General Specifications

FCN-RTU Low Power
Autonomous Controller
Functions

STARDOM™
FCN-RTU

GS 34P02Q02-01E

■ GENERAL

This document describes the system configurations, development/maintenance, software configurations, and network specifications for a low power autonomous controller FCN-RTU.

● FCN-RTU

F01E.ai

FCN-RTU consists of autonomous controller FCN modules:

• Base module (NFBU050, NFBU200)
• Low power consumption CPU module (NFCP050)
• Power supply module (NFPW426, NFPW444)

For hardware details, refer to FCN-RTU Low Power Autonomous Controller Hardware, GS 34P02Q13-01E.

■ FEATURES

FCN-RTU offers reliable controls for geographically distributed applications requiring low power consumption under harsh conditions.

● Low Power Consumption (with short base module)

• FCN-RTU consumes low power to be ideal for solar powered installations.
• I/O points and communication ports adequate for typical general gas/oil wellhead control are equipped on CPU module to reduce total power consumption.

● High Reliability

• FCN-RTU thrives in wide temperature range and in high altitude.
• RAS features (CPU self diagnostics, temperature monitoring, I/O diagnostics, and more)
• Low heat dissipation, eliminating the need for a cooling fan

● Control Capability

• Applicable to a variety of processes, from sequence control processes to analog control processes.
• Controller can be connected to SCADA system using serial connections using TCP/IP over PPP or SLIP.
• By installing FCN/FCJ OPC server for Windows on PC, controller data can be accessed from an OPC (OLE for Process Control) client.

● Autonomous Capability

• Autonomous functions required for geographically distributed applications are embedded in controllers.
• Duolet-enabled — enables users to implement various applications, including displaying images on a Web browser, saving data files, transferring files using the FTP protocol and public network connection using the PPP protocol. Duolet application is a Java language application to run on Duolet function.
• Logging Portfolio make easy use of autonomous functions logging without programming.

● Engineering Efficiency

• Five IEC 61131-3 programming languages enables engineers to choose the proper language according to their applications.
• Control logic can be encapsulated into software parts to improve reusability and quality of applications.
• Application Portfolios packed with Yokogawa's application expertise enable easy implementation of advanced functions, including control-loop instrument blocks and communication with non-Yokogawa PLCs.

● Easy Maintenance

• Online download function allows a control application to be modified during system operation.
• All I/O modules (except CPU embedded I/Os) are hot-swappable.

■ CONFIGURATIONS

● System Configurations

Various system configurations are available depending on the infrastructures in the installation sites.
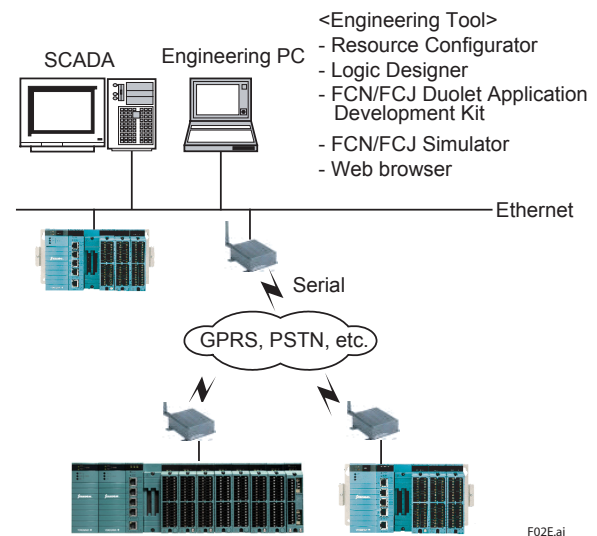
F02E.ai

Figure Example of System Configuration

■ SPECIFICATIONS

● CPU Function Specifications

Execution Speed:
Approx. 50 μs per kilosteps in an IL program
Number of Control Applications: Max. 16 tasks
Task Priority: Can be specified (in 16 levels)
Task Execution Cycle:
10 ms or longer (by 10 msec. increments)

● CPU Memory Capacity

Control Application Capacity:
Max. 3 MB (approx. 360 kilosteps in an IL program)
Data Area (*1): Max. 8 MB
Retained Data Area (*2): Max. 350 KB
Duolet Application Capacity: Max. 32 MB
*1: The data is not retained when the power is off.
*2: The data is retained even if the power is off. The data is retained during a power failure (can be used to store tuning parameter settings for the control application).

● Multiple built-in I/O

- Analog input (1 to 5 V DC): 12 channels
- Analog output (4 to 20 mA): 2 channels
- Digital input: 16 channels
- Digital output: 8 channels
- Pulse input (0 to 10 kHz): 2 channels
- Battery monitoring input (0 to 32 V DC): 1 channel

● Network Specifications

Network is used for communicating FCN-RTUs with various SCADAs, devices, display units, other controllers.

Ethernet Communication Specifications
Ethernet Ports on CPU module: One port

Connection destination	Maximum Connections	Remarks
VDS	4	Total of VDSs, FCN/FCJ OPC Servers and FAST/TOOLS
FCN/FCJ OPC Server		
FAST/TOOLS		
FCN-RTU (FCN/FCJ)	15	Number of FCN-RTUs as connection destinations (*1)
PLC	32	Number of various PLCs such as FA-M3s or MELSECs (*1)

*1: Number when assigning the destinations one channel each
Note: Compliant with IEEE802.3
Note: Power Save mode

Serial Communication Specifications
Serial Ports on CPU module:
RS-232: three ports
RS-422/RS-485: one port

● Guideline of Control Application Capacity

As a guideline, the capacity of the control application is a total of the following.

Function blocks (POUs)
Up to 512
- Regulator control blocks (e.g., indicator blocks, controller blocks, and manual loaders): Up to 128
- Others (e.g., calculation blocks, switch instrument blocks, and communication POUs): Up to 384

Example of a control application:
- Inputs/outputs: 20 AI, 10 AO, 48 DI, and 40 DO
- PID loops: 10
- Sequence program: 180 ksteps (equivalent to 128 sequence tables)
- Control cycle: 1 second

● Online Download Function

- Online download function is a feature with which control applications can be modified while a control function continues in operation.
- With this feature, I/Os, variables, data types, program codes, and libraries can be added, deleted or modified.
- Modifying the control loop during system operation does not affect other control loops. Changing a range of control loop or loop connection causes the control loop to become the MAN mode.

● FCN/FCJ Duolet Function

- WWW server functionality:
download HTML files and Java applets to Web browsers and access data in FCN-RTUs
- FTP client/server functionality:
transfer files to/from other networking systems
- PPP (Point to Point Protocol) functionality:
exchange data with a PC or a cellular phone via the public network such as GPRS by connecting a modem to a serial port of FCN-RTU
support the client mode and the server mode
- SLIP (Serial Line Internet Protocol) functionality:
enable direct TCP/IP communication on FCN-RTU serial ports without modems

● Time Synchronization Function

FCN-RTUs enable time synchronization among equipment supporting SNTP (Simple Network Time Protocol). FCN-RTU can operate as an SNTP client.

Item	Function
	Client Function
Communication Protocol	SNTP (Simple Network Time Protocol) UDP port: 123
Unicast Mode (*1)	Supported
Broadcast Mode (*2)	Supported
Number of Connections	4 servers
Accuracy of Time	±500 ms (*3)
Time Compensation Method	Acquisition of time from a server at intervals of 100 seconds (Unicast Mode) (*4)

*1: An SNTP client periodically interrogates an SNTP server for the time.
*2: An SNTP server periodically notifies an SNTP client of the time.
*3: The accuracy of time varies depending on how the time compensation method is configured.
*4: The following adjustments are to be performed depending on time differences. (The time differences below are default values. Time differences are configurable.)
500 ms or less: No adjustment
Less than 5 seconds:
Smooth adjustments (The time is adjusted smoothly so that it does not skip.)
5 seconds or more:
Immediate setting (The specified time is set immediately.)

■ SOFTWARE

The following figure shows FCN-RTU software architecture. IEC 61131-3 compliant control applications and Duolet applications can simultaneously run on FCN-RTU.
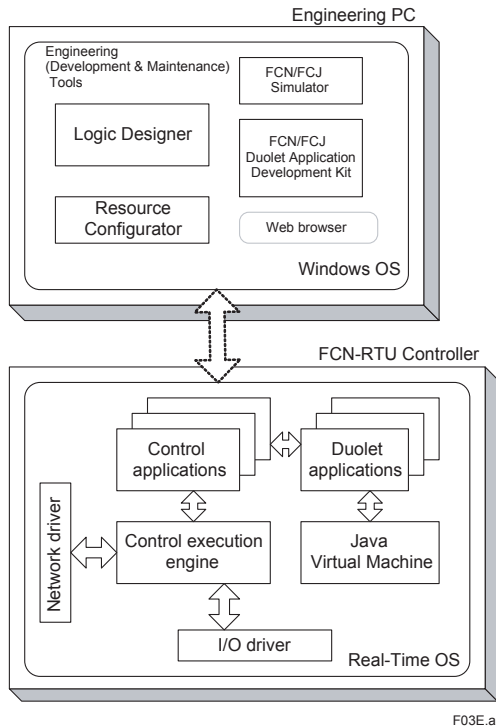

F03E.ai

Figure Software Architecture of FCN-RTU

Controller Software
The following controller software programs run on FCN-RTU:
  • FCN/FCJ Basic Software (With Duolet function)
  • FCN/FCJ Application Portfolios
These software are bundled with its CPU module.

Engineering Software
The following engineering software programs are installed on engineering PC:
  • Resource Configurator
  • Logic Designer
  • FCN/FCJ Simulator
  • FCN/FCJ Duolet Application Development Kit

● Resource Configurator

Resource Configurator on engineering PC is used for hardware settings:

  • IP address settings
  • CPU module built-in I/O settings
  • I/O module settings
  • Initial communication settings
    Note: Resource Configurator is included in the supplied media (CD-ROM) containing the FCN/FCJ software, and does not require a license to run.

● Logic Designer

Logic Designer on engineering PC is used for developing control applications (IEC 61131-3). For details, refer to Logic Designer, GS 34P02Q75-01E.
  Note: Logic Designer is included in the supplied media (DVD-ROM) containing the FCN/FCJ software, and requires a license to be installed.

● FCN/FCJ Simulator

FCN/FCJ Simulator runs control applications on PC. It enables debugging of control applications without actual target controller FCN-RTU. For details, refer to FCN/FCJ Simulator, GS 34P02Q77-01E.
  Note: FCN/FCJ Simulator is included in the supplied media (DVD-ROM) containing the FCN/FCJ software, and requires a license (hardware key) to run.

● FCN/FCJ Duolet Application Development Kit

The FCN/FCJ Duolet Application Development Kit is software for developing Duolet application which run on the FCN-RTU. For more details, refer to FCN/FCJ Duolet Application Development Kit, GS 34P02Q76-02E."

● Application Portfolios

An Application Portfolio is a bundle of useful software parts for FCN/FCJ, such as those for advanced control.

Application Portfolios are offered as:

For control logic:
 • PAS Portfolio

For communication:
 • FA-M3 Communication Portfolio
 • MELSEC Communication Portfolio
 • Modbus Communication Portfolio
 • DNP3 Communication Portfolio

For autonomous functions:
 • Logging Portfolio

For gas/liquid application:
 • Gas Flow Calculation Portfolio
 • Liquid Flow Calculation Portfolio

● FCN/FCJ IT Security Tool

This IT Security Tool sets IT security compliant with other Yokogawa system products security policy. FCN/FCJ engineering tools support IT security.
  Note: The IT Security is not available either for Domain Management or for Combination Management in CENTUM VP.
  The IT Security tool can not coexist with Microsoft Office C2R. To coexist, use Microsoft Office MSI.

● ToolCounter Measure against Wide Area Network connection

It is necessary to install VPN and/or firewall as a counter measure against network risk from Wide Area Network connection. For details, refer to STARDOM Network Configuration Guide, TI 34P02K25-01E.

■ STYLES OF SOFTWARE SUPPLY

Controller software is supplied on software media (DVD-ROMs) and CPU modules.

Engineering software is supplied on software media (DVD-ROMs) and licenses are required on engineering PCs.

Note: Engineering software can be installed on plural PCs with licenses, using same software media.

● Software Media

Programs and user's manuals, listed below, are supplied as a DVD-ROM.

FCN/FCJ Software Media (Model:NT203AJ)
• User's manuals for FCN/FCJ autonomous controllers (electronic documents)
• Resource Configurator
• Logic Designer (*1)
• FCN/FCJ Simulator (*1)
• FCN/FCJ Duolet Application Development Kit (*1)
• PAS Portfolio
• FCN/FCJ OPC Server for Windows (*1)
• Duplexed Network Program for FCN/FCJ OPC Server (*1)
• FCN/FCJ IT Security Tool

*1: Needs a license for use.

Application Portfolio Software Media (Model:NT205AJ)
• FA-M3 Communication Portfolio
• MELSEC Communication Portfolio
• Modbus Communication Portfolio
• DNP3 Communication Portfolio
• Logging Portfolio
• Gas Flow Calculation Portfolio
• Liquid Flow Calculation Portfolio

● Controller Software

The combination of application portfolios can be specified as CPU module (NFCP050) shown in the following table.

Table Suffix code indicating combination

Software		Suffix codes of model NFCP050 -S1□ Extended type	Specification (GS No. to refer to)	Software Media (Model)
FCN/FCJ Basic Software (With Duolet function)		X	GS 34P02Q02-01E	NT203AJ
Application Portfolio	PAS Portfolio	X	GS 34P02P20-02E	NT205AJ
	FA-M3 Communication Portfolio	X		
	MELSEC Communication Portfolio	X		
	Modbus Communication Portfolio	X		
	DNP3 Communication Portfolio	X	GS 34P02P22-02E	
	Logging Portfolio	X	GS 34P02P20-02E	
	Gas Flow Calculation Portfolio	X	GS 34P02P31-02E	
	Liquid Flow Calculation Portfolio	X	GS 34P02P33-01E	

● Engineering Software Licenses

The Logic Designer, FCN/FCJ Simulator and FCN/FCJ Duolet Application Development Kit Licenses come with an order ID sheet describing the order ID number and password. Access the specified Web site of Yokogawa and enter the order ID number and password shown. Then, a file containing the respective license IDs for the supplied software titles will be given.

■ MODELS AND SUFFIX CODES

● **Software Media**

FCN/FCJ Software Media

		Description
Model	NT203AJ	FCN/FCJ software media
Suffix Codes	-P	Programs (including electronic documents)
	C	DVD-ROM
	1	Always 1
	1	Always 1
	E	English version

Application Portfolio Software Media

		Description
Model	NT205AJ	Application Portfolio software media
Suffix Codes	-P	Programs (including electronic documents)
	C	DVD-ROM
	1	Always 1
	1	Always 1
	E	English version

● **Hardware**

Refer to FCN-RTU Low Power Autonomous Controller Hardware, GS 34P02Q13-01E.

■ ORDERING INFORMATION

Specify the model and suffix codes.

■ TRADEMARKS

• All brand or product names of Yokogawa Electric Corporation in this bulletin are trademarks or registered trademarks of Yokogawa Electric Corporation.
• Ethernet is a registered trademark of Xerox Corporation, the United States.
• Java is a registered trademark of Oracle and/or its affiliates.
• Other company and product names appearing in this document are trademarks or registered trademarks of their respective holders.