Co-innovating tomorrow™

YOKOGAWA

STARDOM
FCN-RTU

Autonomous Controller

Bulletin 34P02A00-62E

STARDOM™

Process Control PLC/RTU

FCN-RTU

High Performance with Low Power Consumption

The FCN-RTU, Yokogawa's STARDOM low power consumption model of autonomous controller FCN, is a robust system that meets the demanding requirements of applications where infrastructure is inadequate and conditions inhospitable and hazardous.
The FCN-RTU controller is a reliable platform that keeps you competitive in a rapidly changing market.

Network-based Control System
STARDOM™
FCN-RTU

Integration

- Same look and feel as Yokogawa's DCS Human Machine Interface (HMI) via gateway station
- OPC, DNP3, and Modbus® support for use with a variety of SCADA Systems
- Asset management via a variety of digital communications

Network

- Support of FOUNDATION™ Fieldbus, HART®, Modbus, PROFIBUS-DP®, and CANopen® for field device digital communications
- Communication using several types of networks infrastructure such as GPRS and satellite for SCADA communications

Reliability

- Excellent environmental resistance
- Error Correcting Code (ECC) memory
- Durable designs protect the hardware from harsh environments

Engineering

- Support of all five IEC 61131-3 programming languages
- Extensive regulatory control libraries cultivated throughout Yokogawa's DCS history
- Easy to reuse software architecture

Information

- Web server embedded in CPU module for remote maintenance
- E-mail alarm notification from/to controllers
- Autonomous features such as data logging and FTP transmission on controllers

INTEGRATION

Providing seamless operation from field to center while enhancing the benefits of digital communications.

STARDOM FCN-RTU

One Network... but Multiple Media

A TCP/IP based network enables a seamless connection with control and information networks using COTS network components, and also allows the easy adaption of controllers for use with narrow bandwidth network infrastructure including public telephone lines, GSM/GPRS, satellite, and radio.

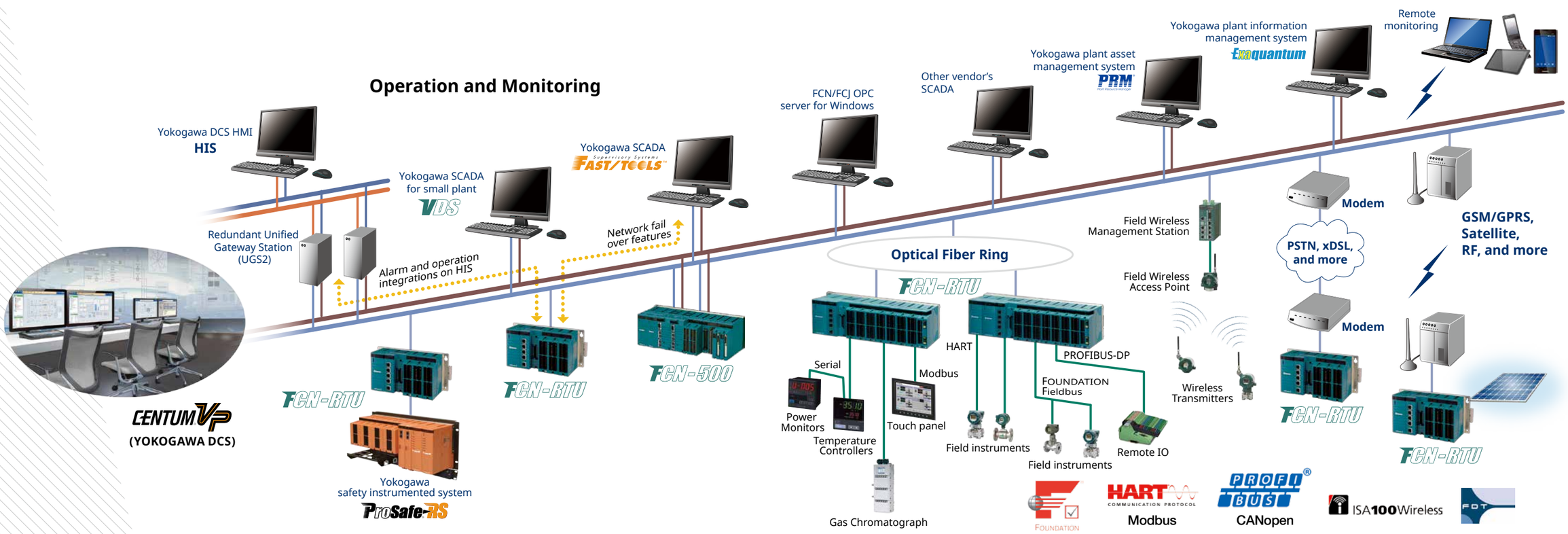
One Window... but Multiple Systems

Many applications make combined use of DCS and PLC systems. From a single window on the Yokogawa DCS HMI, operators enjoy seamless and transparent access to all the utilities on these different systems, with complete consolidation of all alarms.

One Field...Spanning Hundreds of Kilometers

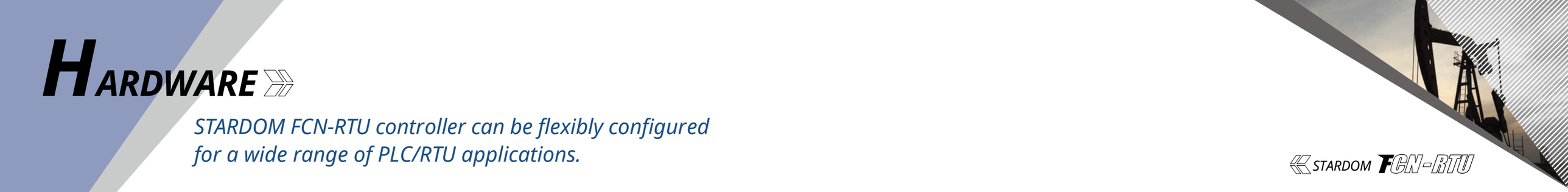
With gas fields, pipelines, and other SCADA applications, field devices are often dispersed over a very wide area, and the annual cost of regularly checking these devices is prohibitively high. By making use of remote device diagnostics, Yokogawa's plant asset management system enables a much more efficient maintenance approach with dramatic reductions in costs.

Connection	Physical layer	Devices (protocols)
Upper-level systems	Ethernet	VDS (TCP/IP), FAST/TOOLS (TCP/IP, DNP3, Modbus TCP), HIS (Vnet/IP via gateway) other vendor SCADA systems (OPC, DNP3, Modbus TCP)
	Serial (RS-232, RS-422/485)	FAST/TOOLS (Modbus RTU/ASCII), Other vendor SCADA systems (Modbus RTU/ASCII, DNP3)
Other devices	Ethernet	FA-M3 (driver available), MELSEC (driver available), others (Modbus TCP)
	Serial (RS-232, RS-422/485)	FA-M3 (driver available), MELSEC (driver available), others (Modbus RTU/ASCII)
Fieldbus	FOUNDATION Fieldbus	FOUNDATION Fieldbus devices
	HART	HART devices
	PROFIBUS-DP	PROFIBUS-DP devices
	CANopen	CANopen devices
	ISA100	ISA100 Wireless™ devices (via gateway)
	Ethernet	Modbus TCP
	Serial	Modbus RTU/ASCII



HARDWARE

STARDOM FCN-RTU controller can be flexibly configured for a wide range of PLC/RTU applications.



STARDOM FCN-RTU

Reliable and High Speed CPU

High speed control

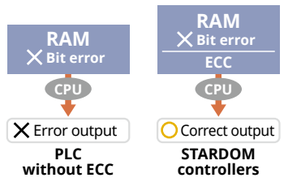
- 50 msec analog control, 10 msec CPU scan time

Error correcting code (ECC) memory

- Correction of single-bit errors in RAM prevents unexpected malfunctions

Time synchronization

- Simple network time protocol (SNTP) enables time synchronization as an SNTP client



Durable Design

Operation in harsh environments

- -40˚C to +70˚C and up to 3,000 m altitude*
- -20˚C to +70˚C and up to 2,000 m altitude*

  * Depending on the combination of I/O modules

Failure-proof

- Fanless design with excellent heat dissipation
- IC chips, which have a higher failure rate, are not mounted on the base module

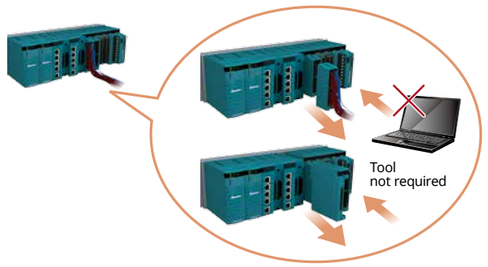
Robust

- Compliant with EMC standards
- Optional Explosion Protection
  - ATEX Type "n"
  - IECEx Type "n"
  - FM Non-Incendive Class I Division
  - CSA Non-Incendive Class I Division
- Optional G3 coating

Easy Maintenance

Quick start after replacing I/O

- Hot swappable I/O modules
- I/O definitions automatically downloaded to I/O modules without use of tools
- I/O modules can be changed without rewiring
- Continuous output of values (fallback function) if CPU fails



Rich Variety of I/O Modules

AI/O modules for process control

- AI, AO, mixed AI/O, pulse input, frequency input
- 4 to 20 mA, 1 to 5 V, -10 to +10 V, RTD, TC/mV
- Channel isolated, isolated, non-isolated
- Transmitter power supply from AI/O module*

  * Check to see if supported for your model

DI/O for a diverse range of applications

- 32 or 64 channels for 24 V DC on/off or transistor contact signals

AI/O and DI/O common features

- Corrosion protection coating (ISA standard G3 option)
- Pressure clamp terminal block and MIL connection with surge absorber (option)

Low Power Consumption Model FCN-RTU

Best-in-class CPU module: NFCP050

▶ **Enables advanced control applications**

- 256MHz, 32 bit RISC processor
- Error Check and Correct (ECC) memory
- Power fail-safe file system
- Low power consumption

Short base unit: NFBU050

▶ **Fits in small cabinets**

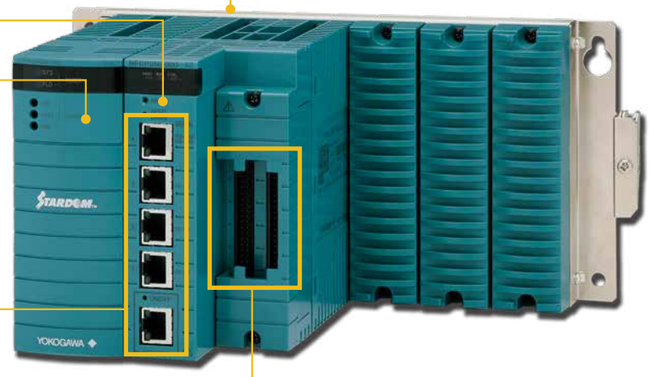
- 28 cm (11 inch)* wide
- DIN rail mount or screw mount
- Three expansion I/O Slots

  * 283 mm (11.14 inch)

Flexible power supply module: NFPW426

▶ **Ideal for solar power applications**

- Wide voltage range: 10-30 V DC



More communication choices

▶ **Suitable for various communication protocols**

- One 100BASE-TX Ethernet port with automatic power saving mode
- Three RS232 serial ports (one port up to 115 kbps)
- One RS422/485 serial port up to 115 kbps with switchable 120Ω terminator
- Support Modbus protocol

▶ **Easy wiring**

- MIL connecter cable: KMS40
- MIL connecter terminal block : TAS40

Multiple built-in I/O

▶ **Reduces your initial installation cost**

- Twelve analog inputs (1-5 V DC)
- Two analog outputs (4-20 mA)
- Sixteen digital inputs
- Eight digital outputs
- Two pulse inputs (0-10 kHz)
- One battery monitoring input (0-32 V DC)

Please select from the following two types based on your budget and application

▶ Short base type

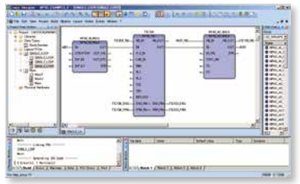
▶ Long base type

ENGINEERING Engineering Tool

Maximize productivity at your site with excellent engineering tools for all project phases, from system design to commissioning.

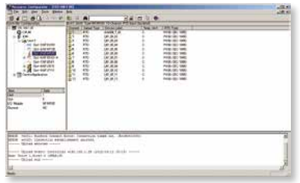
Enhanced Application Portability through Division of Logical and Physical Layers

A platform independent architecture enhances application portability.



Logic Designer: Control application development tool

- Supports all five IEC 61131-3 languages
- Intuitive look & feel with automated application layout
- Project comparison function for confirming modifications



Resource Configurator: Environment configuration tool for control applications

- Connects control application logical I/O with actual hardware I/O
- Configures hardware settings for IP addresses, serial ports, etc.

Application portability by separating logic from hardware

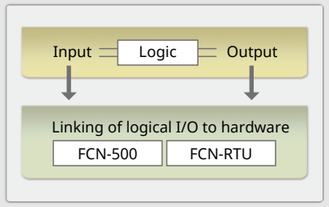
►Logic Designer

- Platform independent programming tool

►Resource Configurator

- Hardware configuration tool for linking logical I/O with hardware

With Logic Designer, programming and debugging are platform independent, and with Resource Configurator logic can be easily ported to other hardware platforms.



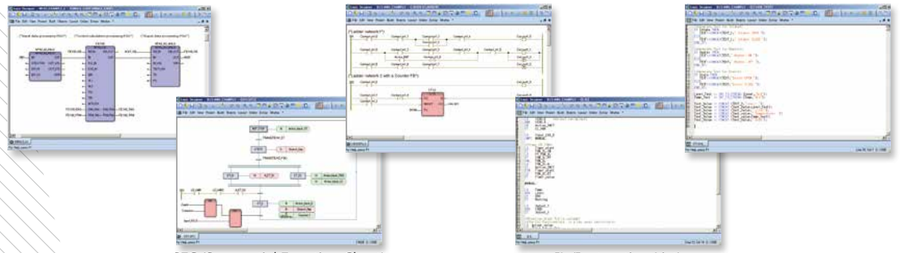
IEC 61131-3 Compliant Programming

IEC 61131-3, the de facto PLC programming standard, is platform independent and allows great reusability.

Support of all five IEC 61131-3 languages

- Choose the language best suited to your logic
- Loop and sequential control with the same development tool

FBD (Function Block Diagram) / LD (Ladder Diagram) / ST (Structured Text)



SFC (Sequential Function Chart) / IL (Instruction List)

Reusable Programming

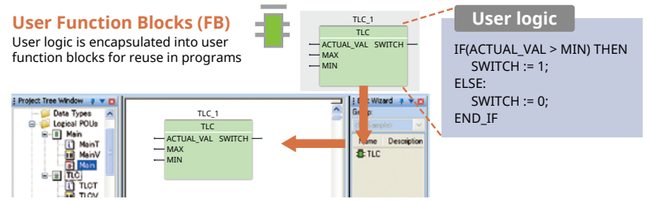
Applications programmed with IEC 61131-3 languages are well structured and easily modularized.

Modularized applications

- Easy reuse of modularized applications, user function blocks, and libraries
- Password protection of function blocks holding your industry know-how
- Drag and drop of function blocks to a program sheet

User Function Blocks (FB)

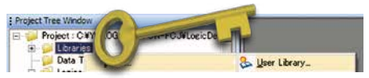
User logic is encapsulated into user function blocks for reuse in programs



User function blocks can be selected from a library list using the Edit Wizard.

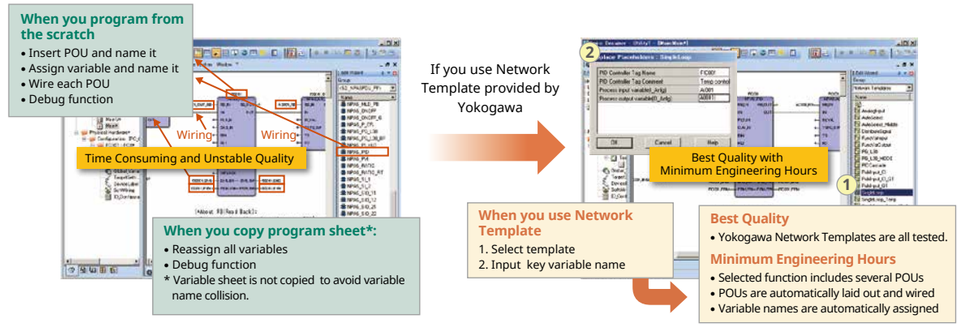
User libraries

Groups of user function blocks can be used as user libraries. They can be protected with a username and password.



Network Template Function

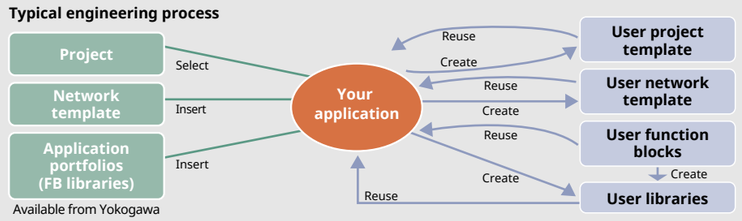
The network template function enables the use of advanced copy features that eliminate the need to reenter variables. In addition to enabling the creation of network templates from your programs, Yokogawa provides a number of network templates for your convenience.



Efficient reusable engineering process

Many skid and utility programs are quite similar. Through modularization, you can have better applications, reduce engineering costs, and speed up commissioning.

Typical engineering process



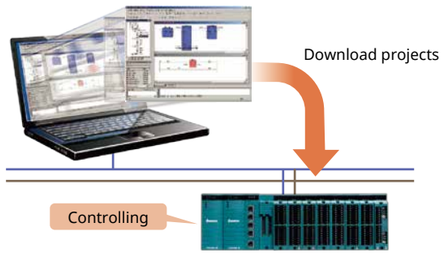
ENGINEERING Maintenance and Debugging Aids

Programming and debugging applications without actual controllers reduces engineering hours and increases efficiency.

Online Download

Modify your application without interfering with a process.

- No need to stop a controller to modify a control application
- Variables inherited from previous applications

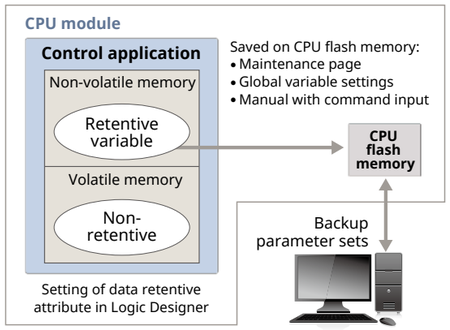


Parameter Saving

Through every phase, from debugging to commissioning, you no longer have to worry about losing essential tuning parameters.

Essential tuning parameters such as P, I, and D in PID control instruments and critical parameters for applications can be retained in a variety of ways.

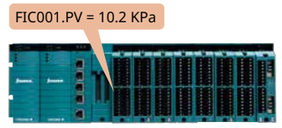
- As a default, essential instrument parameters such as P, I, and D are retentive variables
- In Logic Designer, the retentive attribute can be set for an application variable
- Multiple parameter sets can be backed up to a PC



Industry Quantity Conversion

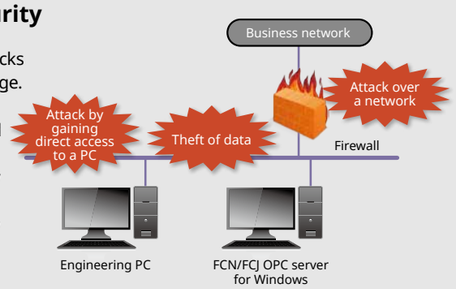
The intuitive display of data improves programming efficiency.

- Internal analog data (0% to 100%) is converted to industrial quantity such as °C for easy and intuitive programming and debugging



Strengthening system security

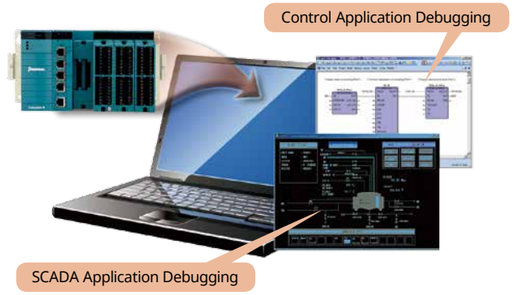
Protecting your system from cyber attacks and ensuring its robustness is a challenge. It can be time-consuming to configure the security with Windows' security and network settings. To assist you in this, Yokogawa has developed an IT security tool. All you need to do is select the desired security model and the security tool will take care of the rest.



STARDOM FCN-RTU

Debugging functions for enhanced engineering efficiency

Application Debugging on PCs



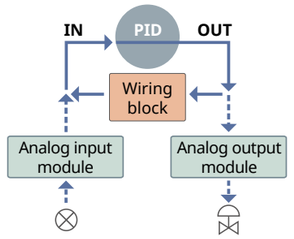
Minimize engineering costs by doing both programming and debugging on one PC.

- Simulate control functions
- Program, modify, and debug logic
- Debug both control and SCADA applications

Software Wiring

Software wiring function simulates the input and output signals without the actual wiring. This eliminates the need for a signal generator and test switches during loop check and logic debugging.

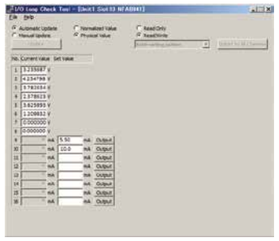
- Wizard available for easy configuration
- Advanced settings for adjustments to process



Wiring Check

Resource Configurator's loop check (wiring check) tool allows you to check the status of your wiring without having to use a calibrator or test switch.

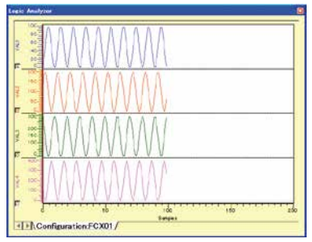
- Confirm the actual input signals for each channel
- Manually output signals to I/O modules



Logic Analyzer

Logic Analyzer saves you time investigating and analyzing software malfunctions.

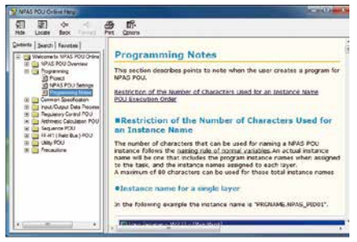
- Records variables in continuous and cycle modes
- Exports the recorded data to text format files
- Adjusts curve colors and scales/ranges on individual axes



Extensive Help Files

Extensive help files for all of your programming questions are included.

- More than 3,500 pages
- From IEC 61131-3 basics to specific information on the use of each library
- Instructions on how to use the engineering tool

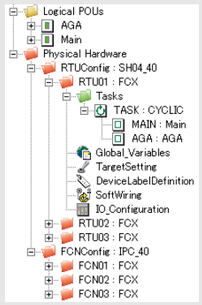


ENGINEERING » Maintenance and Debugging Aids

Multiple controllers configuration in a project

Multiple controllers can be assigned to the same application. Once an application is modified and debugged, all the settings can be quickly and easily transferred to the controllers.

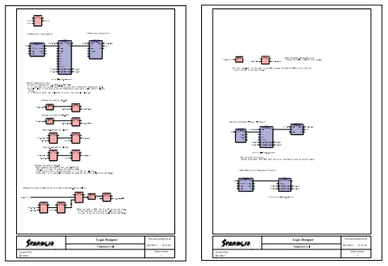
- The FCN-RTU controller can be assigned to the same application
- Only those applications that will be used need to be assigned to a controller
- Any modifications to an application can be downloaded to selected controllers



Page Layout

The diagram of an application can be easily documented in various ways.

- Printing of diagram for entire control applications
- Extensive frame, logo, title, font, and other layout options
- Several design page layout templates

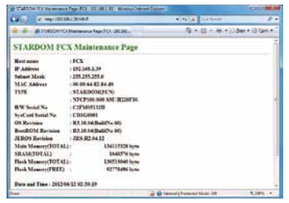


Maintenance

CPU and I/O module information as well as system logs can be confirmed on a Web browser, dramatically improving maintenance efficiency.

System overview

Memory size, OS version, and IP address can be checked online.



System logs

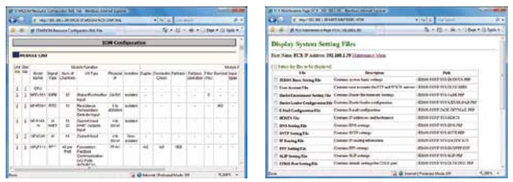
System logs help you identify the cause of an application error.

CPU status

Information on each CPU (in dual redundant mode) including OS version and serial number can be checked.

I/O modules and Other Settings

In addition to CPU information, I/O module and other settings can be confirmed on a Web browser, eliminating the need to use special software and handheld terminals for on-site calibration and maintenance.



» Software Architecture

The combination of reliable control with advanced IT functions that harness the power of the internet gives you greater flexibility in your applications and improves efficiency.

PLC with Advanced IT Functionality

Control and information play in harmony

Duolet functions* manage and transmit information while STARDOM's control functions ensure your processes run smoothly. With Duolet, control and information play Duet on one controller.

*Duolet functions enable Java applications run on the controller.

Advanced IT functionality

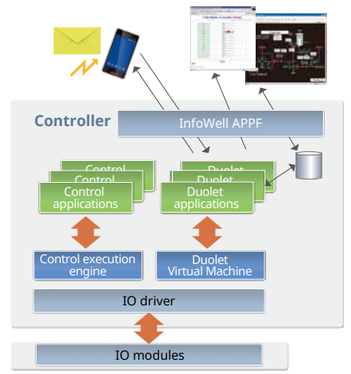
- Web server, FTP server, e-mail, file logging

Duolet enabled

- Co-existence of Duolet applications and control functions on the same platform
- No extra module needed for Duolet applications
- Separation of Duolet and control application areas for guaranteed control performance

Easy and intuitive interface for creation of Duolet applications

- PLC programmers can develop Duolet applications with the InfoWell interface package of application portfolios (APPF)

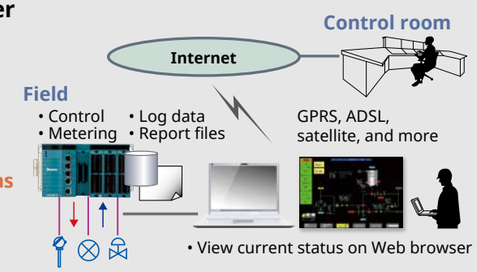


True autonomous controller

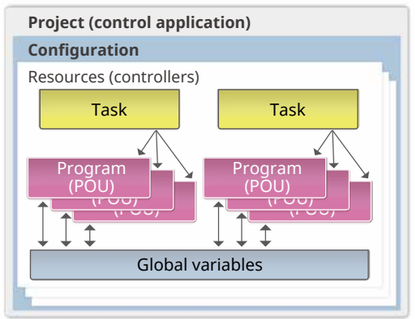
In addition to the functions of a conventional PLC, FCN-RTU controller comes with advanced Web-based and other IT functions for the processing, acquisition, and transfer of data.

►Examples of SCADA applications

- Gas & oil wellheads
- Wind turbines



Reliable Control Application Architecture



Applications can be developed in project units. A project consists of one or more configurations (programs) running on several different resources (controllers). Multiple tasks are allowed to run on each controller.

Guaranteed control performance

- Application performance can be set based on task priority and schedule
- First priority is given to control applications, which run separately from Duolet applications

Excellent reusability

- Hardware-independent projects can be easily assigned to controllers
- Libraries of independently developed common elements for application development can be easily imported to projects

ENGINEERING Application Portfolio

A variety of application portfolios reduce engineering hours and enhances quality.

STARDOM FCN-RTU

NPAS POUs

All of Yokogawa's long experience with distributed control systems (CENTUM series) has gone into the development of the POUs that are included in the new process automation system portfolios (NPAS POUs). These cover a wide range of functions such as regulatory control, mathematical calculations, and sequencing.

List of NPAS POUs

	POU Name	Description
I/O Data Processing	NPAS_AI_ANLG	Standard analog input
	NPAS_AI_TEMP	Measured temperature input
	NPAS_AI_PULS_QT	Exact totalization pulse train input
	NPAS_AI_PULS_CI	Control priority type pulse train input
	NPAS_AI_PCNT	Regularized data (%) input
	NPAS_AI_FREQ	Frequency input
	NPAS_AI_REAL	Real data input
	NPAS_AI_DINT/UDINT	DINT/UDINT data analog input
	NPAS_AO_ANLG	Standard analog output
	NPAS_AO_PCNT	Regularized data (%) output
	NPAS_AO_REAL	Real data output
	NPAS_AO_DINT/UDINT	DINT/UDINT data analog output
	NPAS_DI_STS	Status input
	NPAS_DI_PUSHB	Push button input
	NPAS_DI_WORD	WORD data contact input
	NPAS_DO_STS	Status output
	NPAS_DO_STS_PW	Pulse width output (reset of accumulation type)
	NPAS_DO_STS_PW2	Pulse width output (Continuation of accumulation type)
	NPAS_DO_STS_TP	Time-proportional ON/OFF output
	NPAS_DO_STS_PWH	High resolution pulse width output
	NPAS_DO_WORD	WORD data contact output
	NPAS_FFI_ANLG/STS/USINT	FF-H1 analog/status/discrete input
	NPAS_FFO_ANLG/STS/USINT	FF-H1 analog/status/discrete output
	NPAS_AI_HART	HART variable input
	NPAS_FFRD_ANLG	FF-H1 analog data reading
	NPAS_FFRD_STS	FF-H1 status data reading
	NPAS_FFRD_DINT	FF-H1 integer data reading
	NPAS_FFWT_ANLG	FF-H1 analog data writing
	NPAS_FFWT_STS	FF-H1 status data writing
	NPAS_FFWT_DINT	FF-H1 integer data writing
Regulatory Control	NPAS_PVI	Indicator
	NPAS_PID	PID controller
	NPAS_PI_HLD	Sampling PI controller
	NPAS_ONOFF	2-postition on/off controller
	NPAS_ONOFF_G	3-postition on/off controller
	NPAS_MLD	Manual loader without output tracking
	NPAS_MLD_PB	Manual loader with output pushback
	NPAS_MLD_BT	Manual loader with bias tracking
	NPAS_RATIO(_RT)	Ratio set (with ratio tracking)
	NPAS_PG_L30(_BP)	30-zone program set (with bumpless)
	NPAS_VELLIM(_PB)	Velocity limiter (with output pushback)
	NPAS_AS_H/M/L	Auto-selector High/Medium/Low
	NPAS_FOUT	Cascade signal distributor
	NPAS_FFSUM(_BL)	Feedforward signal summing (with balancing)
	NPAS_XLMT_S/D	Single/Double cross-limit
	NPAS_BSET_F	Batch set block for flow measurement
	NPAS_BSET_LW	Batch set block for weight measurement

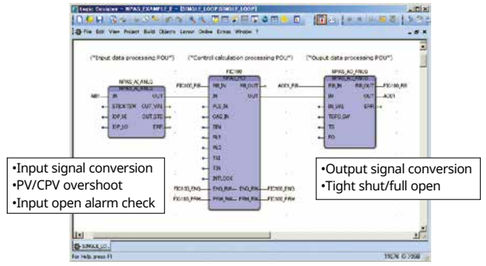
	POU Name	Description
Arithmetic Calculation	NPAS_LDLAG	Lead/Lag
	NPAS_DLAY	Dead time
	NPAS_AVE_M	Moving average
	NPAS_AVE_C	Cumulative average
	NPAS_FUNC_VAR	Variable line-segment function
	NPAS_TP_CFL	Temperature and pressure correction
	NPAS_T_CFL	Temperature correction
	NPAS_P_CFL	Pressure correction
	NPAS_ASTM1	Old JIS-based ASTM correction
	NPAS_ASTM2	New JIS-based ASTM correction
	NPAS_SW13(_SW31)	1-pole 3-position (3-pole 1-position) selector switch block
	NPAS_SW19(_SW91)	1-pole 9-position (9-pole 1-position) selector switch block
	NPAS_BDBUF_R	Data buffer for real data
	NPAS_BDBUF_T	Data buffer for time data
Sequence	NPAS_SI*/SO*/SIO*	Switch instrument (NPAS_SI_1,NPAS_SI_2, NPAS_SO_1, NPAS_SO_2, NPAS_SIO_11, NPAS_SIO_12, NPAS_SIO_21, NPAS_SIO_22)
	NPAS_TM	Timer with preset value
	NPAS_CT	Counter with preset value
Utility	NPAS_SQRT_LC	Square root extraction with low-input cutoff
	NPAS_CDR_DESTR	Analog de-structuralization
	NPAS_CDR_STR	Analog structuralization
	NPAS_BPLS_SW	Bumpless switching block
	NPAS_CDB_DESTR	Digital de-structuralization
	NPAS_CDB_STR	Digital structuralization
	NPAS_CDD_DESTR	Integer de-structuralization
	NPAS_CDD_STR	Integer structuralization
	NPAS_BCD_CI16	16-bit BCD input block
	NPAS_BCD_CO16	16-bit BCD output block
	NPAS_SIOCHGPLS	Contact signal pulse form conversion
	NPAS_DGFLT	Digital filter
	NPAS_DFILE	General-purpose data filing
	NPAS_ADDSW NPAS_ADDINT NPAS_SUBSW NPAS_SUBINT	INT-type parameter support
	NPAS_AI2SW_A/B	Dual signal selector type A/B
	NPAS_AI3SW	Analog-input 2-out-of-3 circuit
	NPAS_SL2SW_A/B	High-low range switching type A/B
	NPAS_DI3	Digital input 2 out of 3 circuit
	NPAS_NPS_STR	Totalization structuralization
	NPAS_PB6	Six-pushbutton block
	NPAS_RS8_A/B	8-input resource scheduler (pemission non-holding/holding)

NPAS Features

Straightforward programming for easy maintenance

A variety of input, control calculation, and output processing POUs prepared for straight forward programming.

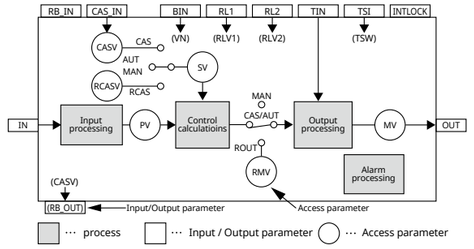
- Input and output POUs include routines for the processing of 4-20 mA, RTD, mV, FOUNDATION fieldbus, and other types of input and output signals
- Input and output POUs can be selected based on signal type
- Read back (RB) connections prevent code nesting in feedback control



Integrated control processing in a single POU

Input, alarm, control calculation, and output processing can all be integrated in individual POUs for smooth linking between functions.

- The integration of various types of processing in a single POU simplifies the creation of programs
- Individuals POUs can be accessed as a tag by an FCN-RTU application or SCADA system



Access and engineering parameters

NPAS POUs have two types of parameters that perform different functions.

- The function of a parameter can be identified by looking at its type
- Access parameters (PV, SV, MV and others) are set on SCADA during operation phase
- Engineering parameters (tracking definition, control action switch, bypass switch, and others) are specified during the engineering phase and have initial values

Easy to understand data structure

Intuitive data handling reduces debugging time.

- Analog signals are converted into easy to understand data with units such as degrees Celsius by an analog input processing POU
- Industrial quantity data on controllers eliminate the data normalization by SCADA
- Related values are included in the data structure

Optimization to prevent alarm flooding

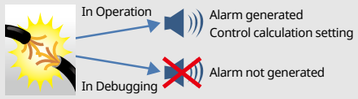
Alarms are handled consistently during input and output processing to prevent alarm flooding and ensure that operators focus on the most important control tasks. All of the alarm handling know-how that Yokogawa has acquired working on DCS projects has gone into the development of the FCN-RTU. This includes techniques for the suppression of duplicated and non-essential alarms and the simulation of control data on the controller.

►Example

Input open alarms (IOP) and output open alarms (OOP) are generated when a sensor wire is disconnected. However IOP and OOP can be ignored during the debugging phase when a wire is disconnected and software wiring is used.

The following settings will ensure that the generation of an IOP or OOP during normal operations does not interfere with control:

- Set data to SH, SL, or previous data
- Suspend totalizing
- Specify that the control mode switches automatically from automatic (AUT) to manual (MAN)



ENGINEERING » Application Portfolio

Communication Portfolios

FCN-RTU controller communicates with other PLCs and SCADA systems using the following communication portfolios:

Modbus communication portfolio

Type	Mode	Function
Serial	ASCII	Master / Slave
	RTU	Master / Slave
Ethernet	TCP	Client / Server

DNP3 communication portfolio

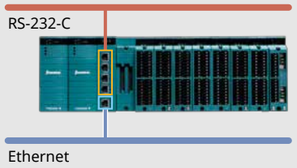
Type	Function
Serial	Slave
Ethernet	Server

FA-M3 communication portfolio

MELSEC communication portfolio

Communication ports on CPU module

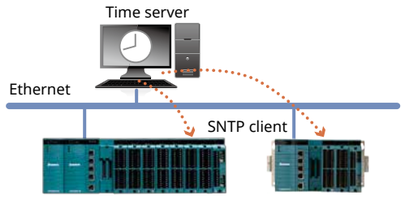
Unlike other PLCs, FCN-RTU utilizes Modbus and DNP3 communications through an RS or Ethernet port embedded on the CPU module. This eliminates the need for dedicated communication modules.



Time Synchronization

Time is synchronized between FCN-RTU using the simple network time protocol (SNTP).

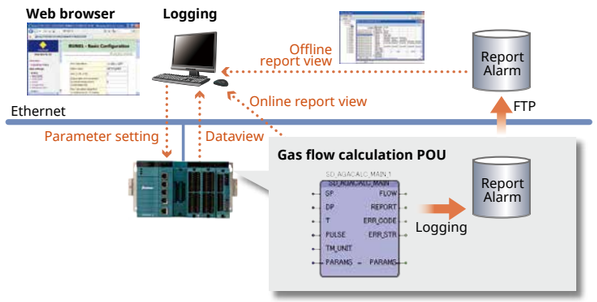
Note: The FCN-RTU does not support SNTP server functions.



Gas Flow Calculation

Gas flow volume is calculated using the following gas flow calculation POUs:

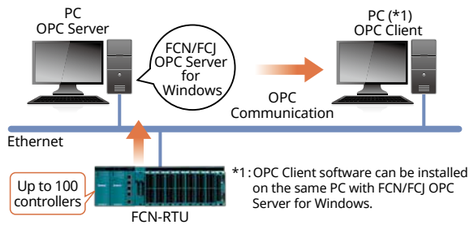
- AGA 3, 7, 8, 9, 10, 11
- GPA2172
- API21.1 compliant



FCN/FCJ OPC Server for Windows

FCN/FCJ OPC Server for Windows supports the OPC DA 2.05a and A&E 1.10 compliant interfaces.

Via OPC Server for Windows, FCN-RTU controller can connect with a variety of SCADA systems.



*1 : OPC Client software can be installed on the same PC with FCN/FCJ OPC Server for Windows.

SCADA » FAST/TOOLS Supervisory Systems

Integrated Remote Control and Monitoring Distributed Utilities

Client and server configuration of Yokogawa's SCADA FAST/TOOLS integrates the remote control and operation of distributed utilities.

Web-based Supervision

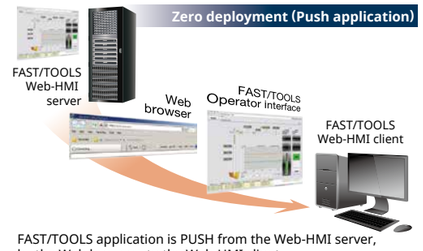
A Web-based HMI is a cost effective solution that provides anytime/anywhere access to the information needed to make quick and timely decisions.

- The Web-based HMI eliminates the need for client software installation and maintenance
- Process and product information can be shared across the enterprise on devices such as notebook PCs and smartphones
- Web security technology on HMI clients ensures that only authorized individuals gain access to data and applications

Scalable and Flexible

At minimum cost, the system can be scaled up to cover applications of any size.

- Capable of handling up to one million I/O points
- Online configuration with no downtime
- Supported OS platforms are:
  Microsoft Windows, RedHat Linux, HP-UX, and IBM AIX

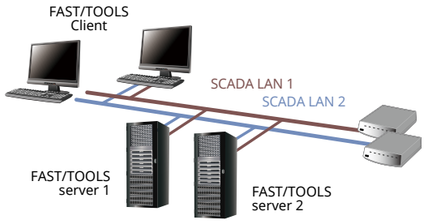


FAST/TOOLS application is PUSH from the Web-HMI server, by the Web browser, to the Web-HMI client.

Reliable Architecture

Continuous operation and zero downtime assured with high availability computing (HAC).

- A HAC package enables the configuration of a standby FAST/TOOLS server
- Real-time data synchronization and watchdog monitoring of system health
- Fast automatic or manual switchover



SCADA integration with controllers

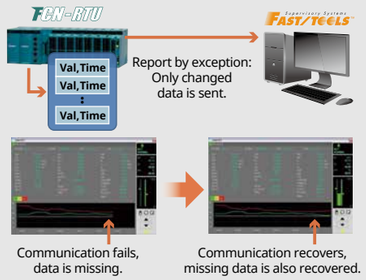
With applications that are distributed over a wide area, GPRS, satellite, and other types of narrow bandwidth wireless communications are often used. However, communications can easily be disrupted and the cost of transferring large amounts of data is often prohibitive. The use of FAST/TOOLS with the FCN-RTU controllers enables the following:

►Report by exception

To hold down communications costs, only changed data is sent to FAST/TOOLS.

►Network fail-over

With the time stamping of data from the FCN-RTU controllers, a smooth switchover with the recovery of all data is assured in the event of a network failure.



INFORMATION InfoWell

STARDOM InfoWell (An information processing and transmission function for the FCN-RTU) allows you to make full use of these IT functions without the need for any special programming skills.

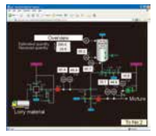
Web Application Portfolio

Data can be displayed in a variety of ways on Internet Explorer to facilitate the monitoring and operation of equipment.

Real-time numeric box | Real-time bar chart | Real-time trend chart | Table | Bar chart | Line-segment chart | Messages

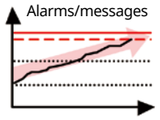
Graphic Portfolio

Graphic elements such as numeric boxes and bar charts allow data to be viewed in a number of ways. For the creation of more attractive presentations, photo, and blueprint background images are available.



E-mail Application Portfolio

Alarms and messages can be e-mailed automatically by FCN-RTU to mobile phone or PC.



Logging Portfolio

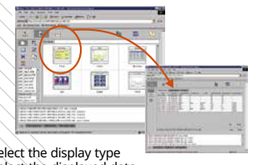
The application data collected and logged on the controller can be viewed in either a table or trend chart. Data on the FCN-RTU controller can be viewed either online (via a browser) or offline (by FTP file transfer to a PC). Periodical FTP tool to a PC is preared.

Trend chart | Table

Logging & Reporting Function	The InfoWell logging portfolio logs data and creates daily, monthly, and yearly reports. **Logging of control application data on controllers** • Periodic data logging : High speed (every 1 to 60 seconds) or low speed (every 1 to 60 minutes) • Batch logging : High speed (every 1 to 60 seconds) or low speed (every 1 to 60 minutes) • Snapshot logging : Continuous or trigger • SOE logging : 100 msec or longer • Message logging : Alarm and event messages **Report file generation** • Report type : Daily, monthly, yearly • Closing data : Minimum, maximum, average, total
Logging view	Logging data can be viewed online using a Web browser or offline using the Logging Viewer. Data can be displayed in trend or tabular format. • Trend format : Up to 10 pens can be assigned. • Tabular format : Up to 40 items can be viewed.
Logging configuration	Logging can be configured online or offline using the Logging Configurator tool.
Logging file collection	Logging files from multiple controllers can be periodically collected using the Logging File Collector tool.
E-mail	Logging and report files are sent as e-mail attachments.

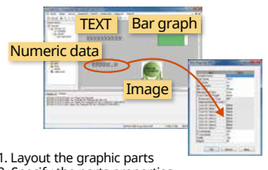
Easy "Fill in Form" (FIF) Engineering

E-mail application portfolio
Web application portfolio



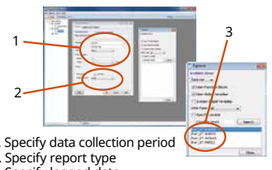
1. Select the display type
2. Select the displayed data

Graphic portfolio



1. Layout the graphic parts
2. Specify the parts properties

Logging portfolio



1. Specify data collection period
2. Specify report type
3. Specify logged data

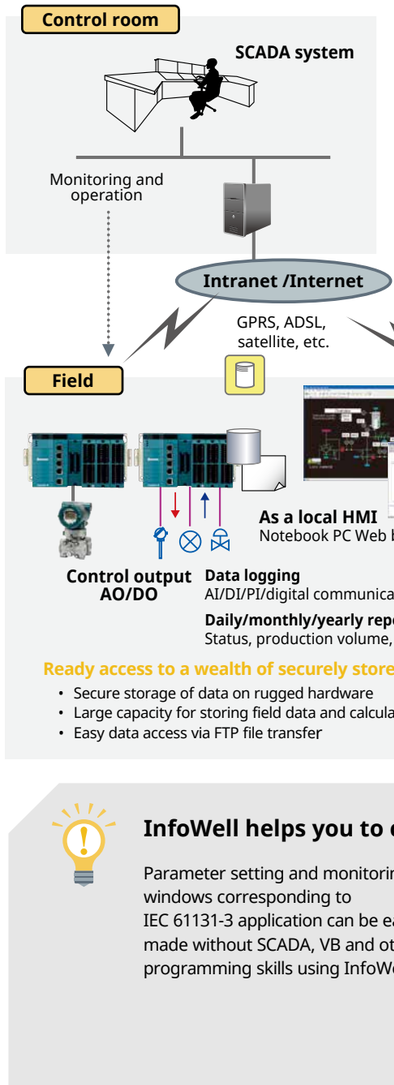
STARDOM FCN-RTU

Features and Benefits

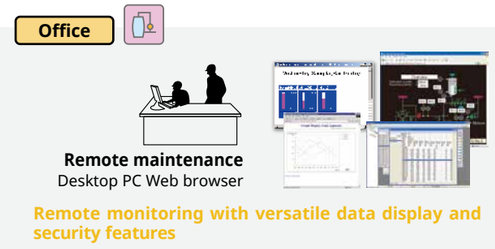
Precious data on rugged hardware at remote side
- Built-in functionality allowing remote access to data logged securely on rugged controllers

Minimize Total Cost of Ownership
- No need for dedicated software or an industrial-purpose PC to control and monitor your applications

Agile action in utility maintenance
- E-mail notification of alarms and messages from controllers



Ready access to a wealth of securely stored data
- Secure storage of data on rugged hardware
- Large capacity for storing field data and calculation results
- Easy data access via FTP file transfer



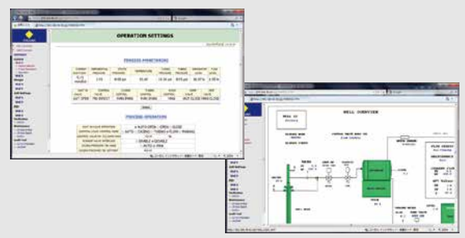
Remote monitoring with versatile data display and security features
- Use a Web browser to monitor the status of an application from a remote location. No need to be in central control room
- Data display in numeric, tabular, or graphical format
- User authentication required to prevent tampering with data

Alarm and message notification
- Secure storage of data on rugged hardware
- Large capacity for storing field data and calculation results
- Easy data access via FTP file transfer

InfoWell An information processing and transmission function

InfoWell helps you to create the simple HMI

Parameter setting and monitoring windows corresponding to IEC 61131-3 application can be easily made without SCADA, VB and other programming skills using InfoWell.



FCN-RTU CPU Specifications

Item		Specification
Processor		SH-4A (SH7730) 256 MHz
Memory	Main	128MB with ECC
	Static RAM	1MB with ECC, battery backup
System card		128MB on-board flash memory
Serial port		3 RS-232 ports (SERIAL: 1, 2, 3), non-isolated, RJ45, 1 RS-422/RS-485 port (SERIAL: 4), non-isolated, RJ45
	Method	RS-232: Full/Half duplex (software settings), RS-422/RS-485: Full/Half duplex (DIP switch settings)
	Synchronization	Asynchronous
	Baud rate	SERIAL1,4 : 1.2, 2.4, 4.8, 9.6, 14.4, 19.2, 28.8, 38.4, 57.6, or 115.2 kbps SERIAL2, 3: 1.2, 2.4, 4.8, 9.6, 14.4, 19.2, 28.8, or 38.4 kbps
	Terminating resistance	RS-422/RS-485: 120 Ω built-in, ON/OFF (DIP switch settings)
Network interface		1 Ethernet port: 100/10 Mbps, 10BASE-T or 100BASE-TX, RJ45 with network power switch (ON/OFF)
I/O interface		SB bus (Single)
RAS features		Watchdog timer, temperature monitor, etc.
Battery		2700 mAH lithium battery (*1)
LED		3 LEDs for CPU status, 2 LEDs for LAN status, 2 LEDs for each serial port status
Switches		RESET, SHUTDOWN, ON/OFF (NETWORK)
Power Supply	Supply voltage	5V DC±5%
	Power consumption	1.16 to 2.30 W
Weight		0.57kg
Size	Dimensions (W/H/D)	65.8 x 130 x 142.5 mm
	Slot	Occupy 2 slots
Duplex Configuration		Power supply modules enabled (NFBU200 with NFPW444)
Built-in I/O		16 DI, 8 DO, 12 AI (1-5 V), 2 AO (4-20 mA), 2 PI, 1 AI (0-32 V) for solar power battery monitoring (*2)

*1 : With battery exhaustion detecting function.
*2 : MIL 40-pin x 2 (KMS40 cable and TAS40 terminal block can be used.)

FCN-RTU CPU Function Specification

Common CPU Specifications

Task Execution

Execution Speed : Approx. 50 µsec/Ksteps in IL language
Number of Tasks : Max. 16 tasks
Task Priority : Possible in 16 levels
Task Execution Cycle : 10 ms or longer (by 10 msec. increments)

Program Capacity on CPU

Control Application : Max. 3 MB (approx. 360 Ksteps in an IL language) (*3)
Duolet (*1) Application : Max. 32 MB
Data Area (*2) : Max. 8 MB
Retained Data Area (*3) : Max. 410 KB

*1 : Duolet functions enable Java applications run on the controller.
*2 : The data is not retained when the power is off.
*3 : The data is retained even if the power is off. It can be used for tuning parameter storage.

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
- Sequence program : Up to 180 kilosteps in Ladder (equivalent to 128 sequence tables)

Network (Ethernet) Specification

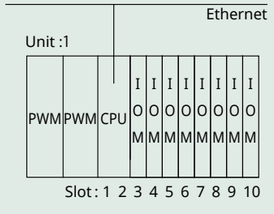
- Compliant with IEEE802.3
- Communicate with up to 15 FCNs per FCN-RTU
- Communicate with up to 4 upper systems (*1) per FCN-RTU

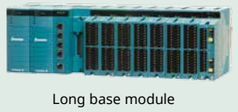
*1 : Total number of VDS, FCN/FCJ OPC Server and FAST/TOOLS

FCN-RTU Configuration

►Long base type

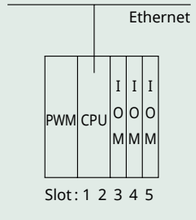
(Redundant Power Supply is enabled)

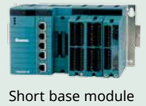




Long base module

►Short base type





Short base module

FCN-RTU Basic Specifications

CPU Modules

Model	Name	Specification	Embedded I/O
NFCP050	CPU module	• Duplex configuration: Not applicable • CPU Status LED: HRDY (Hardware Ready), RDY (System Ready), CTRL (Control Ready) • LAN Status LED: NETWORK ON/OFF (ON in normal, OFF in power down mode) LINK & ACT (ON for communication established, BLINK for Sending/Receiving) • RS Status LED: RCV (Receiving), SND (Sending) • Power consumption: 1.6 W to 2.9 W depending on network and embedded I/O configuration • Weight: 0.57 kg • Operation temperature: -40˚C to 70˚C	• Ethernet: 1 port • RS-232: 3 ports • RS-422/RS-485: 1 port • AI (1 to 5 V): 12 ch. • AI (0 to 32 V): 1 ch. • AO (4 to 20 mA): 2 ch. • DI (24 V DC): 16 ch. • DO (24 V DC): 8 ch. • PI: 2 ch.

Base Modules

Model	Name	Specification	
NFBU200-S0	Base module (19-inch rack-mounted)	• Max current consumption: 0.4 A (5 V) (Self-consumption) • Operation temperature: -20˚C to 70˚C	Weight: 1.9kg
NFBU200-S1	Base module (DIN rail-mounted)		Weight: 1.0kg
NFBU050-S1	Short base module (DIN rail-mounted)	• Max current consumption: 0.025 A (5 V) (Self-consumption) • Operation temperature: -40˚C to 70˚C	Weight: 0.58kg

Power Supply Modules

Model	Name	Specification
NFPW444	Power supply module (24 V DC input)	• Duplex configuration: Possible • Hot-Swap: Possible • Rated output: + 5.1 V DC, 7.8 A • Analog field power supply: Input: 24 V DC ± 10 %, 4 A, Duplexed (matching-diode) • LED: SYS (5 V system power output ON), FLD (24 V field power supply ON) • Checking terminals: + 5 V, + 24 V • Weight: 0.6 kg • Operation temperature: 0˚C to 55˚C (-20˚C to 70˚C for NFPW444)
NFPW426	Power supply module (12 V DC input or 24 V DC input)	• Duplex configuration: Not applicable • Hot-Swap: Not applicable • Rated output: +5.1 V DC (2.4 A) and +24 V DC (0.54 A) • LED: SYS (5 V system power output ON), FLD (24 V field power supply ON) • Checking terminals: + 5 V, + 24 V • Weight: 0.61 kg • Operation temperature: -40˚C to 70˚C

FCN-RTU Module Specifications

Digital I/O Modules

WTR : Wider Temperature Range (-40°C to +70°C or -20°C to +70°C) PCT : Pressure Clamp Terminal available

Model	Description	WTR*	PCT*	MIL	Basic Specification	Specification	Common
NFDV151	Digital Input • 32 ch. • 24 V DC • Isolated	✓ -20	✓	✓ 50 pins	• Functions: Status and Push button (edge count) • Max current consumption: 500 mA (5 V DC) • Weight: 0.3 kg	• Input response time: 8 ms or less (for status input) • Min. ON detection time: 20 ms (for push button input) • Max. ON/OFF cycle: 25 Hz (for push button input)	per 16 ch. (Plus or Minus)
NFDV551	Digital Output • 32 ch. • 24 V DC • Isolated	✓ -20	✓	✓ 50 pins	• Output fallback: Set to all channels • Max current consumption: 700 mA (5 V DC), 60 mA (24V DC) • Weight: 0.2 kg	• Output response time: 3 ms or less (for status output)	per 16 ch. (Minus)
NFDR541 (*1)	Relay Output • 16 ch. • 24 to 110 V DC or 100 to 240 V AC • Isolated	✓ -20	✓	N/A	• Rated applied voltage: 24 to 110 V DC, 100 to 240 V AC • Output fallback:Set to all channels • Max current consumption:780 mA (5 V DC) • Weight: 0.3 kg	• Output response time: 12 ms or less (for status output)	per 8 ch. (Plus or Minus)

Common Specification • LED: STATUS (Hardware normal), ACT (Operating) • Hot-Swap: Possible
*1 : NFDR541 is not compliant with RoHS directive and will not be compliant with CE marking from July 22, 2017.

» FCN-RTU Module Specifications

Analog I/O Modules

WTR : Wider Temperature Range (-40°C to +70°C or -20°C to +70°C) PCT : Pressure Clamp Terminal available

Model	Description	HART	WTR*	PCT*	MIL	Basic Specification	Specification
NFAI135	Analog Input • 4 to 20 mA • 8 ch. • Isolated ch.	✓	✓ -20	✓	✓ 40 pins	• Withstanding voltage: 500 V AC between input and system, 500 V AC between channels • Transmitter power supply: 20.2 to 29.3 V (Output current limit: 25 mA) • Two wire and four wire transmitter setting per channel with connected terminal • Max current consumption: 360 mA (5 V DC), 450 mA (24 V DC) • Weight: 0.3 kg	• Accuracy: ±0.1 % of full scale • Data refresh cycle: 10 ms • Input step response time: 100 ms • Temperature drift: Max. ±0.01 % /˚C
NFAI141	Analog Input • 4 to 20 mA • 16 ch. • Non-Isolated	✓	✓ -20	✓	✓ 40 pins	• Transmitter power supply: 22.8 to 26.4 V (Output current limit: 27 mA) • Two wire and four wire transmitter setting per channel with pins • Max current consumption: 310 mA (5 V DC), 450 mA (24 V DC) • Weight: 0.2 kg	• Accuracy: ±0.1 % of full scale • Data refresh cycle: 10 ms • Input step response time: 100 ms • Temperature drift: Max. ±0.01 % /˚C
NFAI143	Analog Input • 4 to 20 mA • 16 ch. • Isolated	✓	✓ -20	✓	✓ 40 pins	• Withstanding voltage: 1500 V AC between input and system • Transmitter power supply: 24.0 to 25.5 V (Output current limit: 25 mA) • Two wire and four wire transmitter setting per channel with pins • Max current consumption: 230 mA (5 V DC), 540 mA (24 V DC) • Weight: 0.3 kg	• Accuracy: ±0.1 % of full scale • Data refresh cycle: 10 ms • Input step response time: 100 ms • Temperature drift: Max. ±0.01 % /˚C
NFAV141	Analog Input • 1 to 5 V • 16 ch. • Non-Isolated	N/A	N/A	✓	✓ 40 pins	• Input: Differential input (allowable common mode viltage ±1V or less) • Max current consumption: 350 mA (5 V DC) • Weight: 0.2 kg	• Accuracy: ±0.1 % of full scale • Data refresh cycle: 10 ms • Input step response time: 100 ms • Temperature drift: Max. ±0.01 % /˚C
NFAV144	Analog Input • -10 to +10 V or 1 to 5 V • 16 ch. • Isolated	N/A	✓ -20	✓	✓ 40 pins	• Input signal: 1 to 5 V or -10 to +10 V set for all channels • Withstanding voltage: 1500 V AC between input and system • Max current consumption: 500 mA (5 V DC) • Weight: 0.2 kg	• Accuracy: ±0.1 % of full scale • Data refresh cycle: 10 ms • Input step response time: 100 ms • Temperature drift: Max. ±0.01 % /˚C
NFAT141	TC/mV Input • 16 ch. • Isolated	N/A	N/A	✓	✓ 40 pins (*1)	• Input signal: Thermocouple or mV set for each channel from CH1 to CH16 • Burn out detection: Possible (all channels together), Detection time: 60 s • Withstanding voltage: 1500 V AC between input and system • Max current consumption: 450 mA (5 V DC) • Weight: 0.2 kg	• TC input accuracy: ±0.03 % of full scale (-20 to 80 mV) • mV input accuracy: ±0.032 % of full scale (-100 to 150 mV) • Data refresh cycle: 1 s • TC input temperature drift: Max.±30 ppm/˚C • mV input temperature drift: Max.±32 ppm/˚C
NFAR181	RTD Input • 12 ch. • Isolated	N/A	✓ -40	✓	N/A	• Input signal: Set for each channel • Burn out detection: Possible (all channels together), Detection time: 60 s • Withstanding voltage: 1500 V AC between input and system • Max current consumption: 450 mA (5 V DC) • Weight: 0.2 kg	• Accuracy: ±0.03 % of full scale (0 to 400 Ω) • Data refresh cycle: 1 s • Temperature drift: Max. ±30 ppm/˚C

Common Specification • LED: STATUS (Hardware normal), ACT (Operating) • Hot-Swap: Possible

*1: Use a MIL connector cable only for mV input.

Analog I/O Modules

WTR : Wider Temperature Range (-40°C to +70°C or -20°C to +70°C) PCT : Pressure Clamp Terminal available

Model	Description	HART	WTR*	PCT*	MIL	Basic Specification	Specification
NFAP135	Pulse Input • 0 to 10kHz • 8 ch. • Isolated ch.	N/A	✓ -40	✓	✓ 40 pins	• Withstanding voltage: 500 V AC between input and system, 500 V AC between channels • Transmitter power supply: 24 V (30 mA) / 12 V (40 mA) Selectable • Max current consumption: 300 mA (5 V DC), 400 mA (24 V DC) • Weight: 0.3 kg	• Minimum input pulse width: 40µs • Data refresh cycle: 2 ms • Input type:Dry contact pulse (Open collector contact) Dry contact Voltage pulse Current pulse (Two-wired transmitter) Voltage pulse (Three-wired transmitte)
NFAI835	Analog I/O • 4 ch. input (4 to 20 mA) • 4 ch. output (4 to 20 mA) • Isolated ch.	✓	✓ -20	✓	✓ 40 pins	• Withstanding voltage: 500 V AC between input/output and system, 500 V AC between channels • Output fallback: Set for each channel • Transmitter power supply: 20.2 to 29.3 V (Output current limit: 25 mA) • Two wire and four wire transmitter setting per channel with connected terminal • Max current consumption: 360 mA (5 V DC), 450 mA (24 V DC) • Weight: 0.3 kg	• Input accuracy: ±0.1 % of full scale • Output accuracy: ±0.3 % of full scale • Data refresh cycle: 10 ms • Input step response time: 100 ms, Output step response time: 100 ms • Temperature drift: Max. ±0.01 % /˚C
NFAI841	Analog I/O • 8 ch. input (4 to 20 mA) • 8 ch. output (4 to 20 mA) • Non-Isolated	✓	✓ -20	✓	✓ 40 pins	• Output fallback: Set for each channel • Transmitter power supply: 22.8 to 26.4 V (Output current limit: 27 mA) • Two wire and four wire transmitter setting per channel with pins • Max current consumption: 310 mA (5 V DC), 500 mA (24 V DC) • Weight: 0.3 kg	• Input accuracy: ±0.1 % of full scale • Output accuracy: ±0.3 % of full scale • Data refresh cycle: 10 ms • Input step response time: 100 ms, Output step response time: 40 ms • Temperature drift: Max. ±0.01 % /˚C
NFAB841	Analog I/O • 8 ch. Input (1 to 5 V) • 8 ch. Output (4 to 20 mA) • Non-Isolated	N/A	N/A	✓	✓ 40 pins	• Input: Differential input (allowable common mode voltage is ±1 V or less) • Output fallback: Set for each channel • Max current consumption: 310 mA (5 V DC), 250 mA (24 V DC) • Weight: 0.3 kg	• Input accuracy: ±0.1 % of full scale • Output accuracy: ±0.3 % of full scale • Data refresh cycle: 10 ms • Input step response time: 100 ms, Output step response time: 40 ms • Temperature drift: Max. ±0.01 % /˚C
NFAI543	Analog Output • 4 to 20 mA • 16 ch. • Isolated	✓	✓ -20	✓	✓ 40 pins	• Withstanding voltage: 1500 V AC between output and system • Output fallback: Set for each channel • Max current consumption: 230 mA (5 V DC), 540 mA (24 V DC) • Weight: 0.4 kg	• Output accuracy: ±0.3 % of full scale • Data refresh cycle: 10 ms • Output step response time: 100 ms • Temperature drift: Max. ±0.01 % /˚C

Common Specification • LED: STATUS (Hardware normal), ACT (Operating) • Hot-Swap: Possible

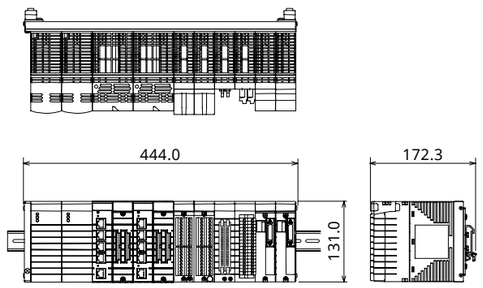
Communication Modules

WTR : Wider Temperature Range (-40 to +70°C)

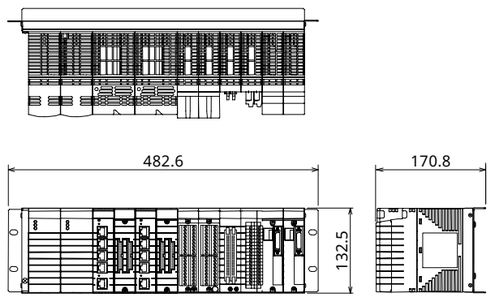
Model	Description	WTR*	Basic Specification	Specification	Remarks
NFLF111	FOUNDATION fieldbus communication module	✓ -40	• Max current consumption: 500 mA (5 V DC) • Weight: 0.4 kg	• Port: 4 ports • 16 devices per port • Speed: 31.25kbps • Link Active Scheduler (LAS)	Clamp terminal
NFLP121	PROFIBUS-DP communication module	N/A	• Max current consumption: 700 mA (5 V DC) • Weight: 0.3 kg	• Port: 1 port • 123 devices per module (if repeaters used)	D-sub 9 pins (female)
NFLC121	CANopen communication module	N/A	• Max current consumption: 700 mA (5 V DC) • Weight: 0.3 kg	• Port: 1 port • CiA 301 compliant • 126 devices per module	D-sub 9 pins (male)

Common Specification • LED: STATUS (Hardware normal), ACT (Operating), RCV (Receiving), SND (Sending)

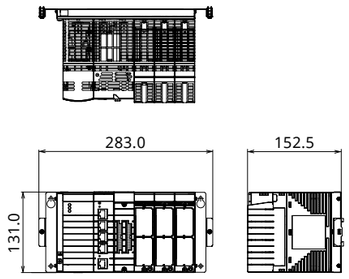
FCN-RTU
(Long base type, DIN rail-mounted)



FCN-RTU
(Long base type, 19 inch rack-mounted)

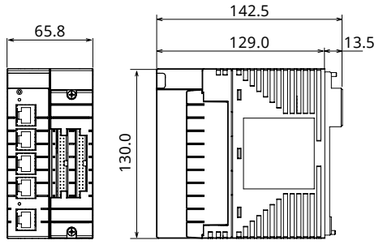


FCN-RTU
(Short base type, DIN rail-mounted)



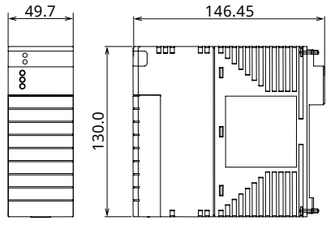
CPU Module

FCN-RTU model: **NFCP050**



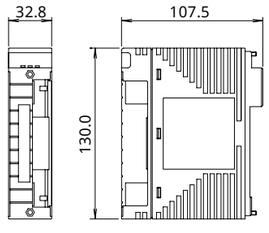
Power Supply Module

Model: **NFPW444/NFPW426**



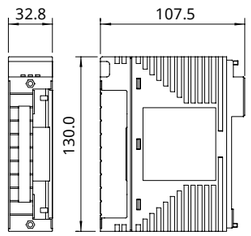
Analog I/O Module

Model: **NFAI135/NFAI141/NFAI143/NFAV141/NFAV144/NFAT141/NFAR181/NFAP135/NFAI835/NFAI841/NFAB841/NFAI543**

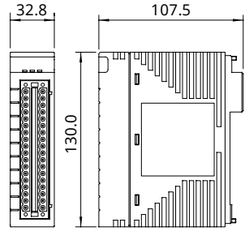


Digital I/O Module

Model: **NFDV151/NFDV551**

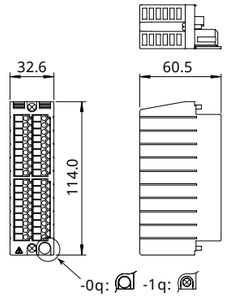


Model: **NFDR541**

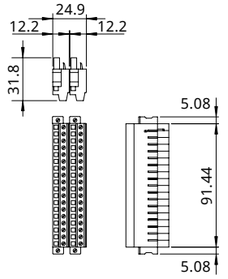


Terminal Block

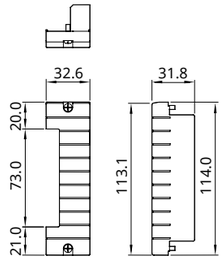
Model: **NFTA4S/NFTT4S/NFTR8S/NFTB5S/NFTD5S/NFTI3S**



Model: **NFTC4S**

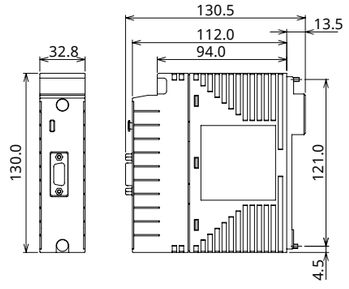


Model: **NFCCC01**



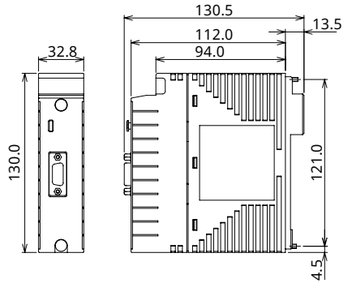
PROFIBUS-DP Communication Module

Model: **NFLP121**



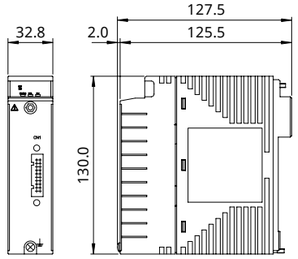
CANopen Communication Module

Model: **NFLC121**

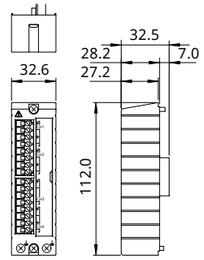


FOUNDATION fieldbus Communication Module

Model: **NFLF111**



Model: **NFLF111**



Software Selection

Name	Model	Suffix Codes/Option Codes
Software Media		
FCN/FCJ Software Media	NT203AJ	PC11E
FCN/FCJ APPF Software Media	NT205AJ	PC11E

Embedded Software		Software Media	
		NT205AJ	NT203AJ
PAS portfolio			✓
InfoWell functions	Web application portfolio	✓	
	E-mail application portfolio	✓	
	Graphic portfolio	✓	
	Logging portfolio	✓	
FA-M3 communication portfolio		✓	
MELSEC communication portfolio		✓	
Modbus communication portfolio		✓	
DNP3 communication portfolio		✓	
Gas flow calculation portfolio		✓	
Liquid flow calculation portfolio		✓	

FCN/FCJ Engineering Tool Linense

Logic Designer License	Run on PC	NT751FJ	LW11A		✓
FCN/FCJ simulator License	Run on PC	NT752AJ	LW11A		✓
FCN/FCJ Duolet AP Development Kit License	Run on PC	NT755FJ	LW11A		✓

FCN/FCJ OPC Server License

FCN/FCJ OPC Server for Windows	Run on PC	NT781AJ	LW11A		✓

Hardware Selection

FCN-RTU Common Modules

Name		Model	Suffix Codes/Options Codes			
			Standard		with ISA standard G3 option	
		CPU Type	Extended		Extended	
CPU module for FCN-RTU		NFCP050-	S15		S16	
Power supply module	10-30VDC	NFPW426-	50		51	
Power supply module	24VDC	NFPW444-	50		51	
		Installation	19inch rack	DIN rail	19inch rack	DIN rail
Base module (long)		NFBU200-	S05	S15	S06	S16
Base module (short)		NFBU050-	N/A	S15	N/A	S16

Input Output Modules (*1) (*2)

Name	Model	Standard			with ISA standard G3 option		
		Terminal Block	Pressure Clamp Terminal		MIL with cover	Pressure Clamp Terminal		MIL with cover
		Surge Absorber (SA)	non SA	SA		non SA	SA	
Analog Input module (4 to 20mA, 8-channels, Isolated channels)	NFAI135-	S50/13S00	S50/13S10	S50/CCC01	S51/13S00	S51/13S10	S51/CCC01	
Analog Input module (4 to 20mA, 16-channels, Non-Isolated)	NFAI141-	S50/A4S00	S50/A4S10	S50/CCC01	S51/A4S00	S51/A4S10	S51/CCC01	
Analog Input module (4 to 20mA, 16-channels, Isolated)	NFAI143-	S50/A4S00	S50/A4S10	S50/CCC01	S51/A4S00	S51/A4S10	S51/CCC01	
Analog Input module (1 to 5V, 16-channels, Non-Isolated)	NFAV141-	S50/A4S00	S50/A4S10	S50/CCC01	S51/A4S00	S51/A4S10	S51/CCC01	
Analog Input module (-10 to +10V, 16-channels, Isolated)	NFAV144-	S50/A4S00	S50/A4S10	S50/CCC01	S51/A4S00	S51/A4S10	S51/CCC01	
TC/mV Input module (16-channels, Isolated)	NFAT141-	S50/T4S00	S50/T4S10	S50/CCC01	S51/T4S00	S51/T4S10	S51/CCC01	
RTD Input module (12-channels, Isolated)	NFAR181-	S50/R8S00	S50/R8S10	N/A	S51/R8S00	S51/R8S10	N/A	
Pulse Input module (Pulse Count, 0~10kHz, 8-channels, Isolated channels)	NFAP135-	S50/13S00	S50/13S10	S50/CCC01	S51/13S00	S51/13S10	S51/CCC01	
Analog I/O module (4 to 20mA input/output, 4-channels input/output, Isolated channels)	NFAI835-	S50/13S00	S50/13S10	S50/CCC01	S51/13S00	S51/13S10	S51/CCC01	
Analog I/O module (4 to 20mA input/output, 8-channels input/output, Non-Isolated)	NFAI841-	S50/A4S00	S50/A4S10	S50/CCC01	S51/A4S00	S51/A4S10	S51/CCC01	
Analog I/O module (1 to 5V input, 4 to 20mA output, 8-channels input/output, Non-Isolated)	NFAB841-	S50/A4S00	S50/A4S10	S50/CCC01	S51/A4S00	S51/A4S10	S51/CCC01	
Analog Output module (4 to 20mA, 16-channels, Isolated)	NFAI543-	S50/A4S00	S50/A4S10	S50/CCC01	S51/A4S00	S51/A4S10	S51/CCC01	
Digital Input module (32-channels, 24VDC, Isolated)	NFDV151-	P60/B5S00	P60/B5S10	P60/CCC01	P61/B5S00	P61/B5S10	P61/CCC01	
Digital Output module (32-channels, 24VDC, Isolated)	NFDV551-	P60/D5S00	P60/D5S10	P60/CCC01	P61/D5S00	P61/D5S10	P61/CCC01	
Relay Output module (16-channels, 24 to 110VDC/100 to 240VAC, Isolated) (*3)	NFDR541-	P50/C4S70	N/A	N/A	P51/C4S70	N/A	N/A	

Communication Modules (*2)

Name	Model	Suffix Codes/Options Codes			
		Standard		with ISA standard G3 option	
Pressure clamp terminal block with surge absorber (SA)		non SA	SA	non SA	SA
Foundation Fieldbus communication module (4-ports)	NFLF111-	S50	S50/F9S00	S51	S51/F9S00
PROFIBUS-DP communication module	NFLP121-	S00	N/A	S01	N/A
CANopen communication module	NFLC121-	S00	N/A	S01	N/A

MIL Connector Cables

Cable Length		0.5m	1.0m	1.5m	2.0m	2.5m	3.0m (*5)
MIL connector cable for analog, NFCP050 built-in I/O (40 pole plug types) (*4)	KMS40-	005	010	015	020	025	030
MIL connector cable (50 pole plug types) NFDV151,NFDV551	KMS50-	005	010	015	020	025	030

MIL Connector Terminal Blocks

		Standard
MIL connector terminal block for analog I/O modules except for NFAR181 and NFCP050 built-in I/O (40 pole plug types, M3.5) (*4)	TAS40-	0N
MIL connector terminal block for digital I/O modules (50 pole plug types, M3.5)	TAS50-	0N

Pressure Clamp Terminal Blocks

Surge Absorber (SA)		non SA	SA
Pressure clamp terminal block for analog (16-channels): NFAI141,NFAV141,NFAV144,NFAI143,NFAI841,NFAB841,NFAI543	NFTA4S-	00	10
Pressure clamp terminal block for thermocouple/mV (16-channels) NFAT141	NFTT4S-	00	10
Pressure clamp terminal block for RTD (12-channels) NFAR181	NFTR8S-	00	10
Pressure clamp terminal block for digital input (32-channels) NFDV151	NFTB5S-	00	10
Pressure clamp terminal block for digital output (32-channels) NFDV551	NFTD5S-	00	10
Pressure clamp terminal block for analog isolated channels (8-channels): NFAI135,NFAP135,NFAI835	NFTI3S-	00	10
Pressure clamp terminal block for relay output (16-channels) NFDR541	NFTC4S-	70	N/A
Pressure clamp terminal block for FOUNDATION fieldbus NFLF111	NFTF9S-	00	N/A

Cover

Dummy cover for I/O module slots	NFDCV01
Dummy cover for power supply module slots	NFDCV02
MIL cable connector cover	NFCCC01

Test Switch and Lamp

Test switch for FCN digital input module NFDV151 (*6)	S9105FA
Test lamp for FCN digital output module NFDV551 (*6)	S9106FA
Cable for test switch / test lamp	A1417WL

*1 : Suffix Code for the following HART module is changed from "S□□" to "H□□":NFAI135, NFAI835, NFAI141, NFAI143, NFAI543,NFAI841.

*2 : Suffix code for extended temperature model is prepared for the following models:NFAR181, NFAP135, NFLF111.

*3 : NFDR541 is not compliant with RoHS directive and will not be compliant with CE marking from July 22, 2017.

*4 : mV input is only applicable for NFAT141.

*5 : Cable length to 25.0m is available. Cable can be ordered by the one meter.

*6 : It can be directly mounted or connected with cable (A1417WL).

Hardware Selection

Name		Model	Suffix Codes/Options Codes			
FCN-RTU Common Module			Standard		with ISA standard G3 option	
		CPU Type	Extended		Extended	
CPU module for FCN-RTU		NFCP050-	S1E		S1F	
Power supply module	10-30VDC	NFPW426-	E0		E1	
Power supply module	24VDC	NFPW444-	E0		E1	
		Installation	19inch rack	DIN rail	19inch rack	DIN rail
Base module (long)		NFBU200-	S0E	S1E	S0F	S1F
Base module (short)		NFBU050-	N/A	S1E	N/A	S1F

Input Output Modules (*1) (*2)		Standard			with ISA standard G3 option		
	Terminal Block	Pressure Clamp Terminal		MIL with cover	Pressure Clamp Terminal		MIL with cover
	Surge Absorber (SA)	non SA	SA		non SA	SA	
Analog Input module (4 to 20mA, 8-channels, Isolated channels)	NFAI135-	SE0/13S00	SE0/13S10	SE0/CCC01	SE1/13S00	SE1/13S10	SE1/CCC01
Analog Input module (4 to 20mA, 16-channels, Non-Isolated)	NFAI141-	SE0/A4S00	SE0/A4S10	SE0/CCC01	SE1/A4S00	SE1/A4S10	SE1/CCC01
Analog Input module (4 to 20mA, 16-channels, Isolated)	NFAI143-	SE0/A4S00	SE0/A4S10	SE0/CCC01	SE1/A4S00	SE1/A4S10	SE1/CCC01
Analog Input module (1 to 5V, 16-channels, Non-Isolated)	NFAV141-	SE0/A4S00	SE0/A4S10	SE0/CCC01	SE1/A4S00	SE1/A4S10	SE1/CCC01
Analog Input module (-10 to +10V, 16-channels, Isolated)	NFAV144-	SE0/A4S00	SE0/A4S10	SE0/CCC01	SE1/A4S00	SE1/A4S10	SE1/CCC01
TC/mV Input module (16-channels, Isolated)	NFAT141-	SE0/T4S00	SE0/T4S10	SE0/CCC01	SE1/T4S00	SE1/T4S10	SE1/CCC01
RTD Input module (12-channels, Isolated)	NFAR181-	SE0/R8S00	SE0/R8S10	N/A	SE1/R8S00	SE1/R8S10	N/A
Pulse Input module (Pulse Count, 0 ～ 10kHz, 8-channels, Isolated channels)	NFAP135-	SE0/13S00	SE0/13S10	SE0/CCC01	SE1/13S00	SE1/13S10	SE1/CCC01
Analog I/O module (4 to 20mA input/output, 4-channels input/output, Isolated channels)	NFAI835-	SE0/13S00	SE0/13S10	SE0/CCC01	SE1/13S00	SE1/13S10	SE1/CCC01
Analog I/O module (4 to 20mA input/output, 8-channels input/output, Non-Isolated)	NFAI841-	SE0/A4S00	SE0/A4S10	SE0/CCC01	SE1/A4S00	SE1/A4S10	SE1/CCC01
Analog I/O module (1 to 5V input, 4 to 20mA output, 8-channels input/output, Non-Isolated)	NFAB841-	SE0/A4S00	SE0/A4S10	SE0/CCC01	SE1/A4S00	SE1/A4S10	SE1/CCC01
Analog Output module (4 to 20mA, 16-channels, Isolated)	NFAI543-	SE0/A4S00	SE0/A4S10	SE0/CCC01	SE1/A4S00	SE1/A4S10	SE1/CCC01
Digital Input module (32-channels, 24VDC, Isolated)	NFDV151-	PF0/B5S00	PF0/B5S10	PF0/CCC01	PF1/B5S00	PF1/B5S10	PF1/CCC01
Digital Output module (32-channels, 24VDC, Isolated)	NFDV551-	PF0/D5S00	PF0/D5S10	PF0/CCC01	PF1/D5S00	PF1/D5S10	PF1/CCC01
Relay Output module (16-channels, 24 to 110VDC/100 to 240VAC, Isolated) (*3)	NFDR541-	PE0/C4S70	N/A	N/A	PE1/C4S70	N/A	N/A

Name	Model	Suffix Codes/Options Codes			
Communication Modules (*2)		Standard		with ISA standard G3 option	
Pressure clamp terminal block with surge absorber (SA)		non SA	SA	non SA	SA
Foundation Fieldbus communication module (4-ports)	NFLF111-	SE0	SE0/F9S00	SE1	SE1/F9S00

MIL Connector Cables								
	Cable Length	0.5m	1.0m	1.5m	2.0m	2.5m	3.0m (*5)
MIL connector cable for analog, NFCP050 built-in I/O (40 pole plug types) (*4)	KMS40-	005	010	015	020	025	030
MIL connector cable (50 pole plug types) NFDV151, NFDV551	KMS50-	005	010	015	020	025	030

MIL Connector Terminal Blocks		Standard
MIL connector terminal block for analog I/O modules except for NFAR181 and NFCP050 built-in I/O (40 pole plug types, M3.5) (*4)	TAS40-	0N
MIL connector terminal block for digital I/O modules (50 pole plug types, M3.5)	TAS50-	0N

Pressure Clamp Terminal Blocks		Surge Absorber (SA)	non SA	SA
Pressure clamp terminal block for analog (16-channels) NFAI141, NFAV141, NFAV144, NFAI143, NFAI841, NFAB841, NFAI543	NFTA4S-		00	10
Pressure clamp terminal block for thermocouple/mV (16-channels) NFAT141	NFTT4S-		00	10
Pressure clamp terminal block for RTD (12-channels) NFAR181	NFTR8S-		00	10
Pressure clamp terminal block for digital input (32-channels) NFDV151	NFTB5S-		00	10
Pressure clamp terminal block for digital output (32-channels) NFDV551	NFTD5S-		00	10
Pressure clamp terminal block for analog isolated channels (8-channels) NFAI135, NFAP135, NFAI835	NFTI3S-		00	10
Pressure clamp terminal block for relay output (16-channels) NFDR541	NFTC4S-		70	N/A
Pressure clamp terminal block for FOUNDATION fieldbus NFLF111	NFTF9S-		00	N/A

Cover

Dummy cover for I/O module slots	NFDCV01
Dummy cover for power supply module slots	NFDCV02
MIL cable connector cover	NFCCC01

*1 : Suffix Code for the following HART module is changed from "S □□ " to "H □□ ":NFAI135, NFAI835, NFAI141, NFAI143,NFAI543, NFAI841.

*2 : Suffix code for extended temperature model is prepared for the following models:NFAR181, NFAP135,NFLF111.

*3 : NFDR541 is not compliant with RoHS directive and will not be compliant with CE marking from July 22, 2017.

*4 : mV input is only applicable for NFAT141.

*5 : Cable length to 25.0m is available. Cable can be ordered by the one meter.

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