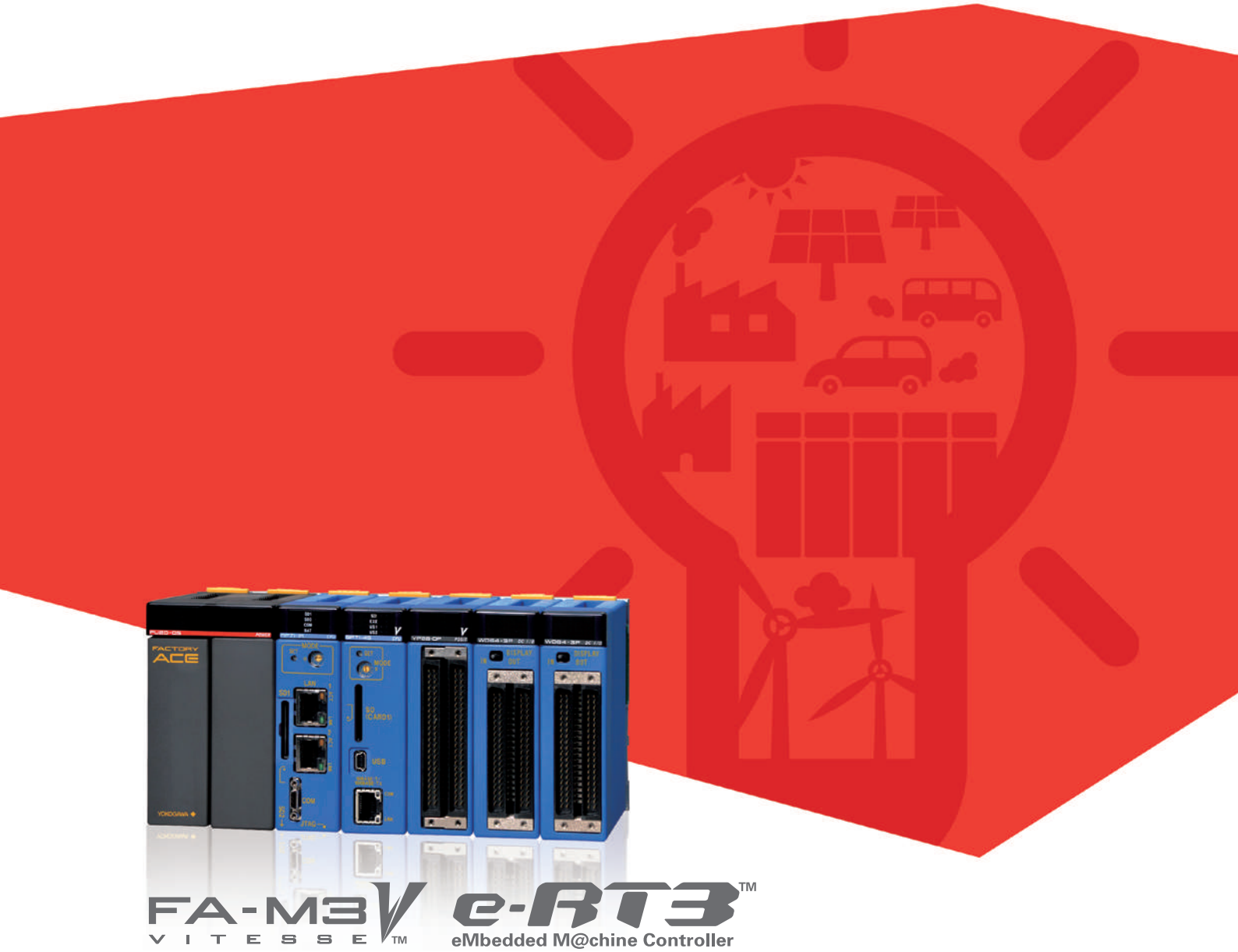
Co-innovating tomorrow™

YOKOGAWA

Application Case Study

Semiconductor/Electronic Parts/Automobile/ Storage of Electricity Energy/PLC Instrumentation



FA-M3V VITESSE™ e-RT3™ eMbedded M@chine Controller

Bulletin 34M06A11-22E

Introduction success stories of applications where we worked together with customers to resolve their challenges.

Since Yokogawa started the PLC business in 1992, FA-M3/ e-RT3* has been chosen by a great number of devices and systems, including semiconductor and electronic parts manufacturing equipment.

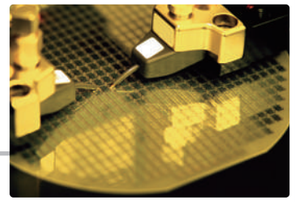
FA-M3/ e-RT3* provides a wide range of advanced function modules, with the ability to work with highly compatible YOKOGAWA products and partner products.
All of these features allow the product family to meet a variety of customer needs and play a key role in various industries.

This catalog contains an introduction to success applicaitons where we, together with the customer, applied FA-M3/ e-RT3* to create new value.

* Oversea unreleased product. For detail please contact to fam3global@csv.yokogawa.co.jp

PLC Applications

Semiconductor



Production Process Management Controller (Cell Controller)

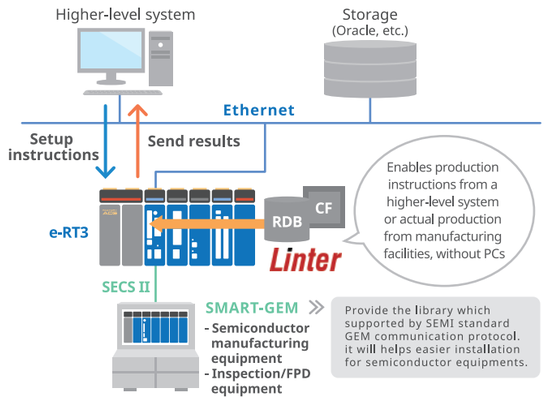
PC-free
Windows-free

Highlights

- The PLC is used as a production process management controller (cell controller) to connect the MES (Manufacturing Execution System) with manufacturing facilities.
- It is equipped with a RDBMS (Relational Database Management System) which makes robust and reliable database.
- SMART-GEM, which is a package for development support of semiconductor assembly equipment that runs on e-RT3 (Vxworks) enables the GEM communications environment to be operated without any PCs.

Key Products

- **VxWorks OS CPU module [F3RP62-2L/F3RP62-2R]**
- **Built-in database [Linter] (BRYCEN Co., Ltd.)**
- **Package for development support of semiconductor assembly equipment [SMART-GEM] (Soft-Service Co., Ltd.)**



Enhance security
Helps non-stop and robust system development

Semiconductor Manufacturing Machine (Wafer Inspection Machine)

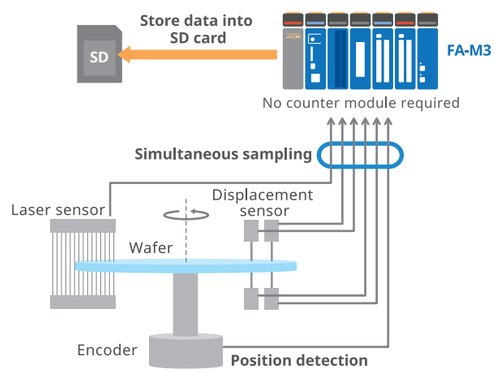
Synchronization with counter.
High-speed A/D conversion

Highlights

- The system enables the outer circumference, thickness, and bow of each wafer to be measured without measuring instruments.
- The built-in counter is synchronized with the encoder, providing an A/D conversion capability on position or angle.
- Data can be captured in accordance with motor movement, eliminating unnecessary rotations and enabling the fastest measurements.

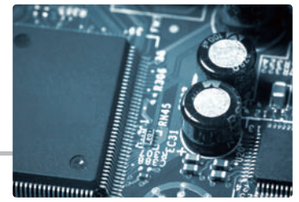
Key Products

- **Sequence CPU module [F3SP71-4S/F3SP76-7S]**
- **High-speed data acquisition module [F3HA06-1R/F3HA12-1R]**



Minimum measurement time for thickness and bowing with just a PLC

Electronic Parts



Sorting/Taping Machine (Index Table)

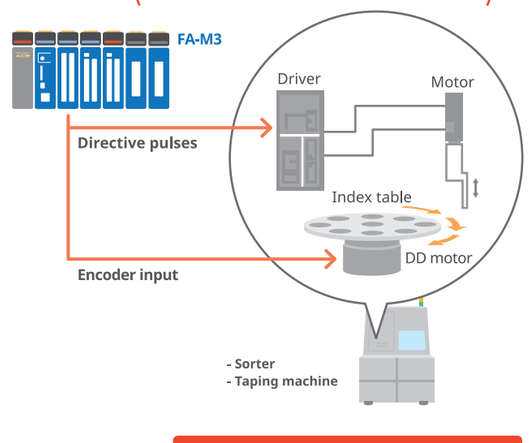
Stable, lag-free high-speed, high-performance motor control

Highlights

- The combination of sequence CPU module and positioning module can reduce the tact time.
- The use of smooth pulse output at 125µs control period improves motor control performance, enabling further reduction of the device working time.
- Reading index table position by counter inputs, the machine can control less data variations and less delays.
  Electronic cam switch function is also available.
- Infinite rotation of the index table is supported.

Key Products

- **Sequence CPU module [F3SP71-4S/F3SP76-7S]**
- **Positioning module (with multi-channel pulse output) [F3YP22-0P/F3YP24-0P/F3YP28-0P]**



More accurate control
Reduced takt time

Electronic Parts Inspection Equipment

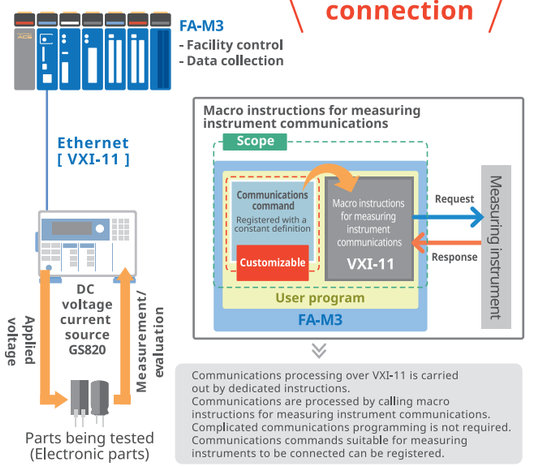
VXI-11 support
Easy Ethernet connection

Highlights

- VXI-11-enabled "macro instructions for measuring instrument communications" allows the PLC to communicate with measuring instruments over Ethernet.
- Communication performance is increased compared with the traditional GP-IB interface, and it helps easier engineering and the cable acquisition.
- Various parameters for workpieces to be inspected are sent from the PLC to the measuring instrument for automatic setup.
- Simple configuration enable to reduce total cost down.

Key Products

- **Sequence CPU module [F3SP71-4S/F3SP76-7S]**
- **Macro instructions for measuring instrument communications [VXI-11 macro instructions for F3SP7□]**



Communications processing over VXI-11 is carried out by dedicated instructions.
Communications are processed by calling macro instructions for measuring instrument communications.
Complicated communications programming is not required.
Communications commands suitable for measuring instruments to be connected can be registered.

Space-saving and cost effective
Simple configuration

Automobile

Bearing Inspection Facility

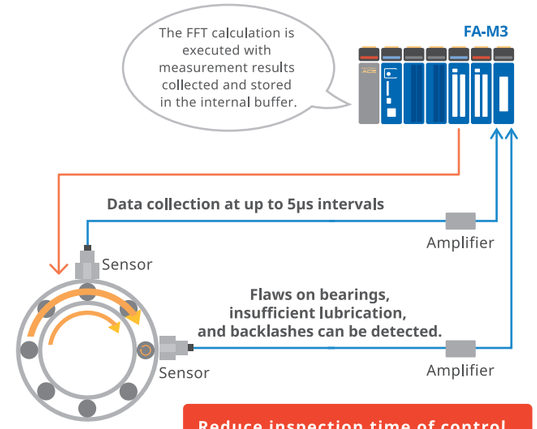
High-speed sampling, FFT operation and data collection

Highlights

- The module executes FFT calculation with vibration data from the sensor. The module itself analyzes the data, the FFT program or script are no longer necessary.
- The sequence CPU module determines the frequency based on the FFT calculation results.
- The PLC itself can test if bearings pass or fail, enabling significantly faster system inspection.
  Also, monitoring vibration of running devices allows you to check them for wear and tear before they fail.

Key Products

- **Sequence CPU module [F3SP71-4S/F3SP76-7S]**
- **High-speed data acquisition module [F3HA06-1R/F3HA12-1R]**



Reduce inspection time of control, measurement and analysis

Test Facility for Motor/ Inverter Characteristics

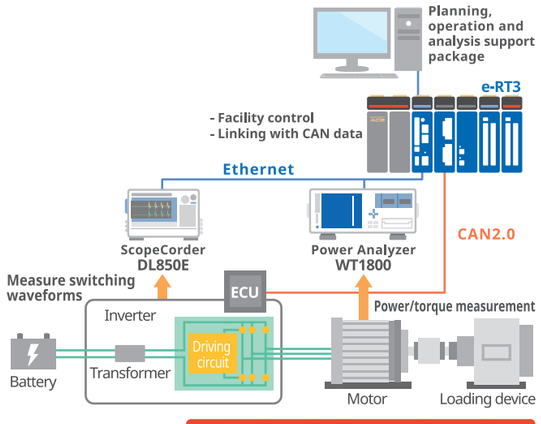
Only on YOKOGAWA PLC CAN2.0 is supported

Highlights

- The data measured by the measuring instruments is synchronized with ECU (Electric Control Unit) data.
- e-RT3 also supports advanced calculations. test data can be managed centrally.
- Experiment, testing and inspection can be automated by working with "TriForts," the planning, operation and analysis support package.

Key Products

- **VxWorks OS CPU module [F3RP62-2L/F3RP62-2R]**
- **CAN Interface Module [F3UM11-0N / F3UM12-0N]**
- **Planning, operation and analysis support package**



Synchronized processing and central management of various types of data

Storage of electricity･Energy

Battery Measuring System

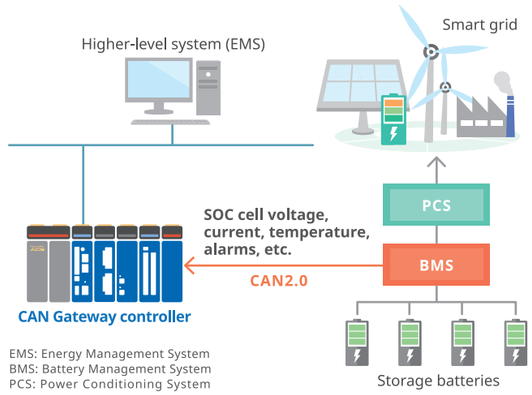
Build a communications system using the PLC

Highlights

- The PLC is used as a network-gateway to send battery levels to the higher-level system (EMS).
- It can be used for monitoring batteries used in smart or micro grids.

Key Products

- **CAN Interface module [F3UM11-0N/F3UM12-0N]**
- **CAN2.0B Interface module [F3LD21-0N]**



Robust and reliable gateway

Remote Energy Monitoring System

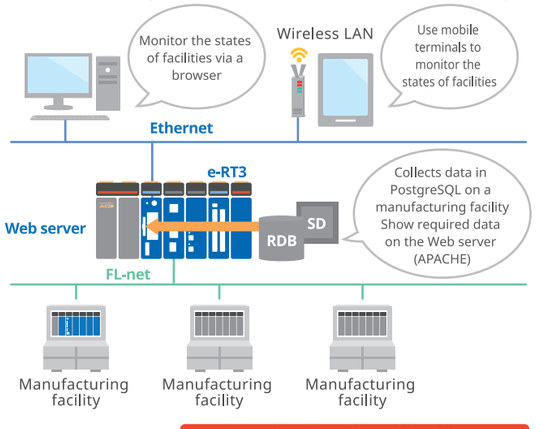
Build a lower price system using Linux+OSS

Highlights

- The PLC is used as a Web server to monitor facility information.
- By utilizing Linux OSS(Open Source Software), you could develop the system with lower prices.

Key Products

- **Linux OS CPU module [F3RP71-1R/F3RP71-2L]**
- **OSS (Open Source Software) Web server [e.g. APACHE]**



Batch collection of facility information Remote monitoring without PC

Converting

Batch Control and Monitoring in the Film Process

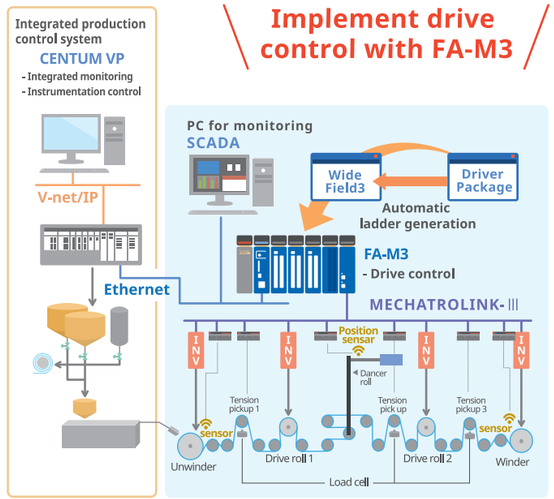
Highlights

- The FA-M3 specific drive control package specialized for sheet transfer implements drive control by means of general-purpose PLCs.Controllability and maintainability are improved.
- YOKOGAWA offers a one-stop solution from integrated monitoring of the entire factory to drive control.

Key Products

- **Sequence CPU module [F3SP71-4S/F3SP76-7S]**
- **FA-M3 Programming Tool WideField3 [SF630-MCW] Live Logic Analyzer function**
- **Integrated production control system [CENTUM VP Basic]**

Implement drive control with FA-M3



Accumulation of control know-how

Visualization of the Film Production Process

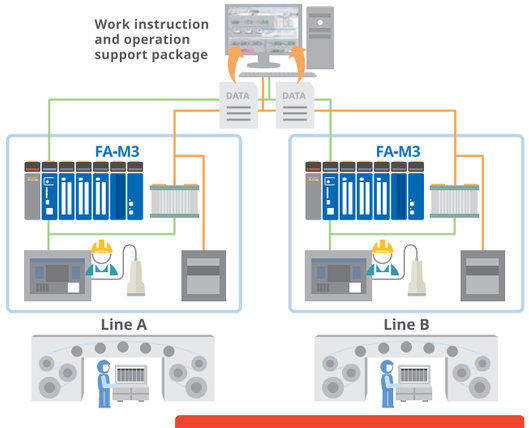
Highlights

- Manufacturing data and other data can be traced easily if a quality error is found in the final product.
- Comparison of process hours, manufacturing data, operators, and operating environments enables quick and easy detection production lines.
- The PLC can provide support, such as setting up devices with their optimum operating setups and giving operators guidance depending on the processes.

Key Products

- **Sequence CPU module [F3SP71-4S/F3SP76-7S]**
- **Work instruction and operation support package**

Support optimum operation



Easier on-site operation

PLC Instrumentation

Solvent Collection Facility Control System

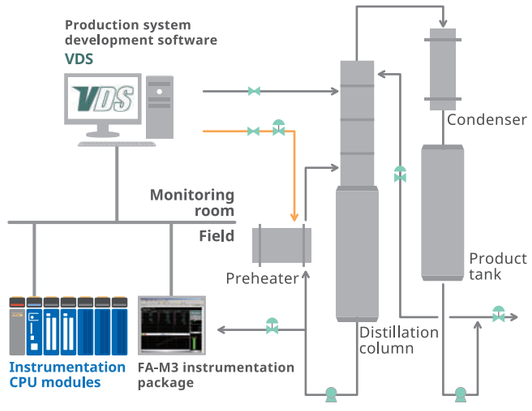
Highlights

- A cost-effective PLC instrumentation system has been established.
- Thanks to software control function, improve the maintenance ability and reduce the cost.
- With implementing the instrumentation control function, the development time can be shorten.
- The "VDS" SCADA system allows you to view tuning panels and face plates (meter diagrams).
- The touch panel provides simplified instrumentation.

Key Products

- **Sequence CPU module [F3SP71-4S/F3SP76-7S]**
- **Production system development software [VDS]**

Build a PLC instrumentation system with FA-M3



Minimum hardware costs
Reduced engineering work hours

Room Pressure Control System

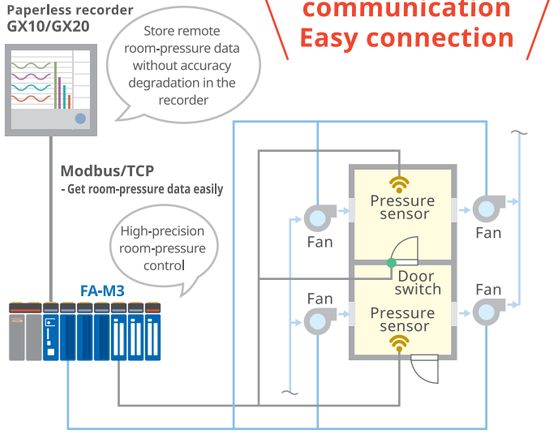
Highlights

- The PLC can store data in the recorder and display it without degradation in accuracy, making it possible to centrally manage the data.
- Modbus/TCP allows data to be obtained and transferred as well as managed and operated easily.
- There is no need for an analog module and a transfer program. A LAN cable can be used for easy connections, leading to less wiring work.

Key Products

- **Sequence CPU module [F3SP71-4S/F3SP76-7S]**
- **Paperless recorder SMARTDAC+ [GX10/GX20]**

Modbus/TCP communication Easy connection



Central data management
Reduced wiring work

Key Products

**FA-M3 / e-RT3 provides a broad and rich set of module line up.
It can satisfy a wide variety of your needs.**

Sequence CPU module
[F3SP71-4S / F3SP76-7S]

FA-M3 "Vitesse Engine" for ladder processing delivers supreme processing capability.
A new control method (PIPS), in which ladder instruction processing is completely independent of peripheral processing, ensures fast and stable control, bringing high-quality products.

High-speed data acquisition module
[F3HA06-1R / F3HA12-1R]

The module offers 5µs high-speed sampling data acquisition at regular intervals with 16-bit ADC that is not affected by scans, and data acquisition synchronized with a counter and associated with motor movement on angle or position basis.
It has a built-in FFT function that can detect error points, enabling more effective data collection and analysis.

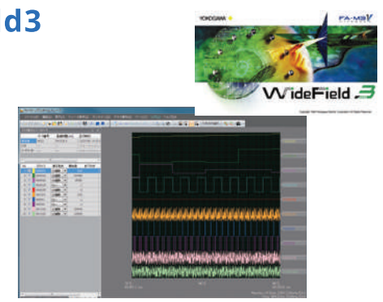
Positioning module
(with multi-channel pulse output)
[F3YP22-0P / F3YP24-0P / F3YP28-0P]

The module provides a maximum of 8 axes in a single slot and a control period of 125µs per 8 axes.
This module has unique trigger function with enables quick startup and quick stop by preset the destination position and target speed with the external device.

FA-M3 Programming Tool WideField3
[SF630-MCW] Live Logic Analyzer function*

WF3 provides new engineering support function which can improve debug efficiency.
It also helps to quick insight into operating statuses that reflect actual performance, which allows you to find out differences and gaps in control timing in an efficient manner.

* Supported by WideField3 R3.01 or later
* Used with F3SP71-4S/F3SP76-7S only (supported by R4 or later)



Linux OS CPU Module*
[F3RP71-1R / F3RP71-2L]

VxWorks OS CPU Module*
[F3RP62-2L / F3RP62-2R]

Finally Yokogawa supports the Free and Open Linux OS CPU and the real time VxWorks OS CPU.
These 2 CPU modules provide significantly easier operation and higher functionality.
You can choose the OS which is the most suitable for your application."

* Oversea unreleased product. For detail please contact to fam3global@csv.yokogawa.co.jp

CAN Interface Module*
[F3UM11-0N / F3UM12-0N]

CAN 2.0B Interface Module
[F3LD21-0N]

This module supports CAN2.0 protocol which is utilized for the testing/evaluation/inspection process in wide range of industry including automobile and battery-related market. It enables the system configuration of CAN communication easily.

* For F3RP62-2L/F3RP62-2R Only
* Oversea unreleased product. For detail please contact to fam3global@csv.yokogawa.co.jp

Positioning Module (with MECHATROLINK-III Interface)
[F3NC97-0N]

Positioning Module (with MECHATROLINK-II Interface)
[F3NC96-0N]

This positioning module supports MECHATROLINK-III, the latest Ethernet-based, high-performance, advanced, open field network standard published by the MECHATROLINK Members Association. It is the top choice for configuring a system involving many controlled axes.

Analog Output Module
[F3DA04-6R / F3DA08-5R]

The analog output modules feature built-in 16-bit high-resolution D/A conversion with fast conversion speed of 2µs per channel and real-time output response of 2µs + 2µs x (number of channels to be updated). Moreover, it supports synchronous update for up to 8 output channels.

Analog Input Module
[F3AD04-5R / F3AD08-□R]

The analog input modules feature built-in 16-bit high-resolution A/D converter including standard 12-bit models. Conversion speed is user-configurable from 50µs to 100ms to suit different applications.

\ Yokogawa will always be there for you /

For questions about application development,
please contact your distributor or local representative.

Alternatively, visit our website at **www.yokogawa.com/itc** to contact us.

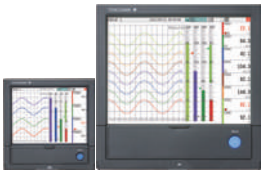
＊e-RT3（F3RP7□/F3RP6□/F3UM1□）is Oversea unreleased product. For detail please contact to **fam3global@cs.yokogawa.com**

YOKOGAWA Product Offerings

Various products & solutions are available to address customers' challenges.

Paperless Recorder
SMARTDAC+

Panel-mounted paperless recorder with intuitive touch-panel operations (GX10/GX20).
Easily connected with PLCs over the Modbus protocol.
You can transfer, manage and work with data without degradation of its accuracy, as well as centrally control devices and manage data.

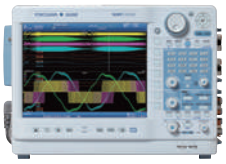


Production System Development Software
VDS

Web-based operation monitoring software used for FA-M3 instrumentation.
It provides graphical representations of information from a variety of control equipment and safely delivers the operation monitoring function of control systems.

Measuring Instruments

Yokogawa offers the DL Series of ScopeCorder digital and mixed signal oscilloscopes; the WT Series of Power Analyzer power measuring instruments, and the GS Series DC Voltage/ Current Source.
These instruments connect with PLCs over Ethernet using VXI-11 instructions dedicated for communications processing.
They can facilitate coordination between manufacturing/facility data and quality data.



Caution

- For proper and safe use of this product, read the user manual thoroughly.
- If faults of this product are expected to result in accidents or losses, install additional external protection and/or safety circuits.
- If the product is to be used in applications which may directly afect or threaten human lives and safety,such as nuclear power and radiation related equipment, railway facilities,aviation and space navigation,medical equipment,please contact yokogawas sales office.
- This Product uses Power PC from Freescale of U.S.A. as its CPU.Use of this product is governed by the Regulations on the Administration of Commercial Cipher Codes of China promulgated in 1999. If you wish to use this product in China, the permission from the State Bureau of Commercial Cipher Code of China is required.

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[Ed : 03/b] Printed in Japan, 104 (VC)

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