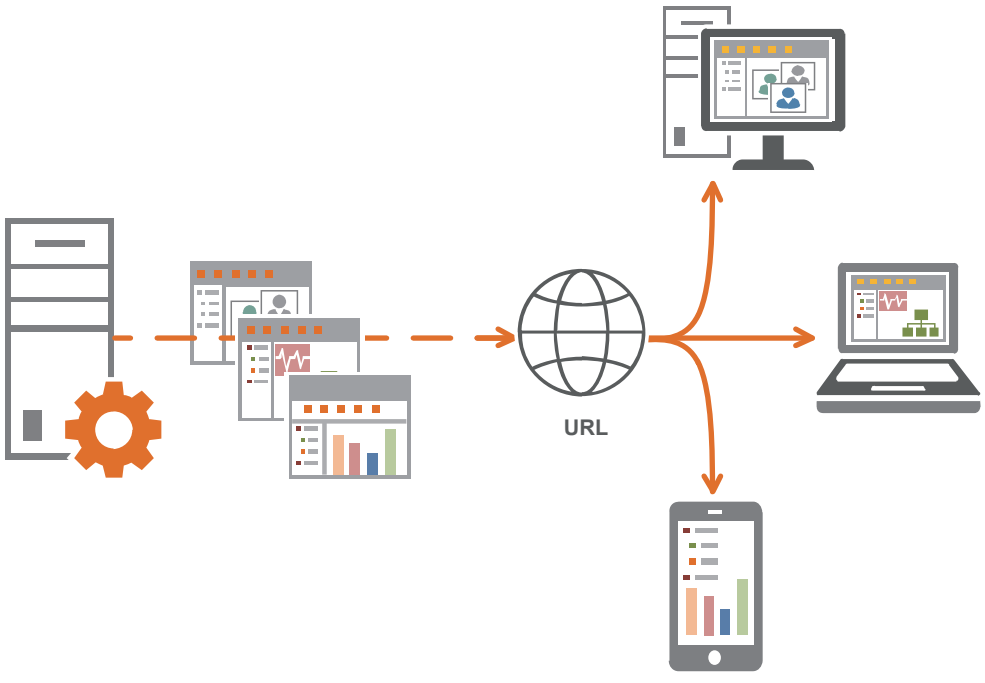
Numerical as well as graphical mimics can be developed in the standard FAST/TOOLS HMI Edit Module hereinwith some limitations as described below. Deployment of FAST/TOOLS mimics to mobile clients is executed through using the export feature of the Edit Module to automatically convert the mimics to HTML5 format.



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Legend Figure:

- FAST/TOOLS Web Server: HMI Server for Web-HMI and Mobile Clients
- Web-HMI Client: Java VM based operator interface web client
- Mobile-Client: HTML5 based operator interface web client

The HTML5 interface is intended for use with mobile devices or lightweight HMI functions for casual users, that require a limited amount of information to be presented. For board displays and 24/7 operator screens the Java based operator interface should be used.

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Not all features of the graphical editor are supported in HTML5. Components that are not supported will not be converted and remain empty in that portion of the display. A full list of supported components and properties is included in the Instruction Manual. Some are highlighted below as guidelines for development and deployment of mimics for mobile devices based on the used HTML5 standards. Continuous advancements are made to enhance the HTML5 support as part of service packs and new releases of the FAST/TOOLS software package.

- The conversion specification is one way direction i.e. from FAST/TOOLS to HTML5
- HTML5 files will have the same names as the converted FAST/TOOLS displays.
- Supported visualization components are: Line, Rectangle, Arc, Polygon, Ellipse, Spline, Text, Number, Icon, Input components, Push buttons, Toggle button, Check box, Radio button, Slider, Spinner, Combo box, List, Text field, Password field, Text Area, Number field and Date/time field.
- Layers with item connection on visibility and transparency properties are supported
- Edit actions allowed on components to be converted are: horizontal/vertical flip, arrange on layers, (un)grouping and shaping properties like: unite, subtract and intersect.
- Supported display properties include: naming, tab icon, width, height, background color/image/blinking, open on event
- Item attributes and object signals can be read/write to FAST/TOOLS server under authorization
- Alarm acknowledgement
- Basic trend functionality is supported
- Faceplates can be opened
- Improved secure communication layer (web sockets)
- Support for parameter passing to a sub-display
- Corresponding layout specified for the display will be used to define the locations of components on the HTML5 page
- Faceplates can be opened in a separate window (dependent on layout file)
- Secure communication layer (web sockets)
- Report component is supported
- AOG components (there is no HTML5 symbol library at this moment)
- Blocking function at alarm overview
- Dataset Table
- Javascript

The generated HTML5 file is W3C Valid and uses HTML5 and SVG 1.1 specifications. The file should run on all browsers that support:

- HTML5
- SVG
- Javascript

Current support for Inline SVG in HTML5 are HTML5 supported web browsers.

Because the HTML5 files are rendered by browsers and not by OS, the operating system does not matter. The only influence is the web browser being used (see table above to ensure compatibility).

When using the HTML5 based Mobile Client HMI consideration must be made for the form factor of the target device. Layout files used for FAST/TOOLS process mimics that define the location and position of displays should be created to reflect the appropriate device resolution and controls.

Note Although a browser may be HTML5 compliant, there may still be differences in presentation due to differences in rendering engines between browsers

For the Mobile Client HMI (HMTL5) a wide range of graphic functions is supported. For the detailed list of the supported functions see Instruction Manual (IM) USER/FAST Editor (IM 50A03D00).

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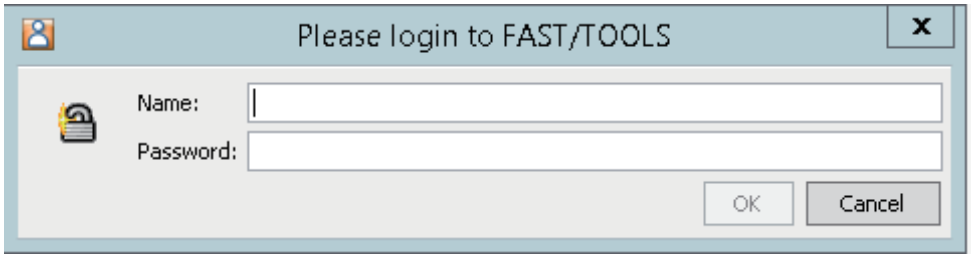
Models and Suffix Codes

HMIMOB-S11

A default login window similar to the Operator Interface login will be deployed to the webpages folder with the name index.html which will be the default start page.



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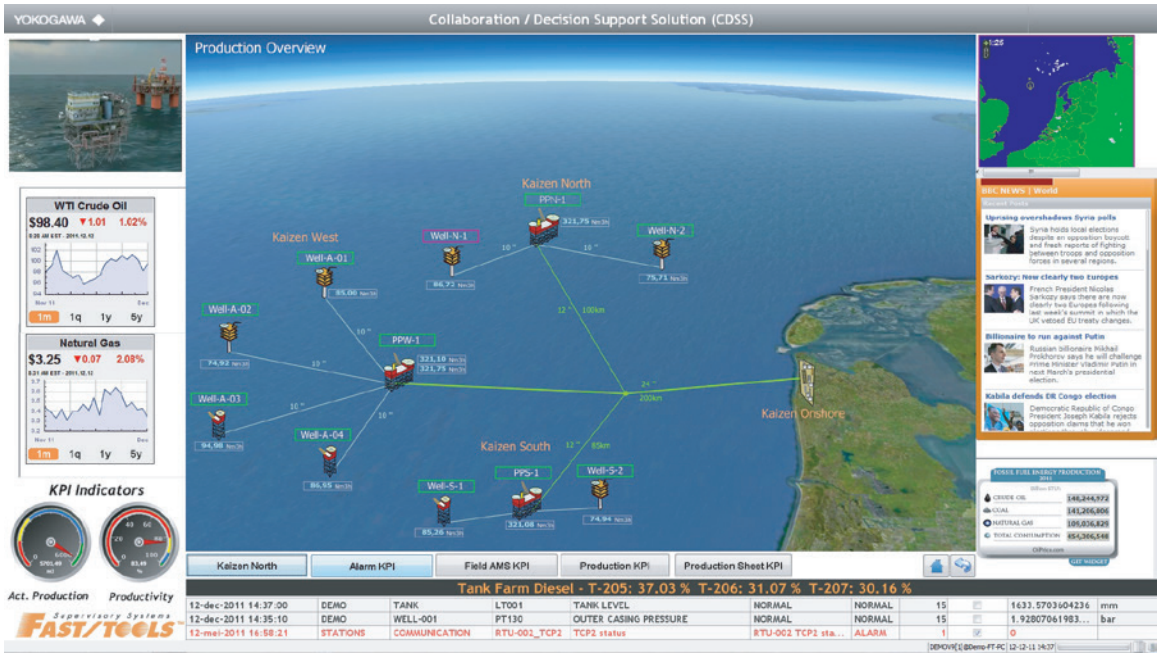
The OK button will send the username and password to the Web-HMI Server. The Web-HMI Server will reply with the Layout and Initial Display of the user. For security reasons the HTTPS communication must be used.

● CDSS (Collaboration Decision Support Solution):

Functionality

FAST/TOOLS CDSS dashboards facilitates a holistic view over all key aspects of a producing company's operations and can be utilized to monitor the main production facilities like (petro) chemical complexes, power plants, as well as its sub processes such as; utilities, reactors, tank farms, loading- and offloading facilities.



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FAST/TOOLS CDSS allows integration of information from all kinds of data sources such as video streaming (CCTV, CAMs), URL (Internet/Intranet), databases, spreadsheets, pdf documents, etc. These sources are available as standard components that can be utilized in mimics and dashboard views with minimal configuration effort.

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Deployment
FAST/TOOLS CDSS can be utilized for a number of objectives that contribute to improved effectiveness and performance of new and installed production management systems

Examples of FAST/TOOLS CDSS deployment objectives:

- Delivery of essential information from all connected sources shared to specific enterprise groups by means of pre-defined trends & reports
- Support to move from transactional processes to 'real-time' interaction and acts as an enterprise information monitoring system
- Optimize human resources efficiently across local and remote production facilities by centralizing knowledge for more effective and consistent use.

Components
The Web Browser component embeds full- or part of- web pages in the operator mimics, menu's, side bars and banners (for example pages of a weather forecast site or specific information from the company's intranet). It is possible to add controls and status fields easily and connect them to the command and navigation properties of the component. For instance, to add Push Buttons and connect them to the Go Back, Go Forward, Go Home, Reload and Stop properties and add a Text Field and connect it to the URL property.
The Web Browser component can only be used when the web HMI client is based on MS Windows. When deploying Web HMI clients on other platforms the Java based web browser can be used which is similar to the IE web browser component however with less commands and navigation properties.

The Media Player (Windows Media Player) component embeds and plays media files (sound and video) in the operator interface (for example instructional videos). With the display properties of the component it can be determined what controls will be available (e.g. playback controls and a tracker bar). For the basic playback controls push buttons can be added and connected to the command properties. The Media Player component is based on MS Windows Media Player. Please refer to the information provided by Microsoft for the media file types that can be played.

The PDF Viewer component embeds PDF documents into the operator environment (for example the Operator's Handbook). With the properties of the component it can be determined which controls will be available (e.g. controls for page browsing, zooming and printing). For the basic page browsing controls and the printing controls it is possible to add Push Buttons and Number Fields for the page number connected to the navigation and printing properties.

Supported platforms: Microsoft systems.

● Advanced Operating Graphics (AOG)

Advanced Operating Graphics (AOG) is a consulting service provided by Yokogawa to design PCS user interface based on human factors and knowledge engineering in order to improve users' situation awareness.

- Identify user, task and functional requirements for operation that require HMI support.
- Analyze the requirements in order to determine the needs and conditions to meet for the project.
- Provide guidance on designing and developing user interface including display layout, navigation, hierarchy, color pallet, data visualization, etc.
- Submit final report of achievements in the project.

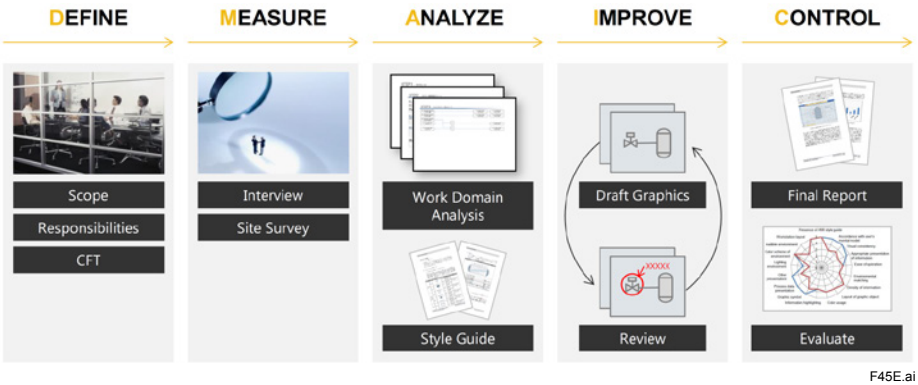

Figure AOG Consulting Process

To support a more effective HMI strategy we have developed a symbol library adopting the ISA-101 philosophies. The ISA-101 standard helps users understand what those concepts mean and how to implement them. It is designed to develop and establish a consistent approach to effective HMI development and implementation for manufacturing and especially process industries. End users, automation suppliers and system integrators can use this standard to create more effective HMIs, which will lead to higher productivity and a safer operating environment. Therefore, the emphasis is on showing meaningful information rather than just numbers facilitating Advance Operating Graphics (AOG).

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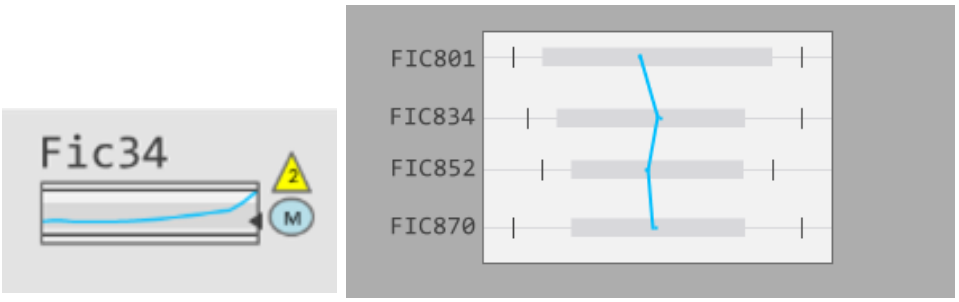
The High Performance HMI is governed by the following principles:

Emphasis on information
Data in general are just numbers. A context is needed to give those numbers a meaning, whereas, information is something that is useful for the user.



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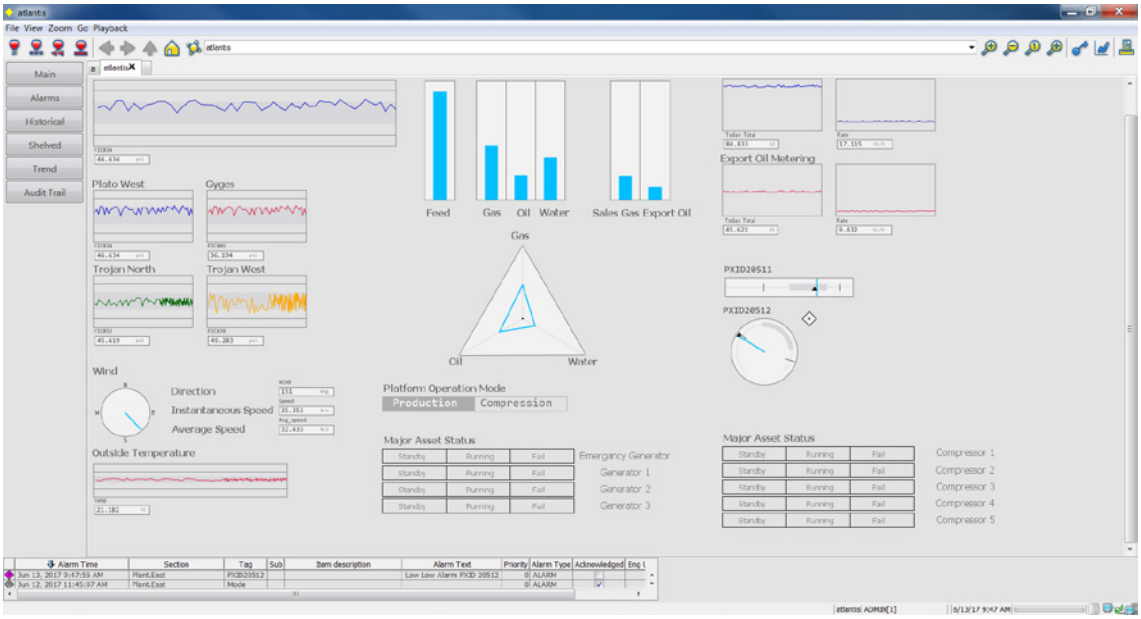
When data are shown within a context, they become relevant for performing a particular task. Therefore, context and relevance are the keywords to convert data into information.

Seek the operator's attention only when required
Shows a colourful display is difficult for the Operator to see abnormal situations. By making use of limit colour and relevant information, the Operator can immediately find out what is imported.

The AOG Symbol library and templates are standard available inside the FAST/TOOLS editor and ready to use in your displays, besides all the other symbols and templates we already have in the FAST/TOOLS editor.



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Note: AOG consulting service is available on request. Please contact Yokogawa Global SCADA Center for details.

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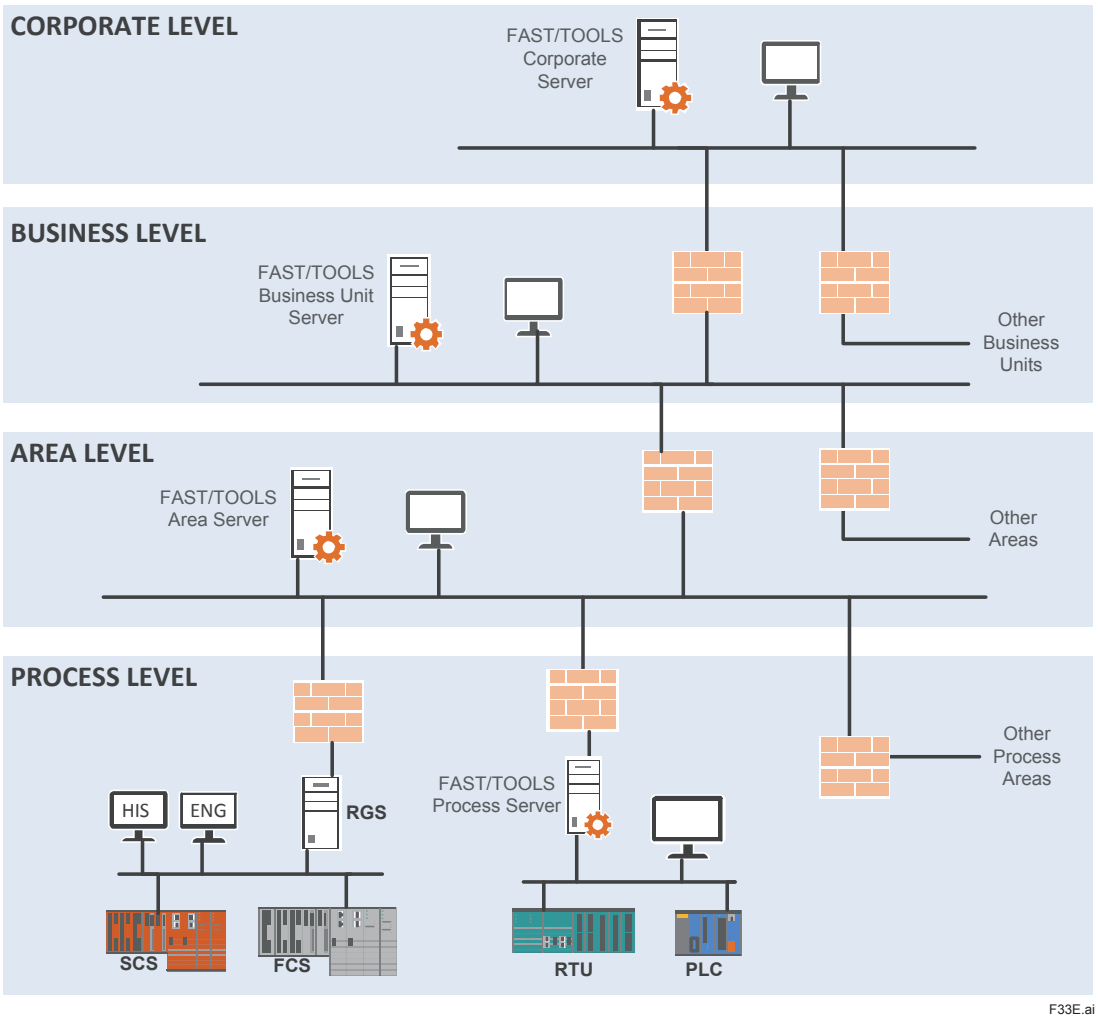
● Enterprise Operations

Enterprise operations delivers the process data to the users at each automation level (see figure below). This covers the process operator controlling the process at the Process level, up to the KPIs that are supplied to the financial systems of the enterprise at the corporate level.



The FAST/TOOLS Enterprise Operation Module is responsible for gathering the data to be displayed to the user, and to process the user responses. For this it uses the name space server to establish the most optimal path to access data to be presented to the user. It tries to find alternative paths to the data if access to a certain server is temporarily interrupted. The rule based security model authorizes a user to perform certain operational tasks.
In the figure above, four networks are depicted: the Corporate network, the Business Unit network, the Area network and the Process network. These networks can be one physical network where the sections are separated by routers and firewalls, or these networks can be physically separated. In the latter case, a Business Unit server may have two network cards, one that connects the server to the Business Unit network, and one that connects the Business unit server to the Corporate network.

The logical automation network supports plug and play. When a server is added to the physical network at any level then the logical automation network will discover this and update its routing tables with the new server.

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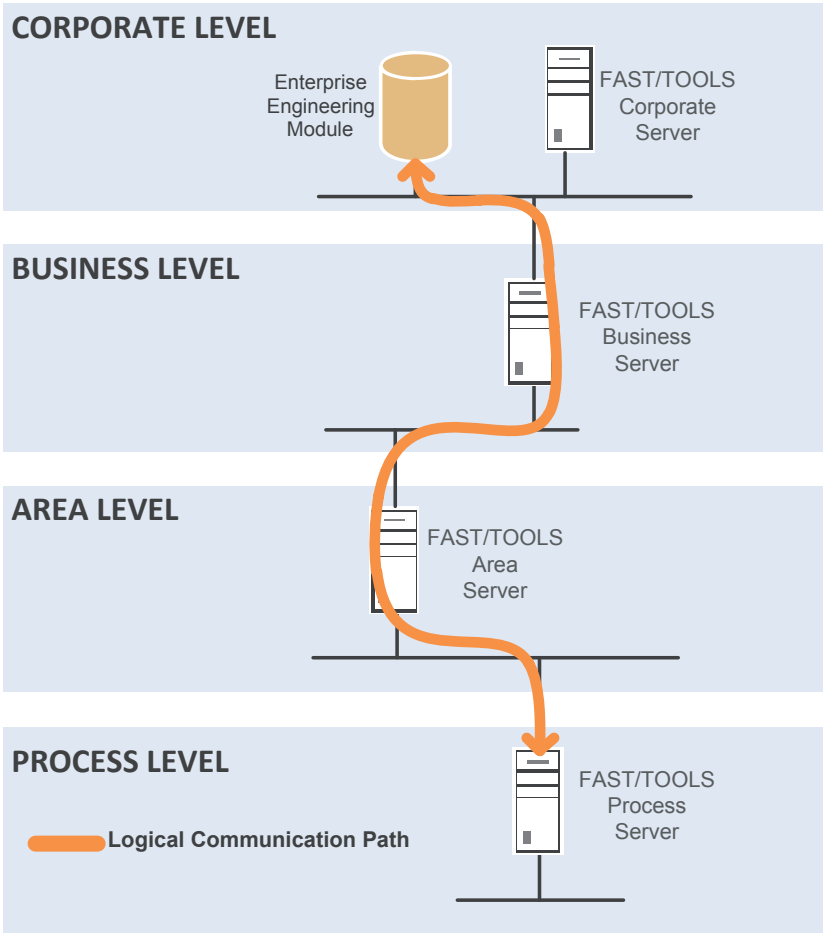

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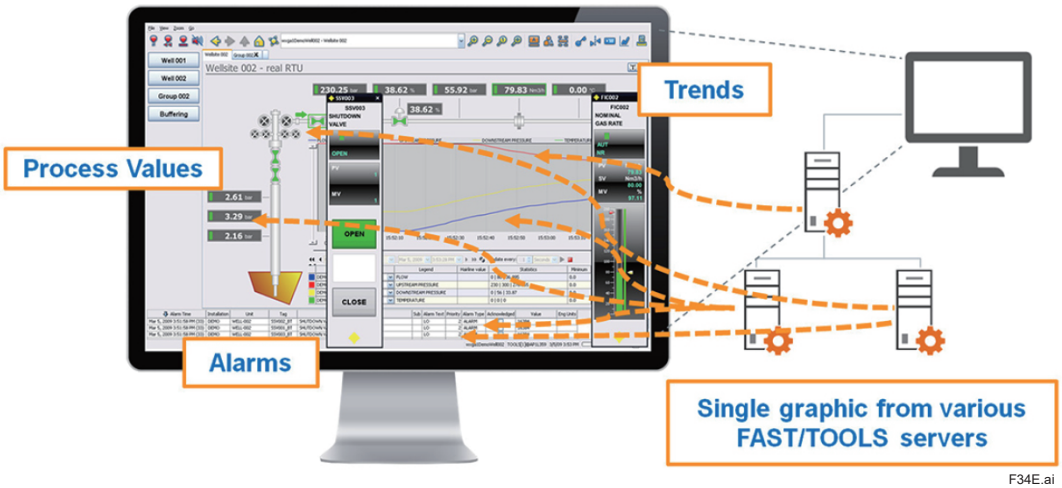
In the figure above a logical connection between an Enterprise Operation Module located at the corporate level and one of the process server from which its visualization environment is gathering information from is shown. This allows the Enterprise Operations Module to connect to multiple FAST/TOOLS servers across several levels and to visualize the gathered information in one Mimic as illustrated here below.



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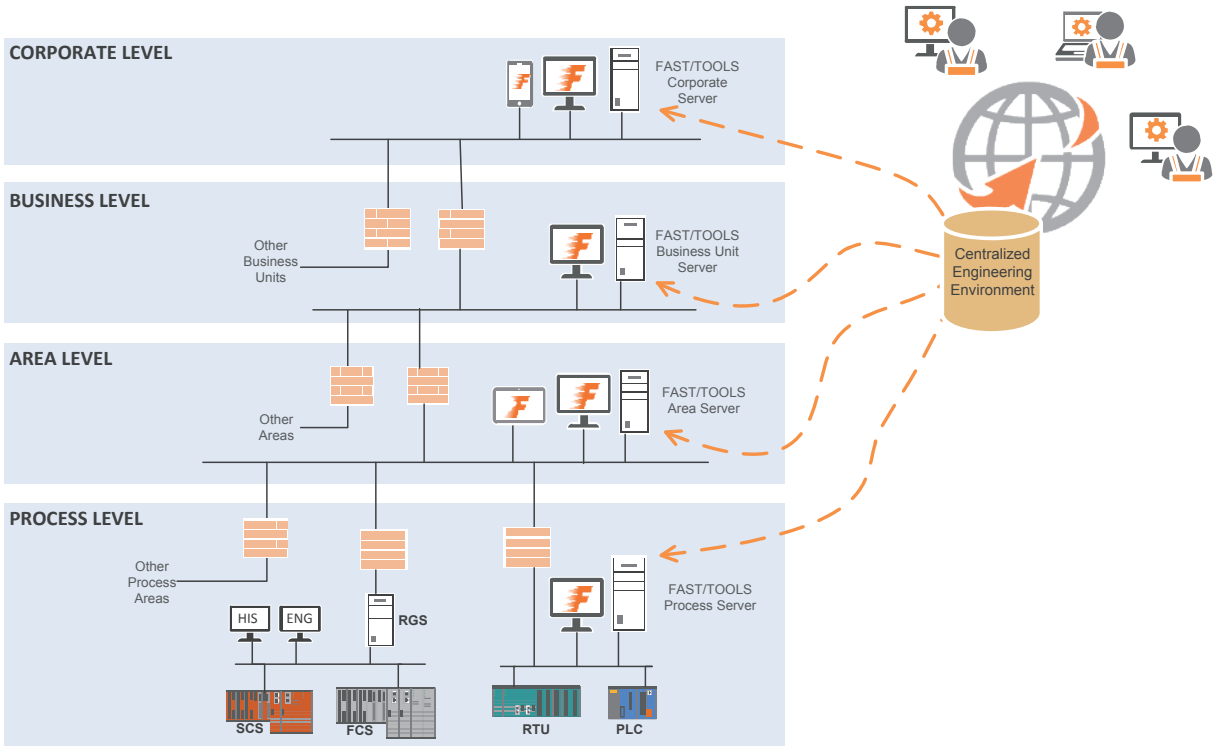
Enterprise Engineering
FAST/TOOLS provides support for multi-level, multi system architecture and maintaining consistency of engineering definitions between these systems.
These large geographical dispersed systems require a different approach from an engineering perspective with central engineering and managed deployment of configurations.
The FAST/TOOLS Enterprise Engineering Module is responsible for this system wide engineering where the Enterprise Engineering database contains all master enterprise definitions for all servers and deployment information (what runs where).
Engineering can be done online and offline simultaneously by local and remote engineers on an integrated enterprise engineering environment. This is easier to manage, and reduces complexity. A dedicated engineering workstation does not load other systems, does not require network access to servers during engineering and provides a method for standardizing engineering configurations across servers. This reduces project and engineering costs significantly.



The Enterprise Engineering Station contains;

- Single engineering environment containing all common enterprise definitions and deployment data.
- Deploy and synchronize to multiple levels and areas from a single database.
- Local and remote access for multiple enterprise engineers on an integrated enterprise engineering environment

Enterprise Engineering is performed using the Enterprise Engineering Module that runs on the Enterprise Engineering Server(EES). EES is connected to Web-HMI client(s).

Model and Suffix codes
The EES in the integrated system has to be licensed with a EES node license.

Model : FTEES (For HAC EES configuration two licenses are requiered.)

FAST/TOOLS Support contract (model SV5FTSUP) is required in combination with the EES node license.

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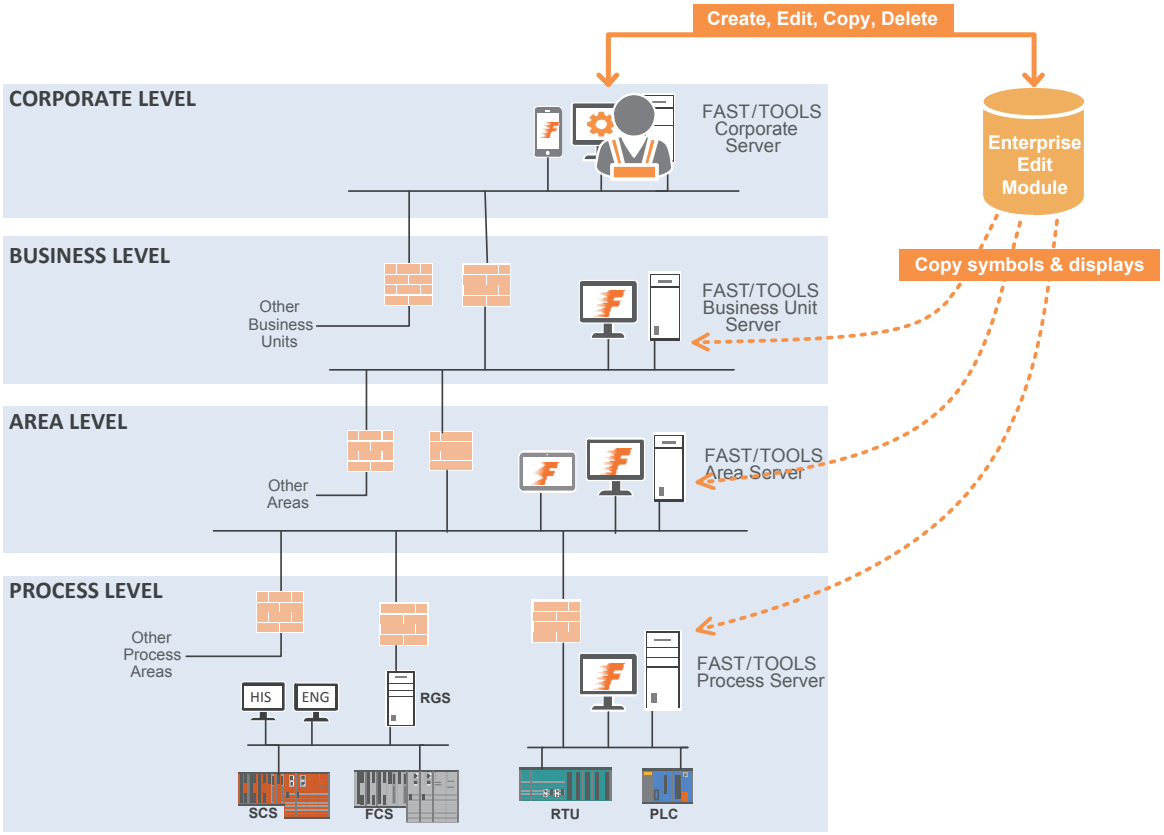

The Enterprise Edit Module contains;

- Enterprise display management functions
- Edit enterprise displays local and remote
- Copy displays to other nodes
- Can be run from any enterprise node

Item calculation for Enterprise Server License

Enterprise Server (ES) (model RVSVRN & UNSVRN) is also required to have a proper license defining an available number of items which needs to be more than the number of items used on it. The following is the guideline to calculate the number of items needed on each ES.

The calculation of number of items is classified into the following four cases.

Case 1: The ES displays (*1) Items which are located on other ESs

If the ES only display items on other ESs as they are, without any modification or calculation to the items, then the ES needs no item on itself for those items. The ES needs no item license for them.

*1: The “display” includes both reading data from item and writing data to item, on a graphic.

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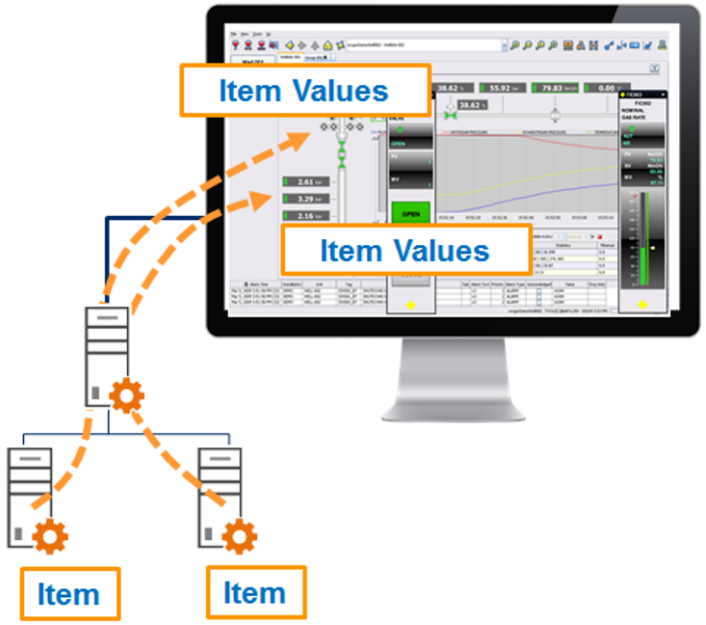

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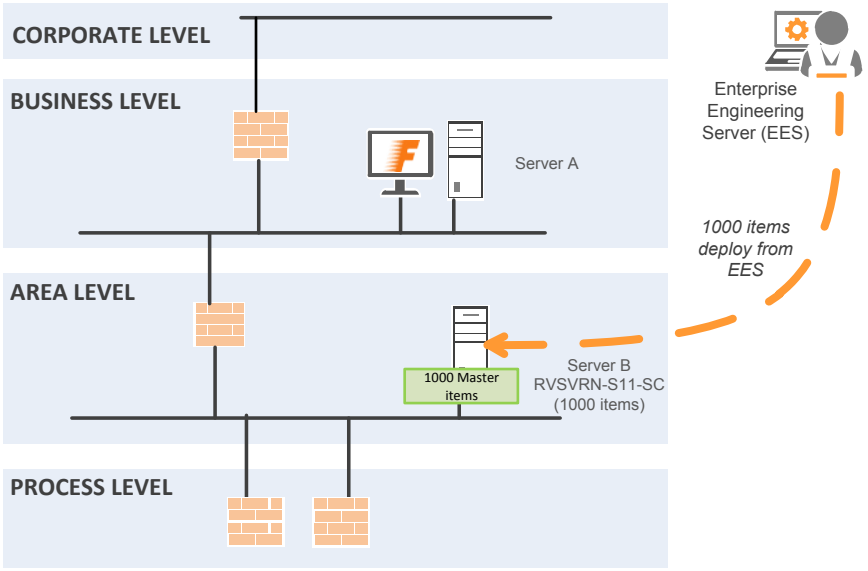
Example:

- Displays connected with Server A only show data of items on Server B via Server A
- 1000 items are deployed from the EES to Server B

A required item license is only for Server B



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Case 2: The ES uses (*2) items which are located on other ESs.

If the ES uses items on other ESs, then the ES needs to have the same number of items it uses on itself. The ES needs the item license for those items.

*2: The “use” means the following cases:

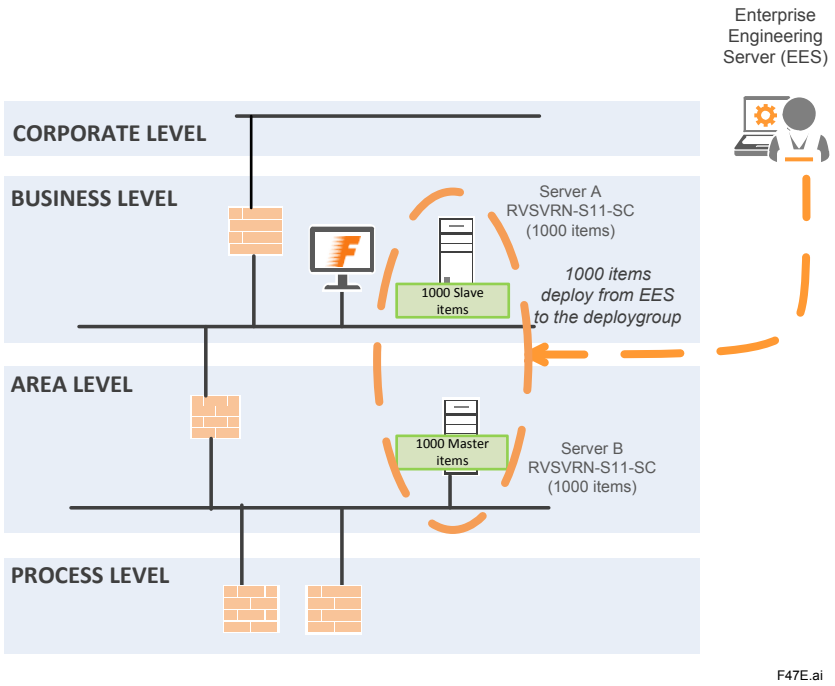
- Use the items in programs.
User can create various programs by using programming languages (Java or FAST/TOOLS language) equipped on FAST/TOOLS, and the program can handle items for calculation, copy, reference and so on. If the ES uses items on other ESs, in the program in it, then it needs to have items for them on itself and is required to have the license for the items.
*The program is called “Object”.
- Store the items as local Historical data
If the ES stores items on other ESs, as Historical data on itself, then it needs to have items for them and is required to have license for the items.

In this case, same items are placed on multiple ESs which use the items and the values of items are synchronized constantly between the ESs. FAST/TOOLS have the concept of “Deployment group” to handle these items.
These items – same items placed on multiple ESs – are in the same deployment group. The deployment group is constructed of items, Objects and ESs on which the items and Objects are deployed. The deployment groups are configured by user on engineering works.

Example:

- Server A and Server B construct the deployment group
- Displays shows items on the deployment group
- 1000 items are deployed from the EE server to ESs in the deployment group

Each server, Server A /Server B, requires the item license.



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Case 3: The ES uses Objects which are located on other ESs and Objects have items created by the Objects.

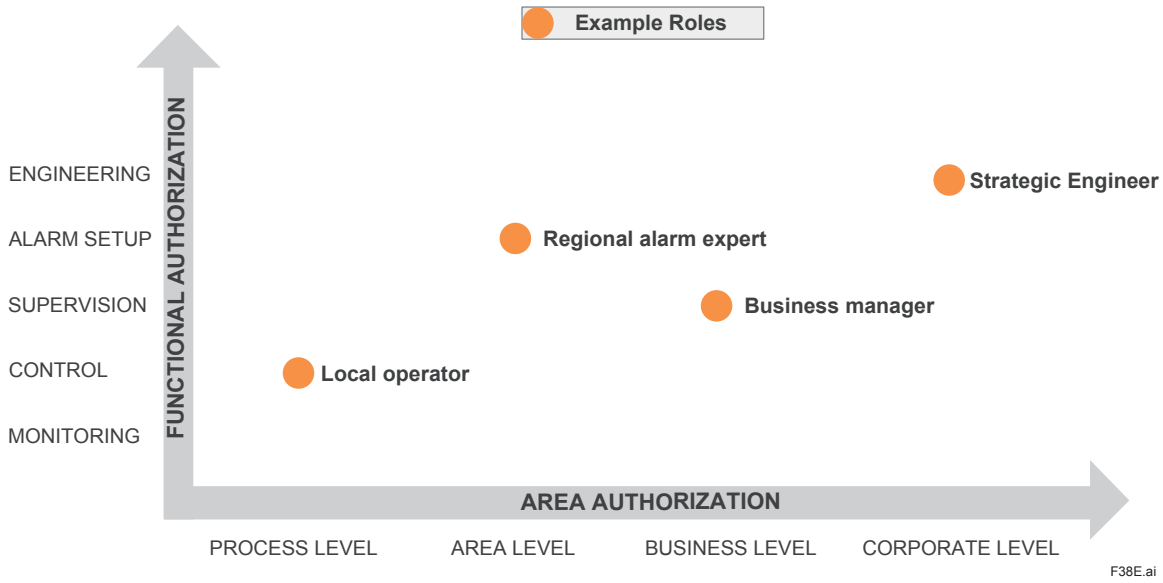
The ES can use Objects (programs) on other ESs. If the ES uses Objects with items which are created by the Objects on other ESs, then the ES needs to have the same number of items included in the Objects it uses on itself. Calculation of items is same as the case 2. The ES needs the item license for those items.

Case 4: The ES have local items.

If a ES have items defined on it, then it needs to have items for them and is required to have license for the items.

Role based authorization & authentication

In an Enterprise environment multiple roles are identified with different information requirements. These roles also require functional authorization versus area authorization to allow who has access to what, therefore requiring Role based Authorization & Authentication.



To enable these roles in a secure manner not only the security of the IT environment and operating system must be considered but also the SCADA based application security needs to work harmoniously.
Therefore FAST/TOOLS supports the integration with Active Directory.
Users can login with their Windows name and password, and Active Directory maintains all user profiles and permissions for all applications. A FAST/TOOLS user Group name for this user is stored in Active Directory and the user group name from Active Directory is mapped to the user group name in FAST/TOOLS. This is so-called “Single sign-on”.

Login functions of Operator Interface, Engineering Environment and Client applications are consolidated into one function. Also profiles of multiple FAST/TOOLS users assigned to an Active Directory user are merged. When Active Directory is enabled, user actions with a Windows user name are logged in Audit Trail.
For further security assurance measures all active users who login to FAST/TOOLS can be shown in Operator screens or used in applications while passwords are immediately encrypted when entertd.

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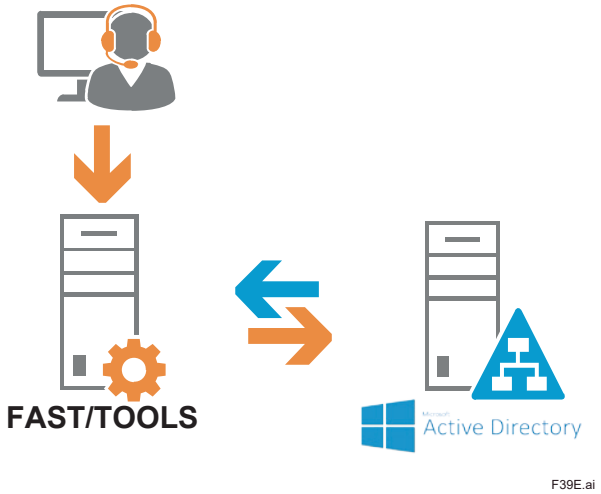
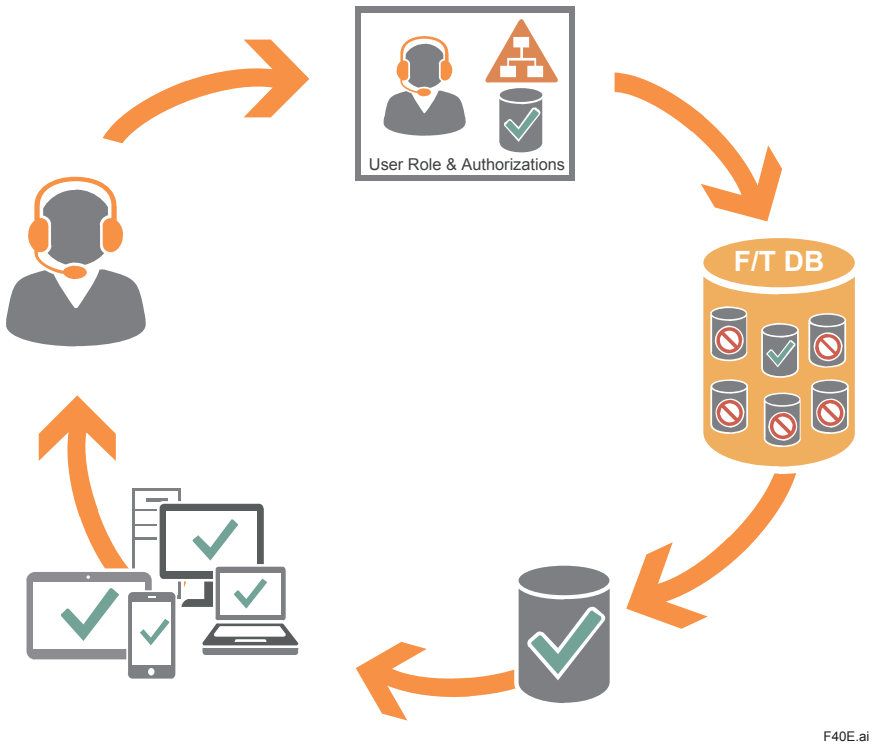


This concept is further enhanced into role-based geo intelligence.
This means that Users can login with their Windows name and password, where the User Role determines which data and controls are accessible. The FAST/TOOLS database provides the allowed and usable data which can be presented to devices assigned to the user profile.



Secure and Robust networking and routing
Application communications between organization layers will use FAST/TOOLS networking and routing. A robust routing protocol function is employed to locate the requested tags. Only UDP ports required for FAST/TOOLS multi-node communications communications need to be made available in the firewalls between layers.

Existing FAST/TOOLS data set authorization and process area mechanisms will control access to enterprise configuration and local engineering capabilities.

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SPNEGO Authentication

With single sign-on for HTTP requests, using the Simple and Protected NEGOtiation Mechanism (SPNEGO), web authentication is now supported which is a standard method for user authentication for web servers, including support for AD SSO from browser environments, MS Excel, etc. It is a “pseudo mechanism” used by client-server software to negotiate the choice of security technology. SPNEGO is used when a client application wants to authenticate to a remote server, but neither end is sure what authentication protocols the other supports.

Users can securely negotiate and authenticate HTTP requests for secured resources in the FAST/TOOLS Host/Application Server by using the Simple and Protected GSS-API Negotiation Mechanism (SPNEGO) as the web authentication service for the FAST/TOOL Application Server. SPNEGO provides a mechanism for extending Kerberos to Web applications through the standard HTTP protocol. Kerberos is a network authentication protocol for client/server applications. Many types of clients connect to same web server, using different technologies that may not provide direct access to AD, especially browser based (e.g. HTML5, JAVA, Web Start).

FAST/TOOLS provides single sign-on for FAST/TOOLS Web Start and other client applications of the web server, specifically build for the HTML5 implementation.

(Fits current FAST/TOOLS single-sign-on implementation with Active Directory enabled systems)

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● ASPA (Alarm System Performance Analysis) Software Module:

ASPA supports the alarm system performance improvement processes to avoid operator overload and reduces the risk of critical alarms being overlooked, causing wrong or to late decisions putting safety as well as the continuity and quality of production at stake.

Functionality

FAST/TOOLS ASPA delivers critical statistical methods, views and tools providing performance analysis in relation to the guidelines of EEMUA 191, ISA18.2 to ensure alarm system quality and effectiveness.
Based on key performance measurements embedded in FAST/TOOLS ASPA, the behaviour of the alarm system will be presented from different angles. This will deliver holistic and informative views providing guidance for improvement.

Deployment

FAST/TOOLS ASPA can be utilized for a number of objectives that contribute to improved effectiveness and performance of new and installed alarm systems based on FAST/TOOLS.

Examples of FAST/TOOLS ASPA deployment objectives:

- To set and measure performance targets to enhance the quality
- To analyse the effectiveness of an existing alarm system
- As a management tool for improvement programs such as Human Centric Operations
- To identify specific nuisance alarms and number of standing, delayed and suppressed alarms

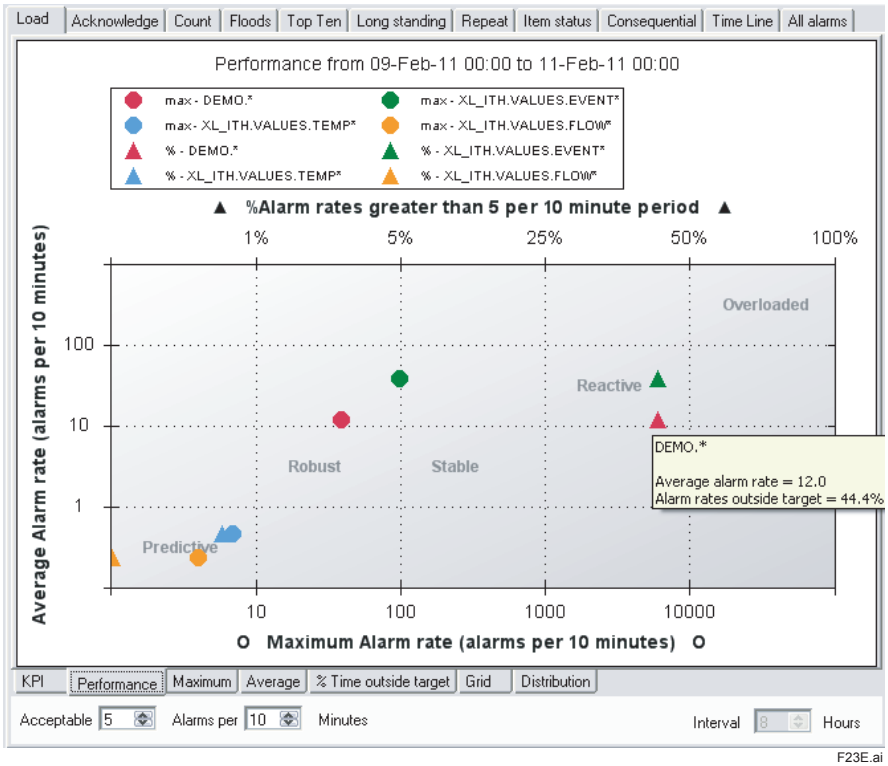
EEMUA 191 - ANSI/ISA 18.2 Metrics

The metrics (or charts) are the basis in the assessment of whether operators will find the alarm system easy to work with and does not exceed the ergonomically acceptable workload and quality. This is made visible by categorizing the state of the alarm system performance into five levels as defined by EEMUA 191.
ASPA identifies the worst case load during any ten minute time slice and categorizes this to alarm system performance levels in accordance with EEMUA 191.

Supported Alarm Analysis Metrics (Charts)

ASPA offers an extensive set of predefined detailed metrics;

The Load report is based on section 4.1.1 of the EEMUA 191 directive. It provides the operator load factor based on the number of alarms exposed per 10 minutes time slice.



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The Alarm Performance Summary Metric show 9 key measurements point of you alarm system calculated over a specific period of days (section 16.5 of ISA18.2).

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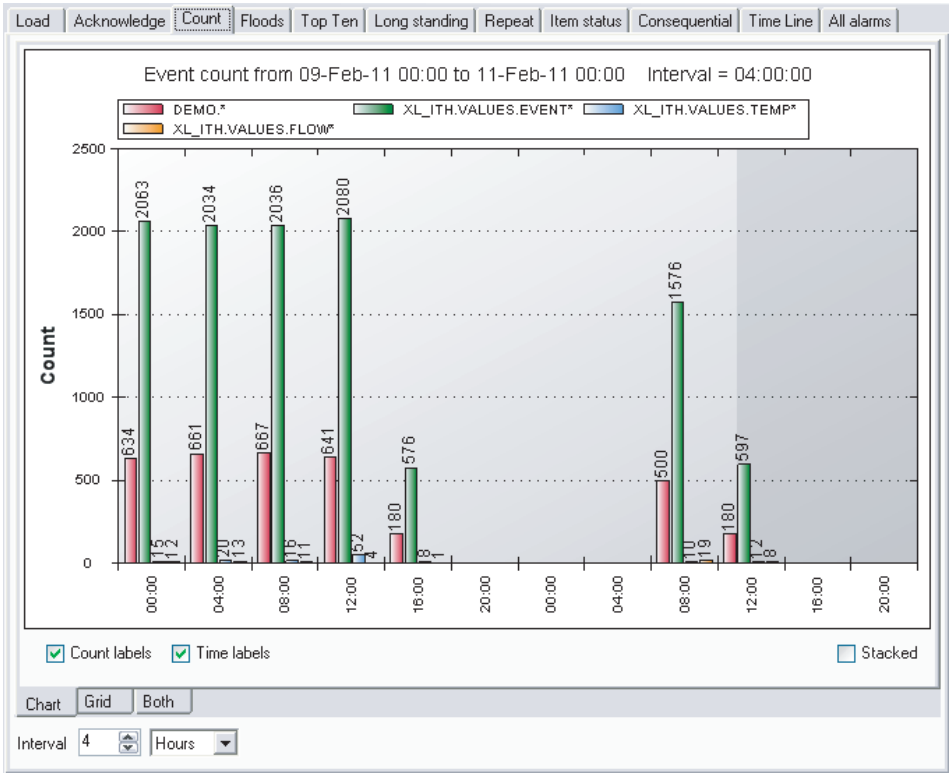
The Acknowledge report provides an overview of the time Windows within alarms were acknowledged by the operator. The Count report is based on section 4.2.1 of the EEMUA 191 directive and provides the counted number of alarms.



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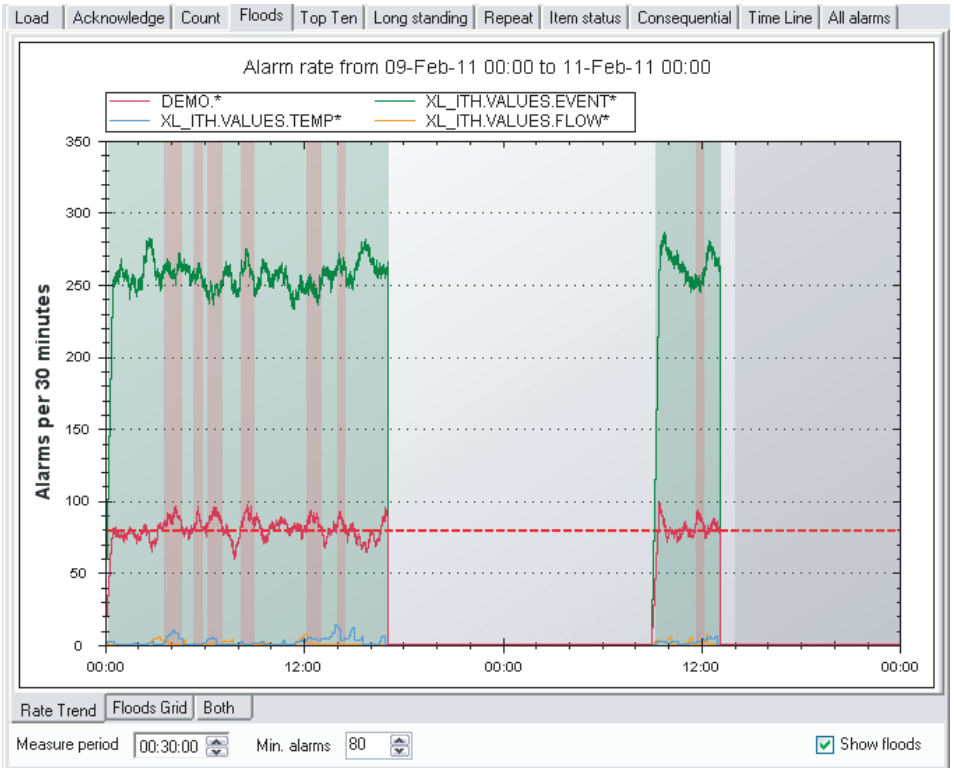
The Floods report is based on section 4.2.1 and appendix 12.7 of the EEMUA 191 directive. It is similar to the Count report, but in addition it allows filters on periods with a particularly high alarm activity that can be displayed. These periods are normally related to major process changes, plant trips or start-ups.



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The Top Ten report is based on section 4.2.1 and appendix 12.6 of the EEMUA 191 directive. It distinguishes the top 'ten' of FAST/TOOLS items (found in all group filters) that have caused the most alarms. In addition other rankings can be made as well (e.g. top 3 or top 20).

The Long Standing report is based on section 4.2.1 of the EEMUA 191 directive. It distinguishes the FAST/TOOLS items with alarms that endured ('stood') for the longest time period. In contradiction with the name of the tab it is also possible to rank items with alarms that endured the shortest time. Alarms that were still standing at the end time of the time period are not considered.

The Repeat provides an overview of FAST/TOOLS items with alarms that have been repeated most times. Only particular items are considered, namely items for which the alarm has been set to repeat as long as the alarm is not withdrawn.

The Item Status report is based on section 4.2.1 of the EEMUA 191 directive and displays the numbers of alarms per status (e.g. how many HIGH alarms occurred? And how many LOW alarms? etc.).

The Consequential report is based on section 4.2.1 and appendix 12.11 of the EEMUA 191 directive and focuses on (simple) patterns of alarms, i.e. how many times an alarm A was directly followed by alarm B? The tab shows a table in which each row is a particular pattern.

The Time Line report puts various views of the alarms on a timeline.

The All alarms report displays a table with all the alarms fetched for the analyzed period.

All charts and reports as described above can be printed, saved as screen dumps in PNG format and exported to CSV or XML.

Comparison function
The following report has the comparison function to view report generated in the past.

- Load report
- Acknowledge report
- Count report
- Floods report
- Top Ten report
- Long Standing report
- Repeat report
- Item Status report
- All Alarm report

Configuration
The ASPA software (FTASPA-S11) can be either installed on the FAST/TOOLS Web HMI Server or the FAST/TOOLS Application Server platform (RVSVRN). One license is required to connect to one FAST/TOOLS server (or when you use the HAC configuration to the active server).
When the ASPA software module is installed on a FAST/TOOLS Web HMI Server it requires the HMIWEB-S11 license to run ASPA.

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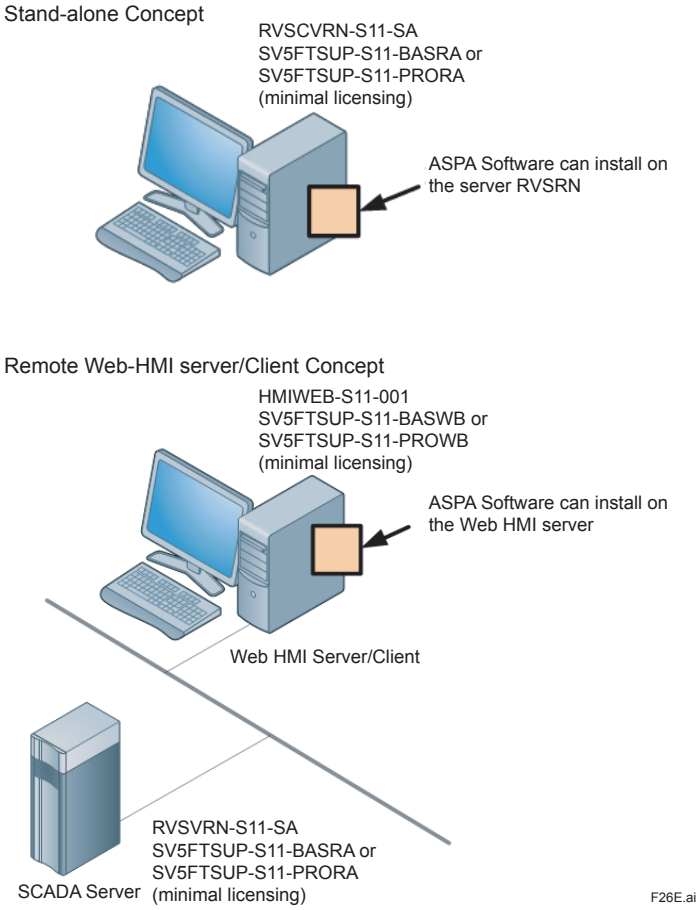

The customized user specific filter selections made can be stored in the ASPA software for later reuse to evaluate improvements and consistent reports. Export of the filters selections is possible as well.

Models and Suffix Codes
FTASPA-S11

Supported platforms: Microsoft systems
For Hardware Recommendations see section System Requirements.

● AGA Calculations

The AGA calculation functions are a set of functions build around an AGA calculation engine.

The AGA calculation engine contains the following flow calculation algorithms:

- AGA3 - Orifice metering of natural gas and other related hydrocarbon gases
- AGA7 - Measurement of gas by turbine meters
- AGA8 - Compressibility factors of natural gas and other related hydrocarbon gases
- AGA9 - Measurement of gas by multipath ultrasonic meters
- AGA10- Speed of sound in natural gas and other related hydrocarbon gases
- AGA11- Measurement of natural gas by Coriolis meter
- V-Cone
- Wafer-Cone

Further the following additional calculations are supported by the engine:

- Calculation of gross heating value, relative density and compressibility factor for natural gas mixtures from composition analysis by AGA5 or GPA2172 method
- Calculation of atmospheric pressure depending on latitude and altitude

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● Process Field I/O Communications

FAST/TOOLS supports many native PLC/RTU driver protocols developed for data acquisition, to enhance communication performance and reliability. FAST/TOOLS can provide direct communication links to various brands of DCS/PLC/RTU on the same SCADA server. It also has many field proven communication interfaces through Fibre Optics, serial lines, radio, satellite, PSTN, etc.

The part of FAST/TOOLS that takes care of communication with I/O devices, like RTU's, distributed I/O, and PLC's, is called EQUIPMENT/FAST. It uses device specific I/O-drivers, polls the equipment and updates the real-time database. FAST/TOOLS supports as standard the equipment types listed below:

EQUIPMENT/FAST Driver				
		TCP/IP	Terminal server (*4)	Serial
Yokogawa STARDOM	(*1)	yes		
Yokogawa DAQStation	(*1)	yes		
Yokogawa DAQMaster	(*1)	yes		
Yokogawa SMARTDAC+	(*1)	yes		
Yokogawa FA-M3	(*1)	yes		
Yokogawa ProSafe-COM	(*1)	yes	yes	yes
Yokogawa Host-Host (*9)	(*1)			
Modbus Slave	(*1)	yes	yes	yes
Modbus Master	(*1)	yes	yes	yes
Beckhoff BK8100	(*1)		yes	
Rockwell CIP	EQP-S11-ROC	yes		
Rockwell DF1	EQP-S11-ROC		yes	yes
Rockwell DH+	EQP-S11-ROC	yes		
Siemens 3964R	EQP-S11-SIE			yes
Siemens SAPI-S7 (*2)	EQP-S11-SIE	yes		
Emerson BSAP	EQP-S11-EME		yes	yes
Emerson Fisher ROC	EQP-S11-EME		yes	yes
WITS level 0 slave (*3) (*5)	EQP-S11-RTU		yes	yes
WITS level 0 master (*3) (*5)	EQP-S11-RTU		yes	yes
DNP3 Master	EQP-S11-RTU	yes	yes	yes
HEX repeater	EQP-S11-RTU		yes	
TIE (*6)	EQP-S11-GEN			yes
HART router	EQP-S11-GEN		yes	
Yokogawa Vnet/IP driver (*7)	EQP-S11-XCS			
Melsec Mitsubishi driver (*8)	EQP-S11-MEL	yes		yes
IEC 60870-5-101	EQP-S11-IEC		yes	yes
IEC 60870-5-102	EQP-S11-IEC		yes	yes
IEC 60870-5-103	EQP-S11-IEC		yes	yes
IEC 60870-5-104	EQP-S11-IEC	yes		
IEC 61850 (*10)	EQP-S11-IEP	yes		
Omron FINS driver	EQP-S11-OMR	yes	yes	yes

*1: Standard in server package RVSVRN & UNSVRN.
*2: Software needed from Siemens; SIMATIC.NET SAPI-7 software package. Only for Windows platform
*3: Only on Windows platform.
*4: FAST/TOOLS system is communicated by TCP/IP to the Terminal Server. Terminals Server is communicated serial to device.
*5: Wellsite Information Transfer Specification (WITS).
*6: Telemetry Integration Environment (TIE) .
*7: Vnet/IP network is used. Software needed (CHS5700) on SENG and Vnet/IP card VI702 in FAST/TOOLS server. Only for Microsoft platform.
*8: Only for Windows platform.
*9: FAST/TOOLS DURM network is used.
*10: Support MMS specification, read and write from/to tags. Included the SISCO stack layer software.

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● Distributed Temperature Sensor Function

DTS (Distributed Temperature Sensing), the technique used involves a fibre-optic cable in which by means of light pulses measures the temperature along the length of the cable.
FAST/TOOLS has an equipment driver which is able to retrieve and store the DTS data from YOKOGAWA DTSX200 and DTSX3000 modules.
Beside this there is also an advanced Trend Component to present the information.

The FAST/TOOLS trend component for DTSX is shown

- 3-dimensional data from DTSX
- Temperature for each point along the fiber is measure at each sample interval
- Trend display can show distance vs temperature or time vs temperature

There is no loss of DTSX samples by network interruption. The DTSX samples stored in the DTSX unit and FAST/TOOLS automatically recover of the stored samples.

Models and Suffix Codes
FTDTSX-S11

FTDTSX can run on one FAST/TOOLS server, model RVSVRN Windows only.

For a redundant FAST/TOOLS server configuration twice the package must be ordered. Driver supports only TCP/IP communication. Communication with the DTSX is based on WITSML (version 1.05 or higher) or MODBUS. The DTSX unit need the WITSML option for WITSML communication.

● System Support Functions

FAST/TOOLS is delivered with a complete set of diagnostic tools for every module which allows online monitoring of:

- Configuration settings
- Real-time values of items, communication statistics, process-load
- Time related issues
- Status values
- And other module specific parameters

These diagnostic tools are used to locate suspicious faulty situations in the SCADA system and to optimize the performance of the SCADA system. Performance optimization can be done by:

- Balancing network traffic between e.g. a server and workstation in a redundant network
- Preventing queue overflows by adapting queue sizes of FAST/TOOLS processes
- Optimizing scan times of external process variables

In addition some diagnostic tools allow logging diagnostic data to a file on disk, which can be used for analyses later on.

● Oracle Java SE

The operator interface supports a number of components that rely on Java FX technology. Java FX is not supported by the open source versions of the Java runtime and is only supported in case an Oracle Java runtime is used.

Customers requiring the use of the following graphical components will need to download and install the Oracle Java SE runtime (*1) and apply this after installing FAST/TOOLS.

- Web Browser component
- Web Browse (lite) component

*1: Oracle has updated its license agreement with regard to Java SE. If the customer needs the Java SE Update for security patches, it is required to close a support agreement with Oracle including a license fee for each installed client seat. This gives you access to support and product updates from Oracle. The customer that requires Oracle Java SE Update is responsible for negotiating a support contact itself with Oracle or one of its resellers. Please contact your local Oracle.

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■ FUNCTIONAL SPECIFICATION

Please find below the functional limits of the FAST/TOOLS software package.

Table (1/2)

Functional Element	Details	Limits	Remarks
Item tags	Name Length	256 Characters	The depth of sections can be zero up to 128, length of the entire path not longer then 256 total characters (ANSI). Section name length is max 31 characters (ANSI).
	Description Field	80 Characters	
	Value clamping		Can be applied to alarm limits and process value scale
	Sub-items	16 per Item	
	Integrator	1 sec. resolution	
	Pulse counter	long integer	
	Min/max indicator		
	Rate of change	1 sec. resolution	
	Limit and dead band	HH, H, L, LL, Dead band	
	Blocks of items, unit & installation		Preserve current values
	Data compression	30 % on average	
Displays / Symbols	Name Length	31 Characters	
	Number of displays and symbols	Unlimited	
	Symbol Library		Standard library contains more than 3000 symbols
	Multi Monitor Support	Dual or Quad	Conforms to available desktop resolution and video hardware performance.
	Multi-language support		
	UTF-8 character sets		
Connectivity	OPC server and OPC client		OPC DA v2.0 server v1.3 and A&E (v1.02) (tested with compliance tool v2.05a) OPC UA DA client v1.0.3, OPC UA server (DA, AC & HDA) v1.0.0
	RDBMS engine		High performance bi-directional RDBMS connectivity
	ODBC Server		For both process and configuration data. ODBC API conformance level 1, SQL conformance level minimum.
	API for easy connection of third party software		Available for C, Java and VB .NET
	EQUIPMENT/FAST devices	Up to 1000 - 'other processes' EQPs per Server. Every EQP can handle max. 4095 devices.	Applicable for every FAST/TOOLS server, based on TCP/IP connections, and as long as the protocol supports it like STARDOM, DNP3 etc.
Alarm Management	Number of Alarms	Unlimited	
	Alarm Acknowledgement		Freely definable alarm states & acknowledgement methods.
	Delayed Alarms	By seconds (65,535 max)	
	Repeated Alarms	By seconds (65,535 max)	
	Alarm Collections	32,767 max	
	First out and first up annunciation	Unlimited	
	Area of Interest	Up to 16	
	Alarm Priority groups	Up to 16	
	Alarm rerouting		Free rerouting of alarms to e-mail, pagers, etc.
Operator log/ audit trail			Store actions of users and SCADA system; who, where, when and why.

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Table (2/2)

Functional Element	Details	Limits	Remarks
Trends	Number of pens	Up to 50 per trend	
	Zooming and Panning		
	Sample period	Up to 1 msec.	Minimum period that be displayed
	Update period	Up to 1 sec.	
	Hairline cursor		
	Synchronization with alarm overview		
	Scalable timeline and resolution		
Reports	Report generation		
	Report browser / manager		Ad-hoc, Scheduled and event-based
	Printer Management		
Data Archiving	Averaging of history values		On scan and event based
	Managing historical files		
	Automatic archiving		External storage of all new historical data
Security	User name & password	Unlimited	
	Authorization groups	Unlimited	
	Process areas	0-999	Operator access level per area
	Automatic login		After system login
	Areas of interest	Up to 32 entries per item	Labels describing the functional area of a process tag

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■ SOFTWARE PERFORMANCE

FAST/TOOLS has been extensively tested on its software performance. These tests were conducted on a system with commercially available off-the-shelf, mid range Intel based rack server.

System load on which test results are based is up to 100.000 item updates per second over a network. Please note that because FAST/TOOLS is event driven an update rate of 100.000 items is only applicable to very large system configurations. The results of the performance tests are presented in the tables below:

SCADA Server CPU load:

Items in database	Items updated per second	Server CPU load in %
10.000	10.000	4%
20.000	20.000	4%
50.000	50.000	4%
100.000	100.000	5%
150.000	100.000	5%
200.000	100.000	5%
500.000	100.000	5%
1.000.000	150.000	5%

SCADA System Network load:

Items in database:	100.000
Updates per second	Network load in Kb/s
0	25
500	35
1000	45
1500	55
2000	65
2500	75
3000	85
3500	95
7500	165
10000	215
12500	260
17500	350
22500	445
27500	535
30000	590
32500	630
37000	715
42500	815
47500	910
49500	945
50000	955
60000	1140
70000	1325
80000	1515
90000	1700
100000	1845

Note: Small deviations from the above results may occur in practice due to the open nature of the system and the freedom to use any qualified customer of the shelf system and network hardware.

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■ OPERATING ENVIRONMENT

● Platform

FAST/TOOLS is supported on the server platforms as defined below. For each platform, the required operating system is specified.

Platform	Operating System
Microsoft	Windows 10 Pro (64 bit) Windows 10 Enterprise (64 bit) Windows 10 Enterprise 2016 LTSB (64 bit) Windows 10 IoT Enterprise 2016 LTSB (64 bit) Windows 7 Professional SP1 (64 bit) Windows Server 2012 R2 (64 bit) Windows Server 2016 (64 bit)
LINUX	Red Hat Enterprise Linux 7.4 (64 bit), CentOS 7.4 (64 bit)
HP	HP-UX (available on request)

Note: Regarding operating environment of RGS, see General Specification no. GS 50A01A12-01EN.

● Software

Visual Studio 2015
This is required when you intend to write application programs that link to FAST/TOOLS libraries.

SimbaServer
When you want to enable PC applications to access FAST/TOOLS datasets via the ODBC interface, the SimbaServer is required. This server must be installed on the system where the FAST/TOOLS Server component is to be installed. The SimbaServer can be found on your FAST/TOOLS CD.

SimbaClient
When you want to enable an application running on a Windows system to access FAST/TOOLS data located on a FAST/TOOLS system via an ODBC interface, then you have to install SimbaClient on the client system.

SimbaClient can be found on your FAST/TOOLS CD.

Microsoft Excel
Excel Add-in Report tool is supported on Microsoft Excel 2013 (32bit/64bit) or later.

■ SYSTEM REQUIREMENTS

The specified hardware is a minimum recommendation for optimal software performance. Furthermore it should be taken into account that additional non FAST/TOOLS applications may require additional resources.

Regarding Dual-redundant Platform for Computer requirements, please see GS 30A05C10-01EN (Dual-redundant Platform for Computer).

● SCADA Server

Items	Specifications	
CPU	Microsoft	Intel © Core™ i7, 3.40 GHz or better.
	LINUX	Intel © Core™ i7, 3.40 GHz or better
	HP (*1)	
RAM	At least 8 GB (for ASPA 16GB)	
Hard Disk	1TB (7200 rpm) At least 300 Mbytes of free space is required for the software. Additional disk space is required to store configuration and historical data: add on average 2150 byte per item definition, 100 byte per history sample , 550 byte per event sample, 18 Kb per class, 2 Kb per object, 2 Kb per report and 30 Kb per display symbol.	
Ethernet adapter	An Ethernet adapter that is supported by the operating system is required at installation. Please note that for HAC (High Availability Computing) a dedicated network adapter is preferred.	
DVD-ROM Drive	A DVD-ROM drive that is supported by the operating system is required.	

*1: Available on request. Please contact Yokogawa Global SCADA Center for details.

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● Web HMI Server

Items	Specifications	
CPU	Microsoft	Intel © Core™ i7, 3.40 GHz or better
RAM	At least 8 GB (for ASPA 16 GB)	
Hard Disk	1TB (7200 rpm) At least 200 Mbytes of free space is required. Additional space is required for display and symbols.	
Ethernet adapter	An Ethernet adapter that is supported by the operating system specified is required at installation.	
DVD-ROM Drive	A DVD-ROM drive that is supported by the operating system is required.	
Peripherals	Sound card and speaker are required for audible messages.	
Web browser	Google Chrome 71 Mozilla Firefox 64 Microsoft Edge 44	

● Web HMI Client

Items	Specifications	
CPU	Microsoft	Intel © Core™ i5, 2.50 GHz or better
RAM	At least 4 GB	
Hard Disk	500 GB (7200 rpm) At least 1 GB of free space is required.	
Ethernet adapter	An Ethernet adapter that is supported by the operating system specified below is required at installation.	
DVD-ROM Drive	A DVD-ROM drive that is supported by the operating system is required.	
Peripherals	Sound card and speaker are required for audible messages.	
Web browser	Google Chrome 71 Mozilla Firefox 64 Microsoft Edge 44	

● Web HMI Mobile Client

Items	Specifications
Web Browser Support HTML5	Google Chrome 71

■ NOTICE FOR THIRD-PARTY PRODUCTS

FAST/TOOLS is software that makes the most of commercial off-the-shelf (COTS) software, so third-party products meeting the specifications required by FAST/TOOLS are myriad. The pieces of software described in the General Specifications and User's Manuals of FAST/TOOLS, will operate correctly to the extent of the specifications. Yokogawa has conducted combination tests on third party products that many want to use with FAST/TOOLS. These tests may also be performed on new third-party products as required. Nevertheless, these tests simply check the basic operations in combination with FAST/TOOLS and are not intended to assure correct operations. The most recent results of these tests will be available to those who have concluded a support contract.

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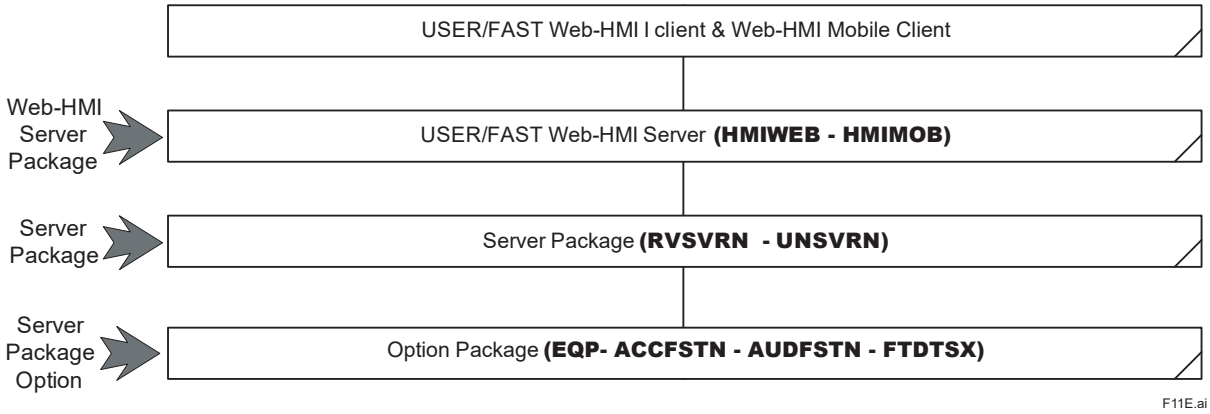
■ MODELS AND SUFFIX CODES

● FAST/TOOLS Package Structure

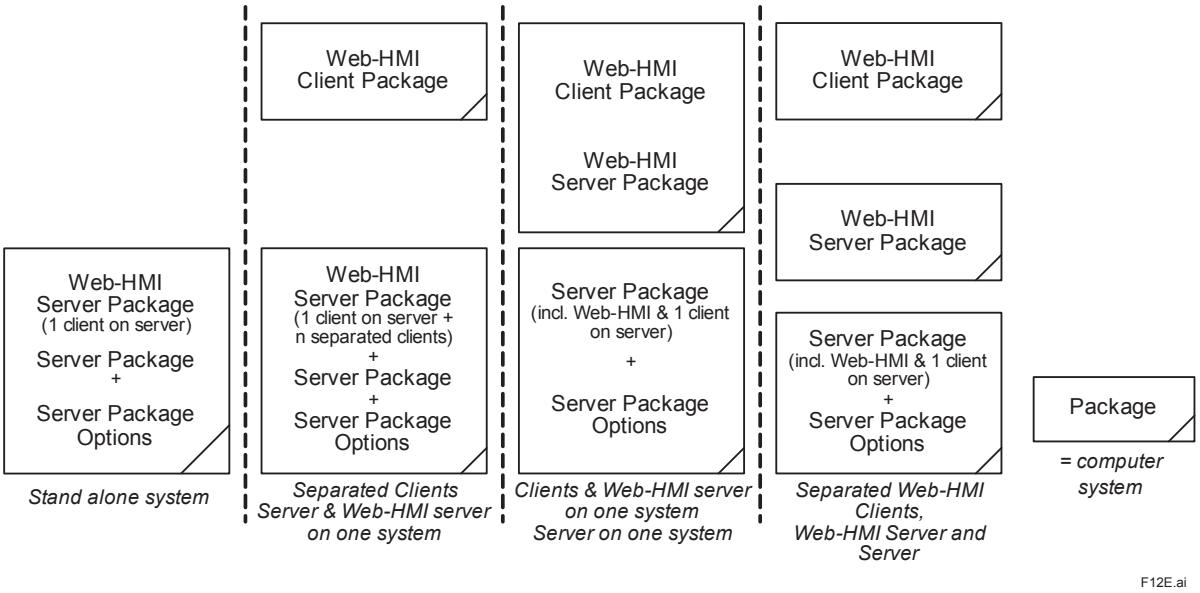
The following figure shows the package structure of FAST/TOOLS.



Note: Bold items are Model numbers.
Note: HMIMOB is an extension of Web-HMI Server Package. HMIWEB is always needed.
Note: OPC clients (DA/AE/UA) are included in Server packages.

● FAST/TOOLS Computer Segregation

The following figure shows the computer segregation of FAST/TOOLS. It shows which package can be combined on the same computer system.



The Web-HMI client can run both the operator interface and the application database configuration interface.

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● Windows & Linux Server Package

		Description
Model	RVSVRN	FAST/TOOLS Microsoft Windows & Linux Server Package
Suffix Codes	-S	Software license
	1	For standard
	1	Always 1
	-SA	Max. item numbers: 250
	-SB	Max. item numbers: 500
	-SC	Max. item numbers: 1,000
	-SD	Max. item numbers: 2,000
	-SE	Max. item numbers: 4,000
	-SF	Max. item numbers: 8,000
	-SG	Max. item numbers: 16,000
	-SH	Max. item numbers: 32,000
	-SJ	Max. item numbers: 64,000
	-SK	Max. item numbers: 128,000
	-SL	Max. item numbers: 256,000
	-SU	Max. item numbers: Unlimited
	-RA	Max. item numbers: 250 for Dual-redundant Platform
	-RB	Max. item numbers: 500 for Dual-redundant Platform
	-RC	Max. item numbers: 1,000 for Dual-redundant Platform
	-RD	Max. item numbers: 2,000 for Dual-redundant Platform
	-RE	Max. item numbers: 4,000 for Dual-redundant Platform
	-RF	Max. item numbers: 8,000 for Dual-redundant Platform
	-RG	Max. item numbers: 16,000 for Dual-redundant Platform
	-RH	Max. item numbers: 32,000 for Dual-redundant Platform
	-RJ	Max. item numbers: 64,000 for Dual-redundant Platform
	-RK	Max. item numbers: 128,000 for Dual-redundant Platform
	-RL	Max. item numbers: 256,000 for Dual-redundant Platform
	-RU	Max. item numbers: Unlimited for Dual-redundant Platform

Note: Standard drivers are: STARDOM, DAQStation, DAQMaster, SMARTDAC+, FA-M3, Host-Host, Modbus slave, Modbus master & Beckhoff BK8100.
Note: FAST/TOOLS Server - Client configuration only
Note: Audit trail module (Model: AUDFSTN) is not included.
Note: For server extensions, see Windows Server Package for Upgrade.
Note: For High Availability Computing (HAC) twice the package and all the Server Package options must be ordered.
Note: OPC clients (DA/AE/UA) are included in server package. OPC Clients are only for Windows platform.
Note: Including one WebHMI client on the server for engineering and operator functions.
Note: FAST/TOOLS Support Contract (SV5FTSUP) must be ordered with the RVSVRN package
Note: Visual Basic .NET API is included.
Note: Collaboration Decision Support Solution Function (CDSS) is included.

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● UNIX Server Package

		Description
Model	UNSVRN	FAST/TOOLS UNIX Server Package
Suffix Codes	-S	Software license
	1	For standard
	1	Always 1
	-SA	Max. item numbers: 250
	-SB	Max. item numbers: 500
	-SC	Max. item numbers: 1,000
	-SD	Max. item numbers: 2,000
	-SE	Max. item numbers: 4,000
	-SF	Max. item numbers: 8,000
	-SG	Max. item numbers: 16,000
	-SH	Max. item numbers: 32,000
	-SJ	Max. item numbers: 64,000
	-SK	Max. item numbers: 128,000
	-SL	Max. item numbers: 256,000
	-SU	Max. item numbers: unlimited

Note: Standard drivers are: STARDOM, DAQStation, DAQMaster, SMARTDAC+, FA-M3, Host-Host, Modbus slave, Modbus master & Beckhoff BK8100.
Note: For server extensions, see FAST/TOOLS UNIX Server Package for Upgrade.
Note: For High Availability Computing (HAC) twice the package and all the Server Package options must be ordered.
Note: FAST/TOOLS Support Contract (SV5FTSUP) must be ordered with the UNSVRN package
Note: UNSVRN is available on request. Please contact Yokogawa Global SCADA Center for details. OS on which FAST/TOOLS run must be informed when UNSVRN is requested.

● EQUIPMENT/FAST

		Description
Model	EQP	FAST/TOOLS EQUIPMENT/FAST (drivers)
Suffix Codes	-S	Software license
	1	Always 1
	1	Always 1
	-XCS	YOKOGAWA Vnet/IP driver (*7)
	-ROC	Rockwell Automation drivers (*1)
	-SIE	Siemens drivers (*2) (*8)
	-EME	Emerson drivers (*3)
	-RTU	RTU protocol drivers (*4)
	-GEN	General drivers (*5)
	-IEC	IEC 60870-5 Protocols (*6)
	-IEP	IEC 61850 Protocol
	-MEL	Melsec driver (*8)
	-OMR	Omron FINS driver

Note: Not all drivers are supported on all platforms. Some drivers will need third part software. Some drivers will support only TCP/IP and/or Serial.
*1: includes CIP, DH+ & DF1 protocol, for e.g. ControlLogix or PLC5
*2: includes 3964R & SAPI-S7 driver, for e.g. Siemens S5 & S7 PLCs
*3: includes BSAP & Fisher ROC driver, for e.g. Bristol Babcock RTUs
*4: includes WITS level 0 slave, WITS level 0 master, DNP3 & HEX Repeater driver
*5: includes TIE & HART Router driver
*6: includes IEC 60870-5-101, IEC 60870-5-102, IEC 60870-5-103 & IEC 60870-5-104
*7: For Vent/IP-Upstream (ProSafe-RS)
*8: Windows client OS Only

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● ACCESS/FAST

		Description
Model	ACCFSTN	ACCESS/FAST
Suffix Codes	-S	Software license
	1	Always 1
	1	Always 1
	-ODC	ODBC server (only on Windows)
	-DAS	OPC UA Server (DA, AC &HDA) (only on Windows), OPC DA & AE Server (only on Windows)
	-TUN	OPC Tunneller client / server (only on Windows)

Note: OPC DA/AE/UA clients are available in Server packages.

● AUDIT/FAST

		Description
Model	AUDFSTN	AUDIT/FAST Audit Trail
Suffix Codes	-S	Software license
	1	Always 1
	1	Always 1

● Web-HMI Server Package

		Description
Model	HMIWEB	Web-HMI Server Package For Engineering and Operator Interface
Suffix Codes	-S	Software license
	1	For standard
	1	Always 1
	-S01	Including 1 concurrent client
	-S02	Including 2 concurrent clients
	-S03	Including 3 concurrent clients
	-S04	Including 4 concurrent clients
	-S05	Including 5 concurrent clients
	-S06	Including 6 concurrent clients
	-S07	Including 7 concurrent clients
	-S08	Including 8 concurrent clients
	-S09	Including 9 concurrent clients
	-S10	Including 10 concurrent clients
	-S15	Including 15 concurrent clients
	-S20	Including 20 concurrent clients
	-S25	Including 25 concurrent clients
	-SXX	Including xx concurrent clients
	-R01	Including 1 concurrent client for Dual-redundant Platform
	-R02	Including 2 concurrent client for Dual-redundant Platform
	-R03	Including 3 concurrent client for Dual-redundant Platform
	-R04	Including 4 concurrent client for Dual-redundant Platform
	-R05	Including 5 concurrent client for Dual-redundant Platform
	-R06	Including 6 concurrent client for Dual-redundant Platform
	-R07	Including 7 concurrent client for Dual-redundant Platform
	-R08	Including 8 concurrent client for Dual-redundant Platform
	-R09	Including 9 concurrent client for Dual-redundant Platform
	-R10	Including 10 concurrent client for Dual-redundant Platform
	-R15	Including 15 concurrent client for Dual-redundant Platform
	-R20	Including 20 concurrent client for Dual-redundant Platform
	-R25	Including 25 concurrent clients for Dual-redundant Platform
	-RXX	Including xx concurrent clients for Dual-redundant Platform

Note: A full client runs on each Web-HMI Server (Engineering & Operator environment).
Note: For Web-HMI client extensions, see model codes for upgrades further down this section.FAST/TOOLS Support Contract (SV5FTSUP) must be ordered with the HMIWEB package

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● FAST/TOOLS User's Manual on DVD

		Description
Model	FTMANCD	FAST/TOOLS User Manual
Suffix Codes	-1	Always 1
	CCD	on DVD

● Windows RGS Package

		Description
Model	FTRGS	FAST/TOOLS Microsoft Windows RGS Packaget
Suffix Codes	-S	Software license
	S	for Single Platform
	R	for Dual-redundant Platform
	1	Always 1
option Code	/UA	Include OPC-UA server

Note: For a redundant RGS configuration twice the package must be ordered.
Note: FAST/TOOLS Support Contract (SV5FTSUP) must be ordered with the RGS package.
Note: Web-HMI-Client is for Engineering only.
Note: Vnet/IP card is required.

● Enterprise Engineering Server Package

		Description
Model	FTEES	FAST/TOOLS Microsoft Windows Enterprise Engineering Server Package
Suffix Codes	-S	Software license
	S	for Single Platform
	R	for Dual-redundant Platform
	1	Always 1

● Alarm System Performance Analysis

		Description
Model	FTASPA	Alarm System Performance Analysis
Suffix Codes	-S	Software license
	1	Always 1
	1	Always 1

Note: ASPA can connect to one FAST/TOOLS server (model RVSVRN).

● Web-HMI Server Package for Mobile

		Description
Model	HMIMOB	Web-HMI Server Package for Mobile
Suffix Codes	-S	Software license
	1	Always 1
	1	Always 1
	-005	Including 5 mobile clients
	-010	Including 10 mobile clients
	-020	Including 20 mobile clients
	-XXX	Including xxx mobile clients

Note: For web browser support see list in General Specification FAST/TOOLS.
Note: HMIMOB is an extention of Web-HMI Server Package. HMIWEB is always needed.

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● Distributed Temperature Sensor Function

		Description
Model	FTDTSX	DTSX driver and advance trending module
Suffix Codes	-S	Software license
	1	Always 1
	1	Always 1

Note: FTDTSX can run on one FAST/TOOLS server (model RVSVRN Windows only).
Note For a redundant FAST/TOOLS server configuration twice the package must be ordered.
Note: Driver supports only TCP/IP communication with YOKOGAWA DTSX200 or DTSX3000.

● FAST/TOOLS Consultancy

		Description
Model	CONFSTN	FAST/TOOLS Consultancy
Suffix Codes	-C	Mo-Fr: 8 hours/day (08h - 17h) per hour
Option Codes	/E1	Uplift for overtime: between 17h 22h
	/E2	Uplift for overtime: between 22h - 08h
	/E3	Uplift for overtime: in weekends / holidas

Note: Prices excluded mobilisation/demobilisation. All traveling hours and related costs to requested site-visits will be invoiced to the Customer.

● FAST/TOOLS Support contract

		Description
Model	SV5FTSUP	Support contract for FAST/TOOLS license
Suffix Codes	-S	Software license
	1	Always 1
	1	Always 1
	-BASSA	RVSVRN/UNSVRN server -SA (Basic)
	-BASSB	RVSVRN/UNSVRN server -SB (Basic)
	-BASSC	RVSVRN/UNSVRN server -SC (Basic)
	-BASSD	RVSVRN/UNSVRN server -SD (Basic)
	-BASSE	RVSVRN/UNSVRN server -SE (Basic)
	-BASSF	RVSVRN/UNSVRN server -SF (Basic)
	-BASSG	RVSVRN/UNSVRN server -SG (Basic)
	-BASSH	RVSVRN/UNSVRN server -SH (Basic)
	-BASSJ	RVSVRN/UNSVRN server -SJ (Basic)
	-BASSK	RVSVRN/UNSVRN server -SK (Basic)
	-BASSL	RVSVRN/UNSVRN server -SL (Basic)
	-BASSU	RVSVRN/UNSVRN server -SU (Basic)
	-BASWB	HMIWEB server -S□□ (Basic)
	-BASGW	FTRGS-SS1 (Basic)
	-BASEE	FTEES-SS1 (Basic)
	-BASRA	RVSVRN/UNSVRN server -RA (Basic)
	-BASRB	RVSVRN/UNSVRN server -RB (Basic)
	-BASRC	RVSVRN/UNSVRN server -RC (Basic)
	-BASRD	RVSVRN/UNSVRN server -RD (Basic)
	-BASRE	RVSVRN/UNSVRN server -RE (Basic)
	-BASRF	RVSVRN/UNSVRN server -RF (Basic)
	-BASRG	RVSVRN/UNSVRN server -RG (Basic)
	-BASRH	RVSVRN/UNSVRN server -RH (Basic)
	-BASRJ	RVSVRN/UNSVRN server -RJ (Basic)
	-BASRK	RVSVRN/UNSVRN server -RK (Basic)
	-BASRL	RVSVRN/UNSVRN server -RL (Basic)
	-BASRU	RVSVRN/UNSVRN server -RU (Basic)
	-BARWB	HMIWEB server -R□□ (Basic)
	-BARGW	FTRGS-SR1 (Basic)
	-BAREE	FTEES-SR1 (Basic)

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		Description
Model	SV5FTSUP	Support contract for FAST/TOOLS license
Suffix Codes	-S	Software license
	1	Always 1
	1	Always 1
	-PROSA	RVSVRN/UNSVRN server -SA (Professional)
	-PROSB	RVSVRN/UNSVRN server -SB (Professional)
	-PROSC	RVSVRN/UNSVRN server -SC (Professional)
	-PROSD	RVSVRN/UNSVRN server -SD (Professional)
	-PROSE	RVSVRN/UNSVRN server -SE (Professional)
	-PROSF	RVSVRN/UNSVRN server -SF (Professional)
	-PROSG	RVSVRN/UNSVRN server -SG (Professional)
	-PROSH	RVSVRN/UNSVRN server -SH (Professional)
	-PROSJ	RVSVRN/UNSVRN server -SJ (Professional)
	-PROSK	RVSVRN/UNSVRN server -SK (Professional)
	-PROSL	RVSVRN/UNSVRN server -SL (Professional)
	-PROSU	RVSVRN/UNSVRN server -SU (Professional)
	-PRSWB	HMIWEB server -S□□ (Professional)
	-PRSGW	FTRGS-SS1 (Professional)
	-PRSEE	FTEES-SS1 (Professional)
	-PRORA	RVSVRN/UNSVRN server -RA (Professional)
	-PRORB	RVSVRN/UNSVRN server -RB (Professional)
	-PRORC	RVSVRN/UNSVRN server -RC (Professional)
	-PRORD	RVSVRN/UNSVRN server -RD (Professional)
	-PRORE	RVSVRN/UNSVRN server -RE (Professional)
	-PRORF	RVSVRN/UNSVRN server -RF (Professional)
	-PRORG	RVSVRN/UNSVRN server -RG (Professional)
	-PRORH	RVSVRN/UNSVRN server -RH (Professional)
	-PRORJ	RVSVRN/UNSVRN server -RJ (Professional)
	-PRORK	RVSVRN/UNSVRN server -RK (Professional)
	-PRORL	RVSVRN/UNSVRN server -RL (Professional)
	-PRORU	RVSVRN/UNSVRN server -RU (Professional)
	-PRRWB	HMIWEB server -R□□ (Professional)
	-PRRGW	FTRGS-SR1 (Professional)
	-PRREE	FTEES-SR1 (Professional)

Note: The annual support contract provides product support on the standard FAST/TOOLS product for faults/bug fixes. The support contract includes office hour telephone and e-mail support. Application support and remote support will be provided on request.
Note: All software licenses will be sold with a support contract to the end-user. This support contract will become effective as soon as the license is purchased. This also applies to upgrade licenses.
Note: Valid for FAST/TOOLS Software license only.
Note: There are following two types of SV5FTSUP.
Basic (-BASxx)
- Minor Release upgrade: Free of Charge
- Major Release upgrade: 40 % of current trancefer/list price

Professional (-PROxx)
- Minor Release upgrade: Free of Charge
- Major Release upgrade: Free of Charge

Note: FTSUP is for one FAST/TOOLS license.

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● Windows & Linux Server Package for Extension

		Description
Model	RVSVRN	FAST/TOOLS Microsoft Windows & Linux Server Package
Suffix Codes	-S	Software license
	2	For extension
	1	Always 1
	-S0	Extension license from 250 to 500 item numbers
	-S1	Extension license from 500 to 1,000 item numbers
	-S2	Extension license from 1,000 to 2,000 item numbers
	-S3	Extension license from 2,000 to 4,000 item numbers
	-S4	Extension license from 4,000 to 8,000 item numbers
	-S5	Extension license from 8,000 to 16,000 item numbers
	-S6	Extension license from 16,000 to 32,000 item numbers
	-S7	Extension license from 32,000 to 64,000 item numbers
	-S8	Extension license from 64,000 to 128,000 item numbers
	-S9	Extension license from 128,000 to 256,000 item numbers
	-SX	Extension license from 256,000 to unlimited item numbers
	-R0	Extension license from 250 to 500 item numbers for Dual-redundant Platform
	-R1	Extension license from 500 to 1,000 item numbers for Dual-redundant Platform
	-R2	Extension license from 1,000 to 2,000 item numbers for Dual-redundant Platform
	-R3	Extension license from 2,000 to 4,000 item numbers for Dual-redundant Platform
	-R4	Extension license from 4,000 to 8,000 item numbers for Dual-redundant Platform
	-R5	Extension license from 8,000 to 16,000 item numbers for Dual-redundant Platform
	-R6	Extension license from 16,000 to 32,000 item numbers for Dual-redundant Platform
	-R7	Extension license from 32,000 to 64,000 item numbers for Dual-redundant Platform
	-R8	Extension license from 64,000 to 128,000 item numbers for Dual-redundant Platform
	-R9	Extension license from 128,000 to 256,000 item numbers for Dual-redundant Platform
	-RX	Extension license from 256,000 to unlimited item numbers for Dual-redundant Platform

● FAST/TOOLS UNIX Server Package for Extension

		Description
Model	UNSVRN	FAST/TOOLS UNIX Server Package
Suffix Codes	-S	Software license
	2	For extension
	1	Always 1
	-S0	Extension license from 250 to 500 item numbers
	-S1	Extension license from 500 to 1,000 item numbers
	-S2	Extension license from 1,000 to 2,000 item numbers
	-S3	Extension license from 2,000 to 4,000 item numbers
	-S4	Extension license from 4,000 to 8,000 item numbers
	-S5	Extension license from 8,000 to 16,000 item numbers
	-S6	Extension license from 16,000 to 32,000 item numbers
	-S7	Extension license from 32,000 to 64,000 item numbers
	-S8	Extension license from 64,000 to 128,000 item numbers
	-S9	Extension license from 128,000 to 256,000 item numbers
	-SX	Extension license from 256,000 to unlimited item numbers

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● **USER/FAST Web-HMI Server Package for Extension**

		Description
Model	HMIWEB	USER/FAST Web-HMI Server Package
Suffix Codes	-S	Software license
	2	For extension
	1	Always 1
	-SP1	Extension for 1 concurrent client
	-SP5	Extension for 5 concurrent clients
	-RP1	Extension for 1 concurrent client for Dual-redundant Platform
	-RP5	Extension for 5 concurrent clients for Dual-redundant Platform

■ ORDERING INFORMATION

Specify the model and suffix codes.

■ TRADEMARK ACKNOWLEDGMENT

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