

# *Yokogawa in the water industry*



Bulletin 53W01A03-01E



**vigilantplant.**<sup>®</sup>

## The clear path to operational excellence

Envision a plant where people are watchful and attentive while your business responds to change quickly and efficiently. Now picture an operation that delivers non-stop production while confidently expanding your capabilities into the future.

Imagine no further.

This is the vision and promise behind VigilantPlant, the clear path to operational excellence.

VigilantPlant excels at bringing out the best in your plant and your people – keeping them fully aware, well informed, and ready to face the next challenge.

## Smart ideas for a sustainable future

Yokogawa is committed to sustaining your business, the environment, and the society that we all are a part of. We are doing this by developing more energy-efficient technology, helping operations reduce their carbon footprint, and building rock solid products that protect our environment from contaminants. Sustainability is not just a job for Yokogawa but for all industry.

## Long-term partnership for your business

With our leading edge technology and extensive application know-how, we work with you to provide quality solutions that invigorate your business and add high value over the entire plant lifecycle.

# Wide application experience in the water industry

Yokogawa delivers cost benefit solutions through the water and waste water plant controls and instrumentation. This improves the performance of plants and ensures that they can operate competitively in today's water markets, and also reduces their operation costs. Yokogawa supports a wide range of control applications in both municipal and industry market and assists plant owners to identify areas of plant operations that benefit from modern controls running on the latest digital control system platform, with modern field instrumentation.

- Water treatment plant
- District meter area ( DMA )
- Wastewater treatment plant
- Sewage treatment plant
- Seawater desalination plant ( RO and MSF )
- Industry multi-utility plant ( Desalinated water, demineralized water, steam, electricity, wastewater )
- Water pipeline/distribution network
- Water/wastewater pumping station

# Water plant

Yokogawa offers optimum solutions to improve the reliable operation of water plants. These solutions include sophisticated technologies, unsurpassed product quality, and extensive application know-how throughout the lifecycle.

## Raw water quality management

- VOC analyzer
- Trace oil-in-water monitoring

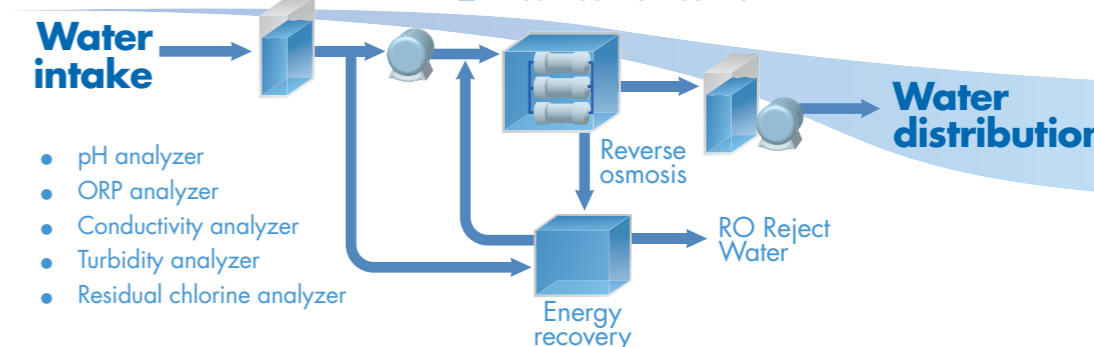
## Chlorine injection feedforward control

- Automatic ammonium-nitrogen analyzer

## Coagulation control

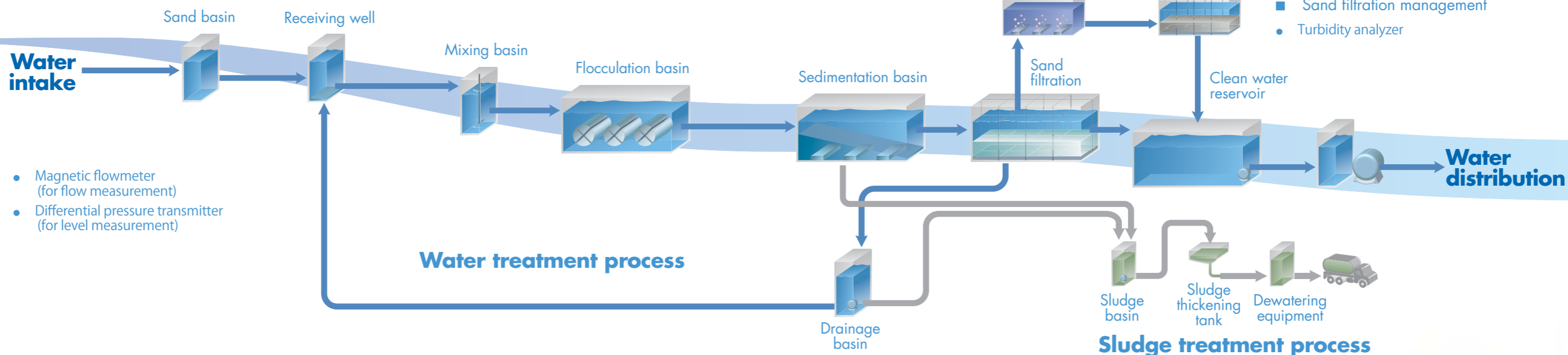
- Turbidity analyzer
- pH analyzer
- Alkalinity analyzer

- Sea water intake control
- Pretreatment control
- SWRO (Sea Water Reverse Osmosis) control
- BWRO (Brackish Water Reverse Osmosis) control
- Post treatment control



## Seawater desalination plant

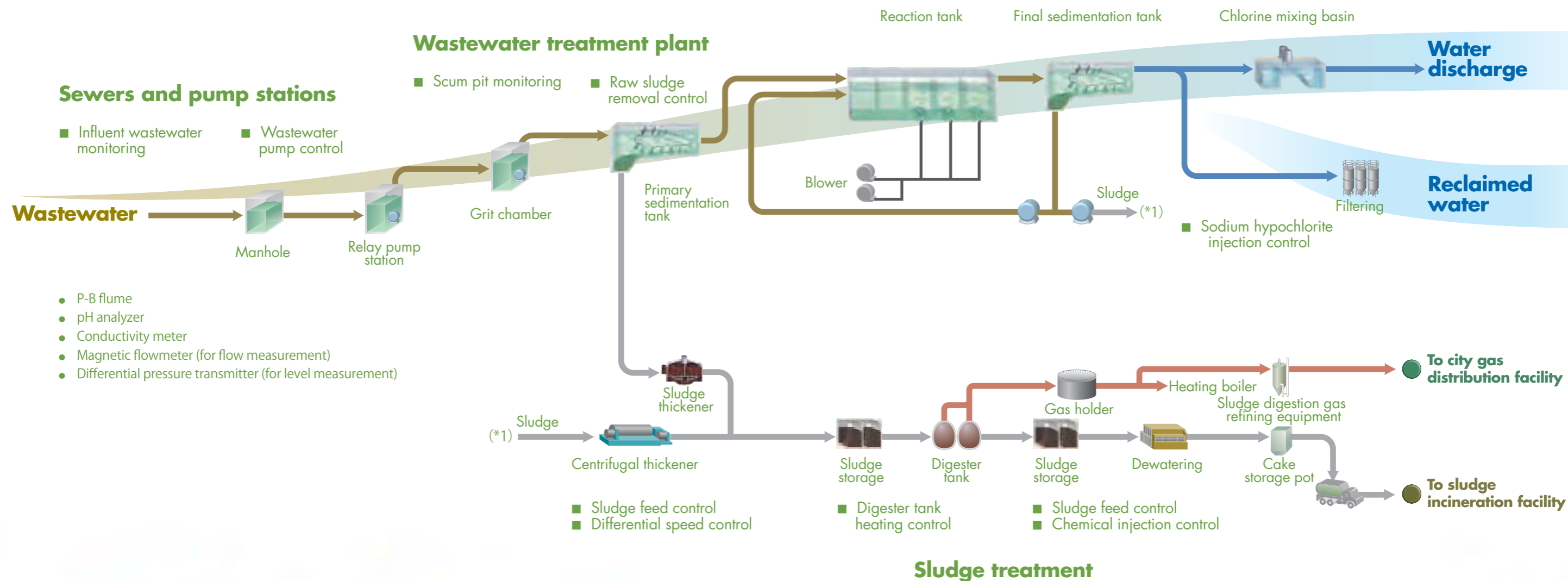
## Water plant



# Wastewater plant

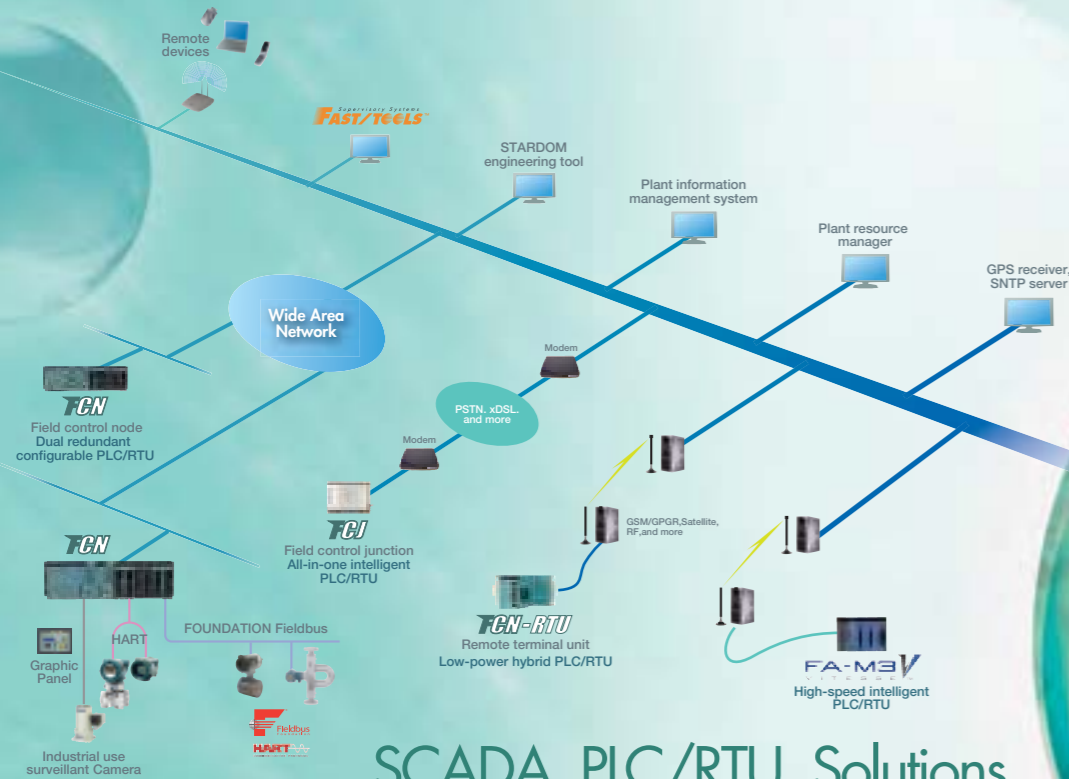
Yokogawa offers sustainable solutions for every part of widely distributed wastewater facilities that maximize efficiency and achieve the operational excellence that is the hallmark of VigilantPlant by improving the visibility of information, enhancing the predictability of processes, and enabling quick and agile responses to changes in the business environment.

- Blower flow control
- Return sludge control
- Discharge water monitoring
- DO, ORP, and MLSS analyzers
- Waste sludge removal control
- UV analyzer
- Phosphorus analyzer
- Turbidity analyzer
- Weir flowmeter
- Nitrogen analyzer



# vigilantplant.® Platforms

Yokogawa offers a wide range of control solutions that embody our outstanding technologies, product quality, and application know-how to improve your operation of municipal and industrial water/wastewater plants.



## SCADA, PLC/RTU Solutions

**Leading-edge technology  
for the total water management**

## Management Solutions



## DCS Solution

**CENTUM VP**



**ISA100  
Wireless  
COMPLIANT**

**VTMX™ VTA Series DP Harp EJX™**

## Digital Fieldnetwork & Wireless Solutions

# SCADA Solution

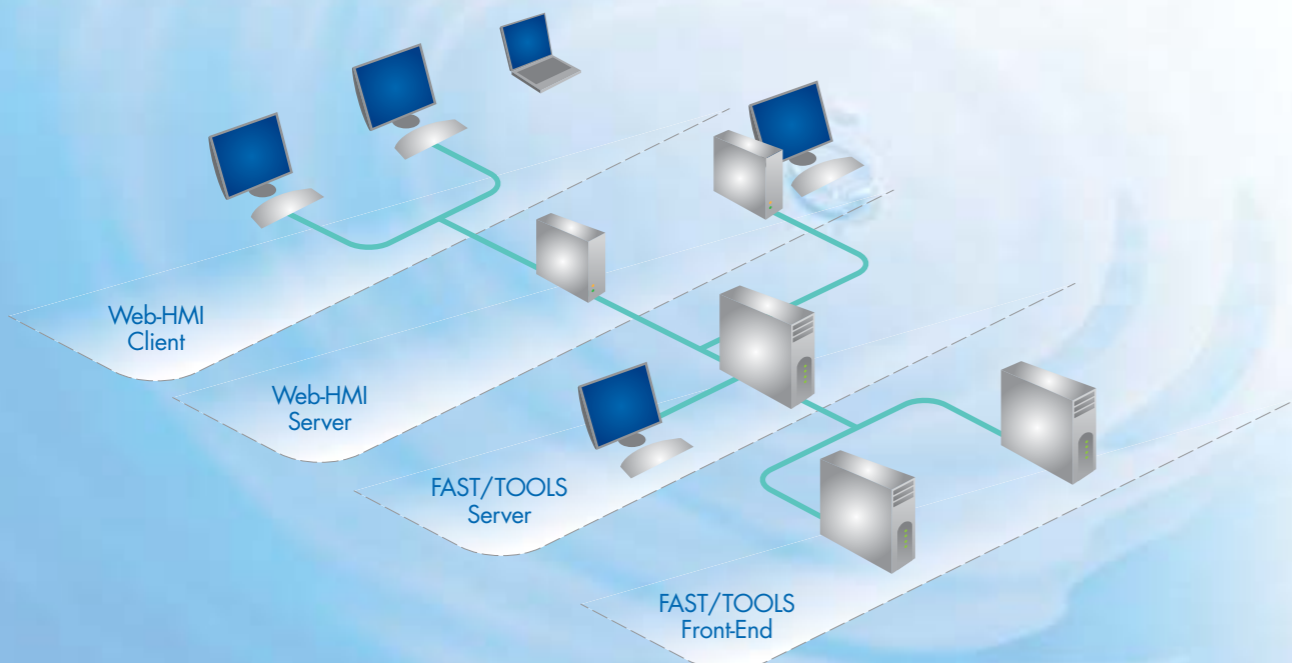


## A full suite solution

FAST/TOOLS is a powerful, state-of-the-art, flexible, distributed Supervisory Control and Data Acquisition (SCADA) system. FAST/TOOLS excels in its highly flexible design, combined with exceptional performance and on-line configuration capability. It is an optimum package for widely distributed RTUs operation, supervisory solutions, and maintenance, available on a wide range of water and wastewater applications with PLC systems. That all adds up to support for the highest levels of efficiency and outstanding quality in industrial and utility processes.

## Client/server architecture

FAST/TOOLS is client/server based, and support for standards such as XML, HTML, Java, ODBC, and OPC ensures uniform and standard interfaces to other packages and applications. This open architecture also provides easy access to the system, making it simple to integrate extra functions to complement the wide range of standard functionality. FAST/TOOLS is scalable from less than a hundred to more than a million I/O points, and supports multiple architectures from single node solutions to multi-node client/server systems.



## Features

### Very high performance

The FAST/TOOLS software kernel has a very small footprint, and its efficient design means low CPU usage. This makes FAST/TOOLS very reliable, and ensures high performance with even the largest systems having 100,000 or more I/O points.

### Web-based HMI

The FAST/TOOLS Web-HMI enables a zero deployment strategy that delivers a rich user experience to the client location, with a minimum of fuss.

### Data archiving

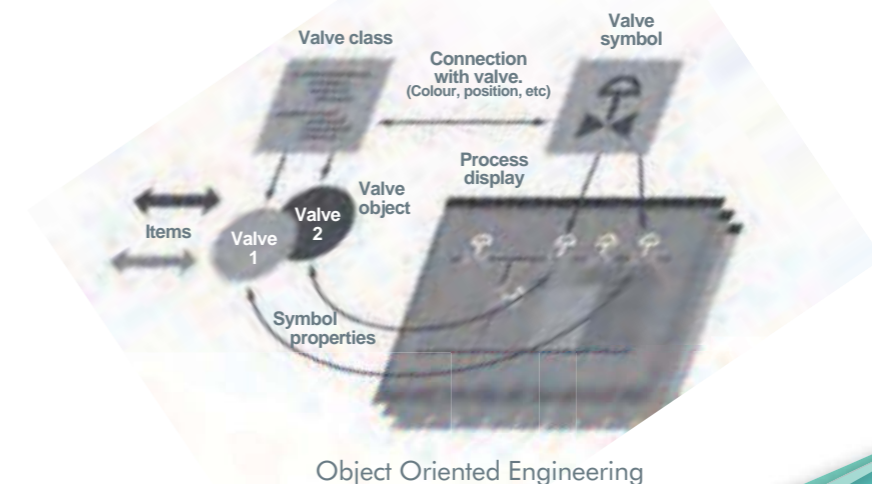
FAST/TOOLS supports long-term data archiving and storage. Stored data is available for online trending, reporting, analysis, and historical alarm/event display, with a defined storage life of hours, weeks, or even years.

### On-line configuration with no downtime

Modifications and extensions to the configuration can be carried out on-line, without affecting systems operations. With FAST/TOOLS, there's no need to schedule down time, no need to reboot.

### Object oriented engineering

Plant equipment such as block valves and pumps can be organized as objects with defined properties and characteristics, and these can be propagated to the entire plant area by assigning the objects unique tag names.



# PLC/RTU & Management Solutions

## Powerful control and management solutions

STARDOM and FA-M3V are open and powerful PLC/RTU systems and enable you to control a variety of water and wastewater facilities distributed over a wide area. STARDOM and FA-M3V bring you maximum return on your facilities in high availability, large scalability and efficient production in combination with SCADA system "FAST/TOOLS" and Yokogawa's management solution packages.

## A variety of PLC/RTU controllers

### • STARDOM FCN

Dual redundant configurable PLC/RTU

The field control node (FCN) autonomous controller can be set up in a dual redundant configuration, ensuring continuous processing, without interruption.

**STARDOM**



**FCN**

### • STARDOM FCN-RTU

Low power consumption PLC/RTU

The FCN-RTU is a low power consumption and robust controller that thrives in extreme temperatures from  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $+158^{\circ}\text{F}$ ) in wide 10 to 30 V DC power supply voltage range for solar battery.

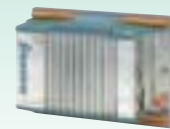


**FCN-RTU**

### • STARDOM FCJ

All-in-one intelligent PLC/RTU

The field control junction (FCJ) is an all-in-one compact controller with built-in I/O that is suitable for direct installation on equipment.



**FCJ**

### • FA-M3V

High-speed intelligent PLC/RTU

The FA-M3V is an all-in-one compact and high speed controller with a diverse range of I/Os and open networks that are suitable for remote and fast speed controls.

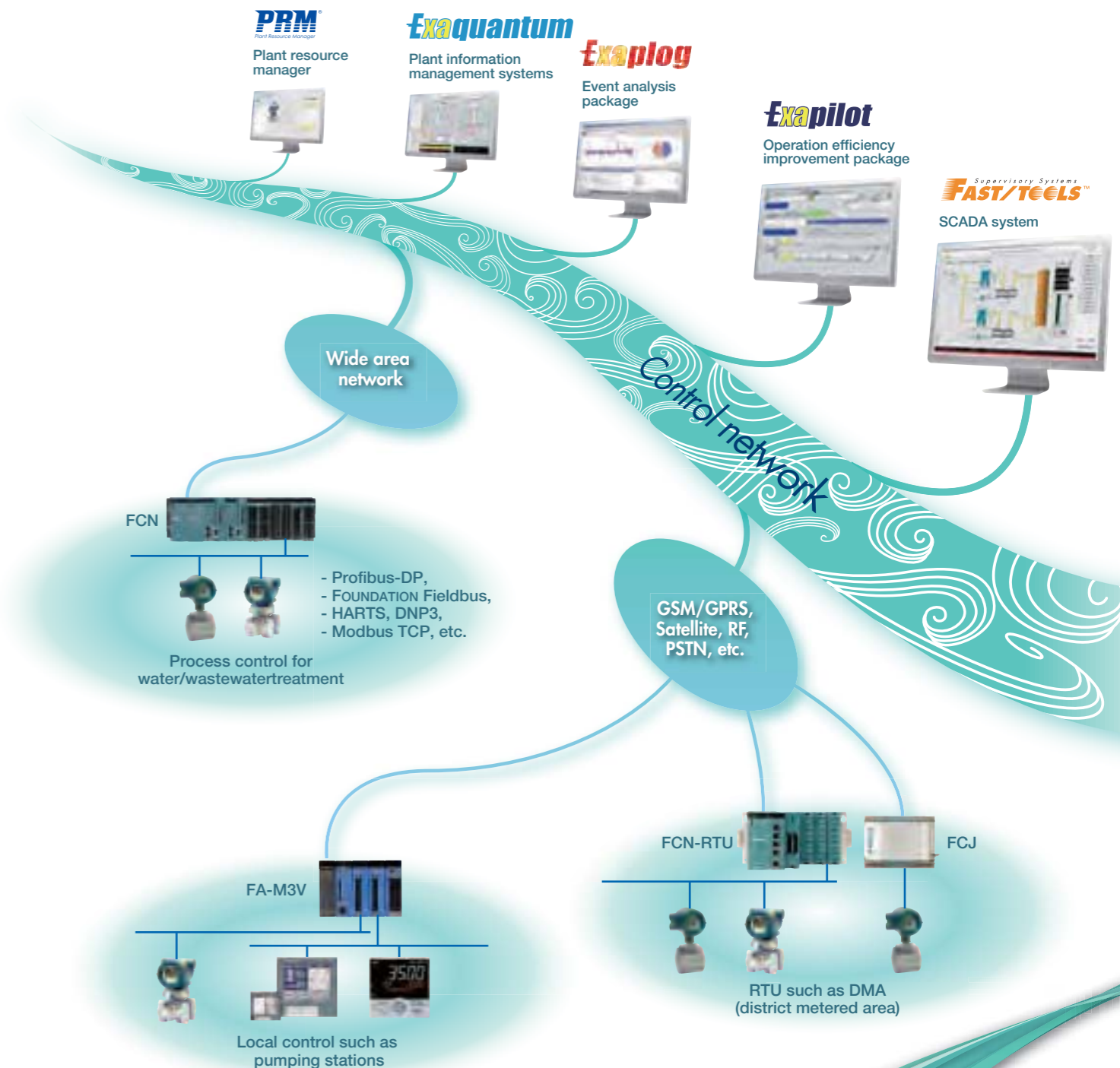
**FA-M3V**  
VITESSE



## Management solution packages

Yokogawa's management solution packages bring you benefits for safer, more stable, optimized, and efficient plant operations in association with the SCADA/PLC/RTU operations.

- **Exapilot** : Operation efficiency improvement package
- **Exaplog** : Event analysis package
- **Exaquantum** : Plant information management systems
- **PRM** : Plant resource manager



# DCS Solution

## Full-scale industrial plant control & operation

The owner of industrial water supply is nowadays expanding its control scope not only industrial water supply but also steam, electricity, wastewater treatment and recycle water in order to meet the requirements of industry utility demands. With its state-of-the-art architecture, the highly reliable CENTUM VP is a core platform of our comprehensive DCS solutions that make it possible for monitoring and controlling the entire Industry multi-utility plant.



Human interface station/  
engineering station

## Innovation and Succession

Leading-edge Yokogawa technologies and know-how have gone into CENTUM VP, the latest evolution of the CENTUM series. By means of, dual-redundant design and online maintenance capability, CENTUM VP delivers the same seven nines (99.99999%) availability that has made CENTUM a best seller worldwide, with over 23,000 installations since it was first introduced to the market a little over thirty five years ago.



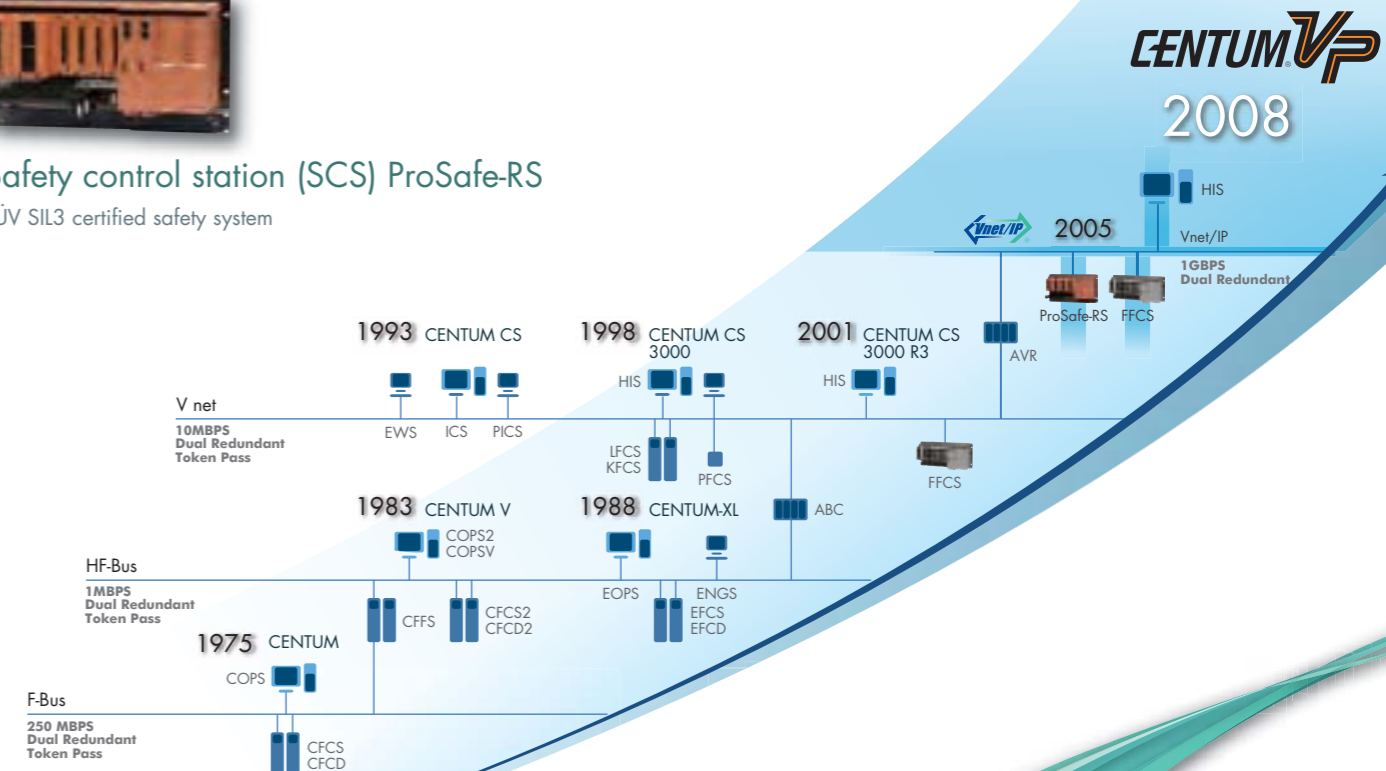
Safety control station (SCS) ProSafe-RS  
TÜV SIL3 certified safety system



Field control station (FCS)  
Power & steam generation controls



Field control station (FCS)  
Desalinated water, demineralized water,  
wastewater & recycle water controls



# Digital Fieldnetwork & Wireless Solution



**ISA100**  
**Wireless**  
**COMPLIANT**

## Digital Fieldnetwork

### Maximizing the value of plant assets through digital field network

Yokogawa's intelligent field device a best-in-class and reliable digital solution meets present and future needs in the water and wastewater industry by providing leading, reliable, interoperable solutions that simplify, maintain and manage the digital life cycle. The Field Digital Solutions ensure true interoperability achieving along with the benefits of advanced diagnostics in devices such as our EJX series of pressure transmitters. A key component in achieving the interoperability is the FDT/DTM technology with FieldMate "One tool for all over device lifecycle". This is a robust industrial communication platform and parameter visualization technology, using a common frame application window, (look & feel) to address multiple communication protocols transparently.

### FieldMate: Versatile Device Management Wizard

#### One tool for all

One integrated tool handles parameter setting for intelligent field devices, regardless of who supplies the devices and what particular field communication protocols are used. FieldMate enables quicker device configuration and problem solving, reducing complex and time-consuming work steps.

#### One tool over device lifecycle

While doing maintenance work on your field devices, FieldMate automatically stores the maintenance work log from initial configuration through start-up and operation.

#### Leading edge technologies

- Multi Protocol Access: BRAIN, FOUNDATION™ fieldbus H1, HART, PROFIBUS and ISA100.11a
- Plug & Play: Instant device recognition upon connection
- Graphical device management: Intuitive user display optimized for each field device



Device DTM display

**FieldMate™**

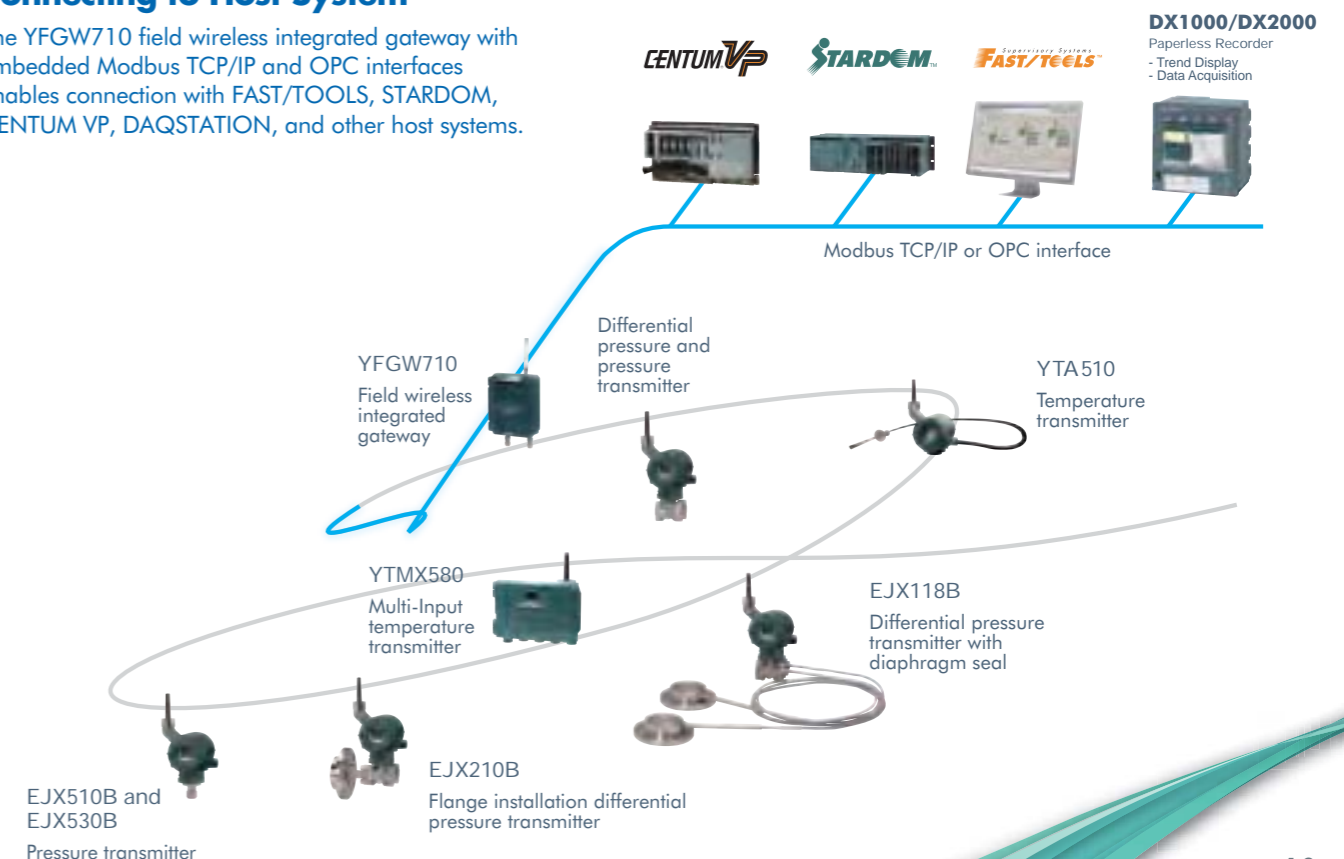
## Wireless Solution

### Evolving your plant with wireless innovation

Yokogawa's wireless solutions enable true end to end, wireless digital sensing. The Yokogawa lineup of DPharp ISA100.11a field wireless sensors combine advanced, high precision digital sensing with reduced engineering and commissioning workload, providing the flexibility to expand your wireless sensor network to meet future demand.

### Connecting to Host System

The YFGW710 field wireless integrated gateway with embedded Modbus TCP/IP and OPC interfaces enables connection with FAST/TOOLS, STARDOM, CENTUM VP, DAQSTATION, and other host systems.



# Field Instruments and Analyzers

## Secure the stable and reliable operation in your entire process

Yokogawa is a leading company to measure the entire industrial automation process. Our powerful field instruments and analyzers with digital sensing technologies provide superior stability and repeatability enabling efficient plant operation.

## Field Instruments

Since developing its first magnetic flowmeter for industrial use in 1953, Yokogawa has provided a wide range of flow measurement solution with high quality, accurate and reliable products. All of these products are designed to give you maximum accuracy, stability, safety and reliability, with the objective of reducing your cost of ownership.



DPharp pressure, DP & level transmitters



ADMAG CA magnetic flowmeter



Ultrasonic flowmeter

## Analyzers

### Liquid analyzer FLEXA Series

The FLEXA series is a next-generation liquid analyzer that can be flexibly configured to install a wide variety of sensors.



- Up to two sensors enabling redundant measurement
- Interactive touch screen for easy operation
- Open communication with HART
- Sensor diagnosis for easy maintenance



pH/ORP, conductivity & dissolved oxygen



Chlorine analyzer



Turbidity analyzer



Process gas chromatograph



Mixed liquor suspended solids (MLSS) analyzer

A revolutionary silicon resonant sensor technology applied for transmitters

# vigilantplant services.<sup>®</sup>

## Taking steps to ensure a profitable future

Investing in Yokogawa industrial automation is only the start of step-change improvements to your plant's efficiency and productivity.

"VigilantPlant Services" is a comprehensive suite of services that help you attain excellence in your operations by making use of our extensive products, knowledge, experience, methodologies, and skills over the entire lifecycle of a plant facility. Yokogawa complements its process automation products with a rich array of operational support - VigilantPlant Services - that extend from simple maintenance and repair, all the way to operational performance optimization. With the active support of Yokogawa's experts, your automation investment will reduce business risk and deliver tangible return-on-investment through savings in manpower, raw materials, and energy usage. Using real-world benchmarks Yokogawa assists you to achieve best-in class performance with your automation infrastructure.

## Standard support packages to maintain automation efficiency

Yokogawa's control and instrumentation solutions are critical elements of a plant's operation. To complement in-house resources to maintain automation infrastructure, Yokogawa offers three standard support packages: Basic, Enhanced and Custom.

These provide support assistance to meet common requests for 'on demand' repair support, 'increased availability' with assured response times, and 'preventive maintenance and enhancements'. The packages may also be tailored to suit individual circumstances.

A suite of advanced services for identifying improvement opportunities and optimizing your automation system's performance are optionally available, providing a path to continuous improvement.



Custom



**Individual services according to customer requirements, plant and operation conditions to improve and maintain operational excellence**

- Network / Security Service
- Deterioration Diagnosis
- Environment Diagnosis
- Renewal / Overhaul Service
- Technology Refresh
- Shutdown Maintenance Service
- Training
- Best Practice Pilot
- Regulatory Control Stabilization
- InsightSuiteAE
- Software Revision Upgrade Facility
- Parts Management
- 24H Emergency Support (RMS\*1)
- Alarm Rationalization
- Preventive Maintenance (Patrol Inspection)
- Engineer Dispatch Service
- Repair Support Service
- Normal Hours Technical Support
- Comparative Effectiveness Analysis (CEA)
- Improvement Leader Development Program (ILDLP)
- Web Access Service

Enhanced



**Basic maintenance and improvements in operation and serviceability**

- Software Revision Upgrade Facility
- Parts Management
- 24H Emergency Support (RMS\*1)
- Alarm Rationalization
- Preventive Maintenance (Patrol Inspection)
- Engineer Dispatch Service
- Repair Support Service
- Normal Hours Technical Support
- Comparative Effectiveness Analysis (CEA)
- Improvement Leader Development Program (ILDLP)
- Web Access Service

\*1 Remote Maintenance Support System

Basic



**Basic maintenance and operational improvement**

- Preventive Maintenance (Patrol Inspection)
- Engineer Dispatch Service
- Repair Support Service
- Normal Hours Technical Support
- Comparative Effectiveness Analysis (CEA)
- Improvement Leader Development Program (ILDLP)
- Web Access Service

# Success Story

## Ministry of public works and public housing

SCADA system takes a new municipal water treatment plant in Bali to higher level of operations

Location: Bali, Indonesia  
Order date: Apr. 2013  
Completion: Nov. 2013

Petanu water treatment plant

## Indonesia

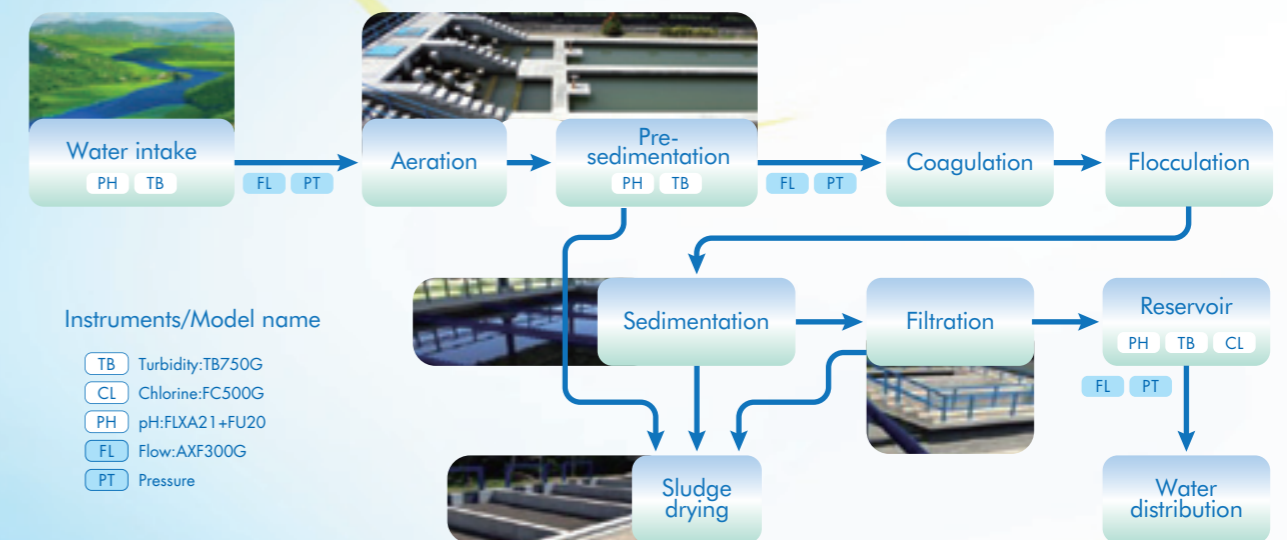
### Executive summary

Indonesia is the world's fourth most populous country, and its infrastructure is developing rapidly to meet the growing needs of its urban population and various industries. Bali, Indonesia is one of the most popular tourist destinations in the world, and its water infrastructure is rapidly developing to satisfy the growing needs of its tourism industry. To meet the growing water demand in the Sanur beach resort on Bali's southeastern coast, the Indonesian government's, Ministry of Public Works and Public Housing (PU) planned to build the new Petanu water treatment plant. The Indonesian state-owned plant builder, PT Waskita Karya (Persero) Tbk, constructed the plant.

The Petanu water treatment plant is dedicated to set a new level of water supply operation in Indonesia. Instrumentation and automation technology are introduced to improve its operational accountability as well as the easiness of its manageability for the operator. SCADA system is the appropriate measure to reach the goal.

The Petanu water treatment plant started its commercial operation in May 2014 and produces 300 liters per second (approximately 25,920 cubic meters per day) of drinking water. The plant will increase its production progressively to supply drinking water for three municipalities in Southern Bali (Gianyar, Denpasar and Badung).

The PU and Waskita Karya selected Yokogawa's process automation system as a one stop solution which includes FAST/TOOLS™ SCADA (supervisory control and data acquisition) system, STARDOM™ network-based control system, and various field instruments. To meet the urgent market demands, PU and Waskita Karya requested Yokogawa Indonesia to deliver these instruments and systems within three months from the order. Furthermore, PU and Yokogawa are committed to support the capacity building for the operator in the Petanu water treatment plant, especially in operating and maintaining SCADA system.



Process flow diagram

### Process overview

The Petanu water treatment plant is using surface water sources from Petanu River and producing drinking water for public consumers. The raw water from the water intake goes to aeration and pre-sedimentation where heavy particles settle to the bottom. The water, with suspended solids and particles, then go to sedimentation, where they are coagulated with alum or PAC (Polyaluminum Chloride) other chemicals and become flocks, which are heavy enough to sink to the bottom. The settled particles and flock are removed to the sludge drying bed. Then the water is filtered and chlorine is added to disinfect the water. Finally, the treated water moves to the reservoir to be distributed to the consumers.

## Success Story

SCADA system takes a new municipal water treatment plant in Bali to higher level of operations

# Indonesia

## The challenges and the solutions

Yokogawa Indonesia executed the entire project from product supply to engineering, installation, and commissioning as a total solution.

The PU is familiar with conventional panel operation in their existing water treatment facilities in Bali. However, for the new water treatment plant at Petanu, the PU decided to employ the latest reliable control system in order to increase availability and quality of operation, and improve ease of maintenance and future expansion. This decision to adopt new technologies was a big challenge for them. Since Petanu water treatment plant started its operation in May 2014, the plant has been supplying safe and clean water to the South West of Bali. Behind this success, both customers and Yokogawa Indonesia made extra ordinary efforts to overcome significant challenges to achieve the objective.

FAST/TOOLS™ SCADA system at operation room



### 1. Centralized operation

To satisfy the PU expectation of acquiring the latest most reliable control system available, Yokogawa Indonesia provided FAST/TOOLS™ SCADA system and the STARDOM™ network-based control system with field instruments. The major field instruments include pH analyzer, turbidity analyzer, chlorine analyzer, magnetic flowmeter and pressure transmitter as well as other associated field instruments in the process monitoring of water intake, pre-sedimentation, chemical dosing and reservoir. These instruments have LCD operation panel for easy parameter setting and for prompt operation at site.

The main process of a water treatment facility uses many pumps and motors. To increase reliable control of the operation, STARDOM™ provides dual redundant configuration in dual control CPUs, power supplies and communication networks. All STARDOM™ controllers are connected to FAST/TOOLS™ SCADA system at the central operation room through the Ethernet network. As compared with PU existing conventional panel operation in Bali, FAST/TOOLS™ provides more sophisticated and flexible operation by integrating with process data, equipment status, alarms, messages, trending, process reports, and historical data and system maintenance information. With this control system, the Petanu water treatment plant is achieving secure, stable and reliable operations in the entire process with a minimum number of operators.

### 2. Local engineering support

It was the first time for both PU and Waskita Karya to work with Yokogawa Indonesia for their water treatment plants. In addition, PU and Waskita Karya requested short delivery of the system. To satisfy customer's expectation and get their confidence, Yokogawa Indonesia used their experience, knowledge and local engineering skills of infrastructure plant projects in Indonesia and carefully verified and applied the control logics and operation screen designs into the control system.

### 3. Sophisticated operator training

For the customer's smooth start-up of SCADA based operation, Yokogawa Indonesia gave customized training for PU at both Jakarta and Bali so that they could get accustomed to the graphic screen operation in advance. Through the training, PU became confident and adapted to SCADA operation before the plant commissioning.

This sophisticated operator training prepared operators for any unusual operations, such as a sudden flow-rate change at the water intake due to heavy rain, so they can adjust the water inlet flow accordingly.

Once the operators obtained the benefits of SCADA system, they extended their operation to be more flexible and efficient.



TB750G  
Turbidity analyzer



AXF300G ADMAG  
Magnetic flowmeter



STARDOM™  
Network-based control system

## Customer satisfaction

"We are very satisfied with the successful installation and smooth operation on schedule. The water demand in this area was very critical. So sooner water supply was definitely required. We appreciate Yokogawa Indonesia's commitment and sophisticated services for this project.

It was the first time for us to use Yokogawa control system. However, thanks to Yokogawa Indonesia's local efforts and supports, we are now very confident to use the state of art technology and reliable products. With Yokogawa control system, we can operate the plant more efficient with less manpower than conventional panel operation. Now Petanu water treatment plant has become a showcase of water treatment plant in Bali. We want to utilize this facility as a training center for future operators contributing to increase the quality and efficiency of water production. We are very proud of supplying safe and clean water to our region 24 hours/365 days 24/7 for 365 days constantly", said, Mr. I Gusti Alit Joni, a Head of Water Supply Management Unit of Bali.

# Success Story

## YTL PowerSeraya Pte. Limited

World's first 16" SWRO membrane desalination plant  
- Monitored & controlled entirely by a Yokogawa STARDOM™ and FAST/TOOLS™ SCADA system

Location: Pulau Seraya, Singapore  
Order date: May 2006  
Completion: Sep. 2007

## Singapore Executive summary

YTL PowerSeraya Pte. Limited. is in the business of producing, wholesaling, trading, and retailing of energy, with a primary focus on electricity. With its strategic location on Jurong Island and excellent infrastructure, the company has built an integrated energy business which includes the sale of steam and water as well as oil trading and storage.

YTL PowerSeraya's desalination plant converts seawater into potable drinking water and service water for its existing boiler plants and utilities operations. It can produce 10,000 m<sup>3</sup> of water per day. All operations at this plant are monitored and controlled by an integrated STARDOM™ and FAST/TOOLS™ SCADA system. Installed on a very tight schedule by Yokogawa Engineering Asia, this system has been in operation since September 2007 and has experienced no major system problems. The high reliability of this SCADA system is managed by the O&M (operation and maintenance) staff of YTL PowerSeraya.

## The challenges and the solutions

The first challenge in the YTL PowerSeraya desalination project was a very tight schedule. Working flawlessly from start to finish of this project, Yokogawa Engineering Asia was more than up to this challenge. A key advantage was that the company is a one stop provider not only of STARDOM™ controllers and the FAST/TOOLS™ human machine interface (HMI), but also various kind of field instruments.

Yokogawa also provided comprehensive engineering services, from the formulation of control strategy to the installation and commissioning of the integrated system. Approximately 1,400 I/O points were wired in/out at the STARDOM™ controller panels in the desalination plant's main control room. With this integrated system, all the real time process data can now also be monitored from the administration and turbine buildings via a dual redundant fiber optic cable network.

YTL PowerSeraya needs a constant supply of water for its boiler plants, ensuring the steady generation of power around the clock, 365 days a year. The quality of this service water is tightly monitored and controlled by Yokogawa conductivity and pH meters. Accurate measurements of the conductivity and pH readings in the salt water reverse osmosis (SWRO) membranes are important for the quick detection of any seawater leakage. This contributes to a longer SWRO membrane life and reduces TCO (total cost of ownership).

At this plant, Yokogawa magnetic flowmeters also help to keep costs down by accurately measuring the consumption of many different types of chemicals.

## Customer satisfaction

Abdul Rahim Sapuan, team leader of the Multi Utilities-Gen Dept. said, "We are very happy with Yokogawa's proven SCADA system which helps to produce a constant supply of water to our boiler plants. The reliability of Yokogawa's system and products is excellent."



SWRO  
membrane process



Main control room for  
field operations



Magnetic flowmeter

Magnetic flowmeter converter



Conductivity/pH meters

# Success Story

## Metropolitan waterworks authority

Real-time management of large water supply network using the STARDOM™ network-based control system

Location: Bangkok, Thailand  
Order Date: Sep. 2005  
Completion: Nov. 2006



## The challenges and the solutions

Bangkok is a rapidly expanding city with an ever increasing demand for basic services, including water supply. To meet demand, the MWA plans to build more than 1000 block stations and to set up branch piping for each of these stations. Real-time data monitoring at each of these block stations is essential to bringing the water loss issue under control.

Achieving an accurate water loss management system while keeping the running costs to a minimum was a real challenge in this project. Yokogawa met this challenge by providing STARDOM™ FCJ controllers that function as intelligent remote terminal units (RTUs).

### Specific advantages of the STARDOM™ FCJ controller include:

- Interfaces that support the use of GPRS, PSTN, and ADSL networks
- Embedded network fail-over detection and automatic reconnection functions that reduce GPRS network instability
- Data logging functions to protect against data loss in the event of network failure
- Supports flexible system scalability and interconnectivity with other systems

More than 200 Yokogawa STARDOM™ FCJ controllers have been installed to date, enabling the MWA's monitoring system to collect data from widely dispersed block stations and monitor for leaks using a leakage check algorithm. Via a telephone network, a central operations center continually monitors this system.

## Thailand

### Executive summary

Thailand's Metropolitan Waterworks Authority (MWA) supplies drinking water to 1.8 million customers in a 2,100 km² region encompassing greater Bangkok and the neighboring provinces of Nonthaburi and Samut Prakarn. A significant challenge impacting the efficiency of the MWA's water distribution network is the problem of water loss caused by damage to pipes and equipment, inaccurate water meters, and other reasons. In 2005 the MWA launched a project that would address this problem through improved management of water distribution. Its initial goal was to reduce water loss to 30% by 2006 and then to maintain it at this level through to the year 2017. In order to bring the MWA a real-time monitoring and management capability, Yokogawa Thailand installed STARDOM™ controllers along with Yokogawa pressure transmitters, magnetic flowmeters, and ultrasonic flowmeters at key points throughout this distribution network.

### The benefits

The improved monitoring system has achieved the expected reduction in water loss. The real-time monitoring capability supports a core active leakage control function that responds to losses in the water pipe network. Abnormal conditions, particularly burst water pipes, are discovered much sooner, and it is easier to pinpoint leak locations. In addition to improving the efficiency of the loss management program, work efficiency and cost performance as well as employee morale have been improved. As a result, the quality of services provided to end customers is gradually increasing.

# Success Story

## Marseille provence metropole

Innovative GEOLIDE wastewater treatment complex in Marseille  
uses CENTUM and Exaquantum

Location: Marseille, France

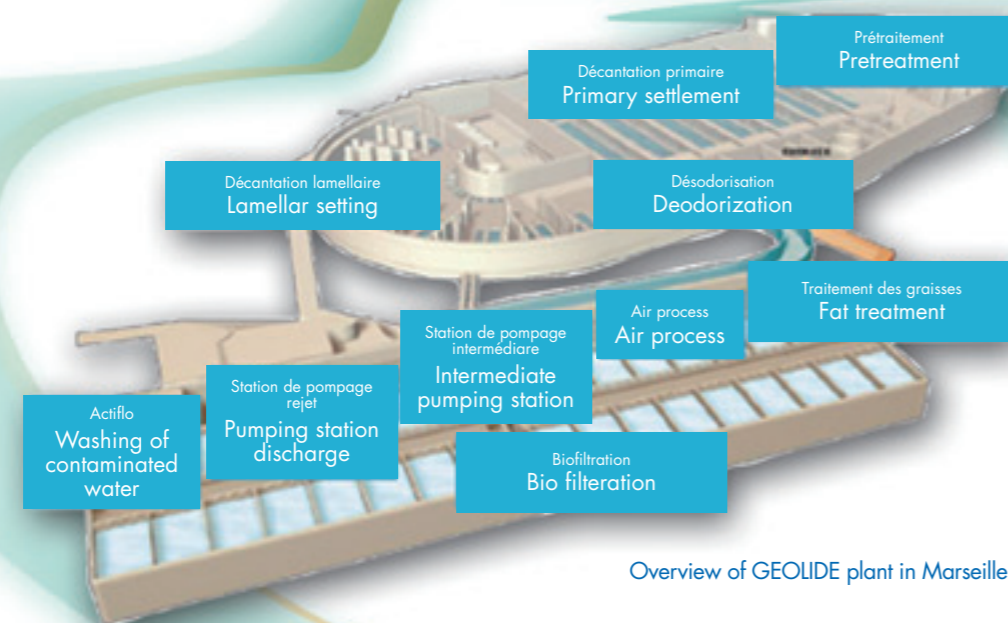
Order date: 2006

Completion: 2008

## France

### Executive summary

Constructed in 1987, the GEOLIDE wastewater purification plant treats up to 220,000m<sup>3</sup> of wastewater per day (86 million m<sup>3</sup> per year) for the city of Marseille (population 1,860,000) and 16 towns in the surrounding area. The plant has been operated since 2001 by Seramm, which is a subsidiary of the French water supply and wastewater treatment company Lyonnaise des Eaux.



Although located in the Marseilles city center, the GEOLIDE wastewater purification plant has minimal impact on the surrounding area as it is built almost entirely underground and releases none of the objectionable odors that are normally associated with facilities of this type. Originally configured to provide just primary water treatment using physical and chemical processes, the GEOLIDE plant was revamped in 2008 to provide advanced biological treatment processes. Water treated by this facility is discharged into the sea, and sludge is transported 6 km to the Cayolle treatment plant.

As part of the revamping process that was completed in 2008, Yokogawa France was asked to upgrade the GEOLIDE plant's existing Yokogawa CENTUM<sup>®</sup> V production control system (PCS) to the CENTUM<sup>®</sup> CS 3000 PCS and to install the Exaquantum plant information management system (PIMS). This work was carried out in collaboration with Veolia Environnement and Suez Environnement.



GEOLIDE wastewater purification plant in Marseille

# Success Story

## Marseille provence metropole

Innovative GEOLIDE wastewater treatment complex in Marseille uses CENTUM® and Exaquantum

## France



Central control room

## The challenges and the solutions

The GEOLIDE plant treats and purifies wastewater from households and industry in the greater Marseille area so that it can be safely released into the natural environment. The plant operates 24/7 throughout the year.

The secondary treatment process relies on biological processes to eliminate contaminants that are dissolved in the water. The water passes through trickling filters that are coated with a film of bacteria, which digest the dissolved contaminants. The purified effluent is released into the sea, and the trickling filter sludge is sent to the Cayolle treatment plant.

Many different motors and pumps are used in these processes, and their operation is automatically controlled using the sequence function of the CENTUM® CS 3000 PCS. All the process I/Os are connected to the CENTUM® CS 3000 field control stations (FCSs), and the signals are accessed by a variety of function blocks that execute monitoring and control functions.

Sitting at their human interface stations, operators have real-time access to data on operations throughout the plant on screens that show process trend graphs for selected time intervals, data on up to eight control loops, detailed parameter settings for individual loops, and guidance messages. Such data is also transferred to the Exaquantum process information management system for reporting and data analysis. The visualization of all data on items such as motor and pump operating time and chemical consumption amount allows operators to optimize key operation items.

## Sustainability

The water released into the sea from the GEOLIDE plant surpasses all relevant European regulatory standards.

	Incoming wastewater (mg/l)	Released water (mg/l)	EU regulatory limit (mg/l)
Suspended solids	300	25	35
COD-Cr	643	64	125
BOD5	323	15	25

COD= Chemical oxygen demand  
BOD= Biochemical oxygen demand

## Automated control, visualization of data

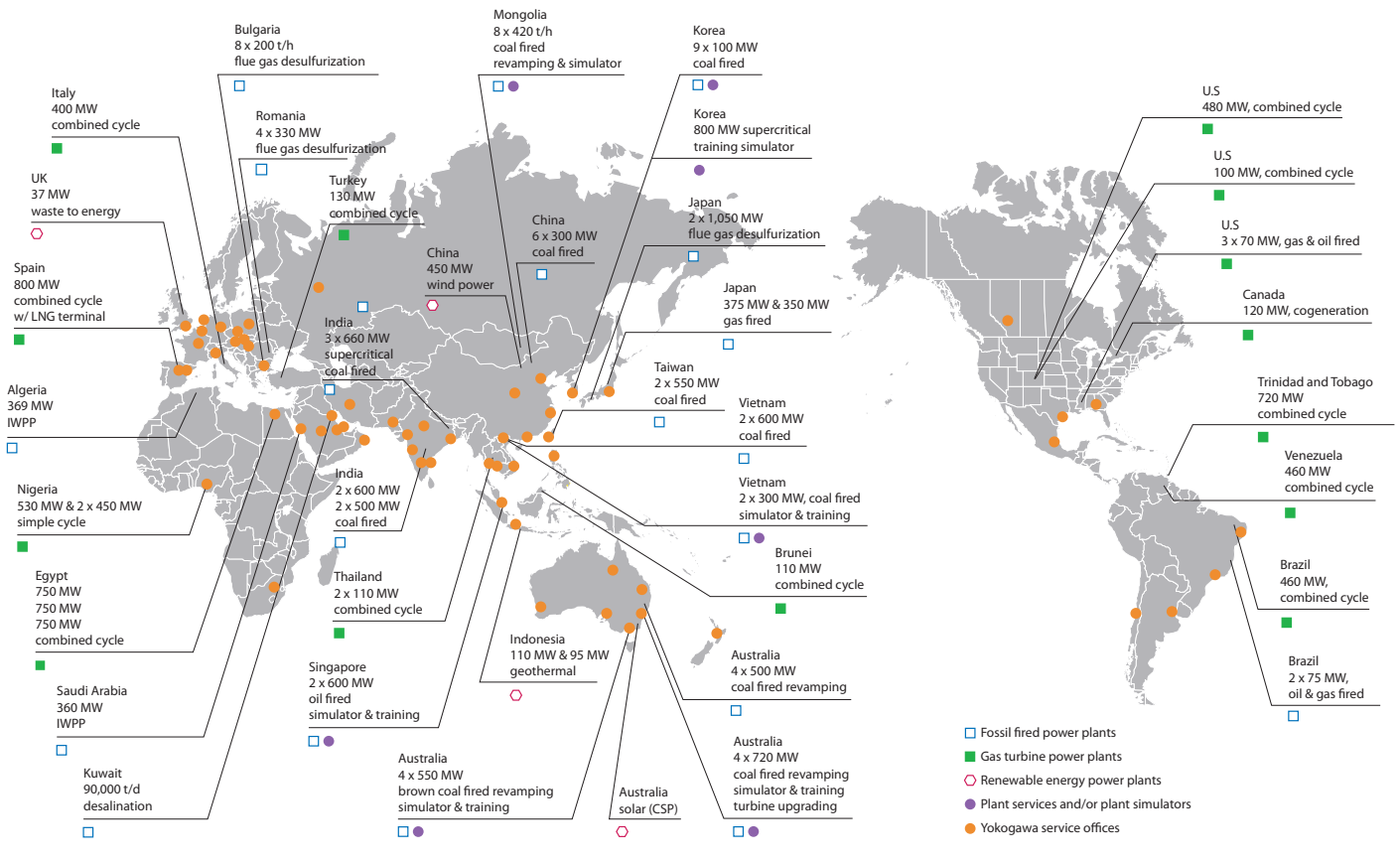
The plant's primary treatment process removes solid contaminants that are suspended in the wastewater. The wastewater is filtered to remove large waste particles, then is sent to basins for grit removal and oil skimming. Sand and grit are removed from the bottom of the grit chamber and washed. Fat and grease float to the surface and are skimmed off, then sent to a biological treatment center for digestion. The water is subsequently left to settle in a pre-clarifier. Suspended solids fell to the bottom and form primary sludge, which is subsequently sent to the Cayolle treatment plant.

## Customer satisfaction

Bruno Triboulet, Seramm director: "This wastewater treatment plant operates year-round. To lessen its impact on the environment, we have to carefully manage the quality of the water that is discharged into the sea. We have been using a Yokogawa control system since 1987 and are very happy with its high reliability. We have had no major system problems to date."

Mickael Chaptal, Seramm maintenance manager: "We are long-time users of Yokogawa's CENTUM® system, and our upgrade to the new version was problem-free. Using the configuration menus at the engineering workstation, it is very easy to modify control strategies. We can quickly change the configuration and immediately put it into operation. We are very comfortable using Yokogawa's system."

# Yokogawa Vigilance at your service worldwide - representative projects



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The clear path to operational excellence

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