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

- FCN-RTU

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.

  SCADA
  Engineering PC
  <Engineering Tool>
  - Resource Configurator
  - Logic Designer
  - FCN/FCJ Duolet Application Development Kit
  - FCN/FCJ Simulator
  - Web browser

  Ethernet
  Serial
  GPRS, PSTN, etc.

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. 350 KB
  - Duolet Application Capacity: Max. 32 MB

- **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

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

*1: Number when assigning the destinations one channel each
\[\text{Note: Compliant with IEEE802.3} \]
\[\text{Note: Power Save mode}\]

## Serial Communication Specifications

<table>
<thead>
<tr>
<th>Serial Ports on CPU module:</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-232: three ports</td>
</tr>
<tr>
<td>RS-422/RS-485: one port</td>
</tr>
</tbody>
</table>

## 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

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**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.
SOFTWARE

The following figure shows FCN-RTU software architecture. IEC 61131-3 compliant control applications and Duolet applications can simultaneously run on 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>
<thead>
<tr>
<th>Software</th>
<th>Suffix codes of model NFCP050</th>
<th>Specification (GS No. to refer to)</th>
<th>Software Media (Model)</th>
</tr>
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<tbody>
<tr>
<td>Extended type</td>
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<tr>
<td>FCN/FCJ Basic Software (With Duolet function)</td>
<td>X</td>
<td>GS 34P02Q02-01E</td>
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<td>Application Portfolio</td>
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<tr>
<td>DNP3 Communication Portfolio</td>
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<tr>
<td>Gas Flow Calculation Portfolio</td>
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<tr>
<td>Liquid Flow Calculation Portfolio</td>
<td>X</td>
<td>GS 34P02P33-01E</td>
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</table>

- **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

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- Hardware

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

ORDERING INFORMATION

Specify the model and suffix codes.

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