General Specifications

NFLC121
CANopen Communication Module

$STARDOM$

FCN

GS 34P02Q58-01E

■ GENERAL

This General Specification (GS) describes CANopen communication functions and hardware specifications of the module.

The CANopen Communication Module is installed in the FCN or FCN-RTU and communicates with the devices that have CANopen communication functionality.

For details on FCN-500, see "FCN Autonomous Controller Hardware (FCN-500)" (GS 34P02Q14-01E) and "FCN Autonomous Controller Functions (FCN-500)" (GS 34P02Q03-01E).

For details on FCN-RTU, see "FCN-RTU Low Power Autonomous Controller Hardware" (GS 34P02Q13-01E) and "FCN-RTU Low Power Autonomous Controller Functions" (GS 34P02Q02-01E).

Notation in this document:
• The term "FCN" refers to the module consisting type autonomous controllers.
• The term "FCN-500" refers to the autonomous controllers with NFCP501/NFCP502 CPU module.
• The term "FCN-RTU" refers to the low power autonomous controllers with NFCP050 CPU module.

■ OVERVIEW OF THE CANopen

CANopen international standard (EN 50325-4) defines a higher-layer communication protocol based on CAN (Control Area Network).

CANopen is widely used in machine control, medical equipment, building automation, power generation and other application fields. In wind power generation, CANopen is used for the exchange of inverter and pitch control data between peripheral devices.

CANopen enables configuration of a flexible network with the following features:

• Baud rate is selectable from 10 kbps to 1 Mbps.
• Up to 127 nodes can be connected within one network.
• CANopen enables efficient system design through the use of standard device and application protocols.

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■ CANopen COMMUNICATION SYSTEM IN STARDOM

The figure below shows an example of a CANopen communication system in STARDOM (hereinafter referred to as CANopen System) configuration:
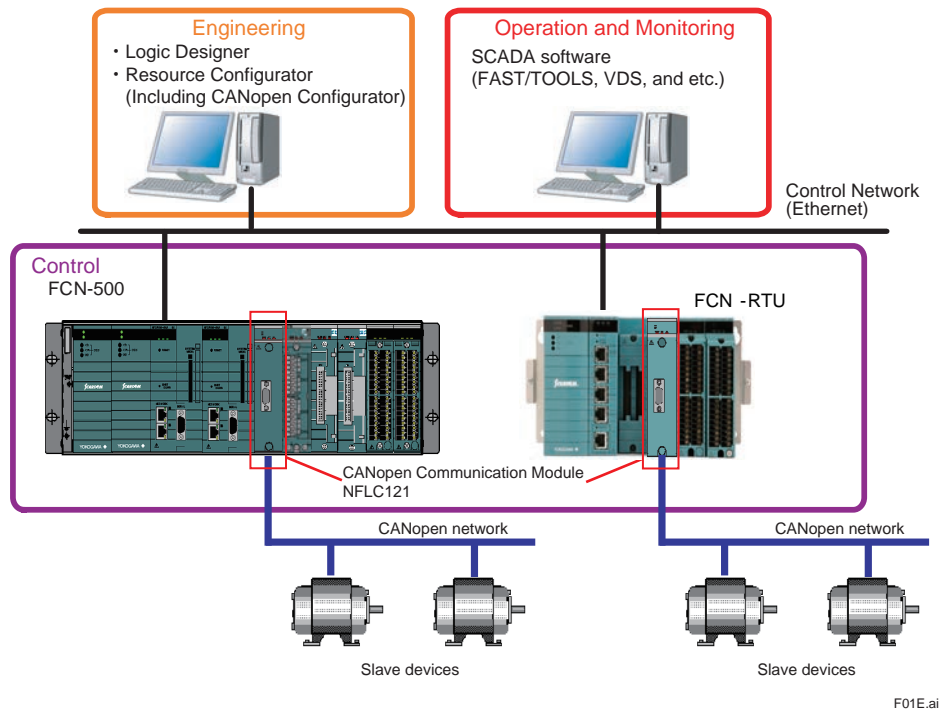

Figure CANopen System Configuration Example

● FCN (CPU module NFCP501/NFCP502 style S1 or later, CPU module NFCP050 style S2 or later)

FCN controls and monitors slave devices. It collects system alarms and other information from fieldbus devices. Its control and calculation functions allow calculation results to be sent to slave devices.

● CANopen Communication Module (NFLC121)

The CANopen Communication Module (NFLC121) is installed in the FCN system to provide for CANopen communications. It runs as a master device in CANopen communication.

● Logic Designer

Logic Designer software is used for developing control applications for the FCN.

It is used to create, debug, and download control applications to be run on the FCN.

● Resource Configurator (Including CANopen Configurator)

Resource Configurator software is used for basic FCN setup. It is used for basic configuration (IP address, I/O modules, license, and etc.) of the FCN and device label definition.

From Resource Configurator, you can run the CANopen Configurator software tool to configure CANopen communication protocols of the CANopen Communication Module (NFLC121) and slave devices.

● SCADA software (FAST/TOOLS, VDS and etc.)

SCADA software is used for controlling and monitoring processes. SCADA software controls and monitors slave devices via the FCN.

● Slave devices

CANopen slave devices have CANopen communication functionality and thus can exchange data with the FCN connected to same CAN bus via a CANopen Communication Module (NFLC121).

■ CANopen SYSTEM MAIN FUNCTION

The main function of a CANopen system is described below.

● Communication Function

The CANopen Communication Module (NFLC121) runs as a CANopen master device in CANopen Communication.

A CANopen Communication Module (NFLC121) installed in the FCN uses the PDO (Process Data Object) and SDO (Service Data Object) protocols to access data of slave devices.

Table Communication Function of CANopen Communication Module (NFLC121)

Item	Specification
Communication profile	CiA 301 (CANopen application layer and communication profile)
Number of installed NFLC121 modules	4 max. for FCN-500 (*1)
	2 max. for FCN-RTU
Number of slave devices	126 slave devices per CANopen Communication Module (NFLC121)
Data access	PDO: 190 PDOs max. per CANopen Communication Module (NFLC121)
	SDO: SDO Client
Baud rate	10 kbps, 20 kbps, 50 kbps, 100 kbps, 125 kbps, 250 kbps, 500 kbps, 800 kbps or 1 Mbps
Supported protocols	Node Bootup
	SYNC producer
	Heartbeat Consumer/Producer
	Guarding
	Emergency Consumer
Message frame format	11 bit

*1:   The number of CANopen Communication Module (NFLC121) allowed may be reduced if other communication modules are also installed. For details, see "FCN Autonomous Controller Hardware (FCN-500)" (GS 34P02Q14-01E).

● Status Monitoring Function

The CANopen Communication Module (NFLC121) uses the CANopen communication protocols listed in the table below to monitor the status of slave devices.

The module also monitors the status of the CAN bus and other CANopen Communication Module (NFLC121) communication status.

Table Status Monitoring Function of CANopen Communication Module (NFLC121)

Protocol	Description	Remarks
Emergency	Protocol for receiving error messages from slave devices	If an error message is received, a system alarm message is transmitted to the higher-level system such as SCADA software.
Guarding/Heartbeat	Protocol for monitoring alive information of slave devices	If the monitoring result indicates an error, the Status of the device label variable is changed to BAD, and a system alarm message is transmitted to the higher-level system such as SCADA software.

● Engineering Function

The Resource Configurator, CANopen Configurator and Logic Designer software tools are used in STARDOM CANopen system engineering.

Table List of Engineering Software

Software		Description
Resource Configurator		Configuring CANopen Communication Module (NFLC121) and other I/O modules
		Running CANopen Configurator
		Downloading FCN or FCN-RTU configuration information and CANopen Configurator configuration information
	CANopen Configurator	Registering slave devices
		Configuring CANopen communication protocol
Logic Designer		Defining device label variables
		Creating control applications
		Downloading control applications

■ SOFTWARE

● Operating Environment

Table Software Operating Environment

Software	Rev. No.
CANopen Configurator	Windows 10 Enterprise 2019 LTSC (64-bit) Windows 10 IoT Enterprise 2019 LTSC (64-bit) Windows 10 Enterprise 2016 LTSB (64-bit) Windows 10 IoT Enterprise 2016 LTSB (64-bit) Windows 10 Pro 20H2 or later (64-bit)

The other system requirements are the same as those of the Logic Designer.

Note: For details on the system requirements of Logic Designer, see "NT751FJ Logic Designer" (GS 34P02Q75-01E).
Note: Some functions of the STARDOM software may possibly be restricted when Windows Update is applied to Windows 10 Pro.
Refer to the following Yokogawa Web site (registration is required) for the support status of STARDOM software for Windows 10 Pro.
"System Requirements" Page in "YOKOGAWA Partner Portal STRADOM" site
https://partner.yokogawa.com/global/member/rtu/os/index.htm

● Software Required

CANopen systems configuration requires the following software.

Table Software Required

Software	Rev. No.
Resource Configurator (Including CANopen Configurator)	R4.30.01 or later
Logic Designer	R4.30.01 or later
PAS Portfolio (Input/Output Data Processing POUs.)	R4.30.01 or later
FCN/FCJ Basic Software	R4.30.01 or later

Note: Refer to related GS for other software revisions.

■ CANopen COMMUNICATION MODULE (NFLC121) HARDWARE

Hardware specifications of the CANopen Communication Module (NFLC121) are described below.

● Hardware Specifications

Item	Specification
Model	NFLC121
Interface	CANopen
Connection method	CiA 301 compliant
Number of ports	1
Isolation	Between signal and system
Connector	D-sub 9-pin (male)
Maximum transmission distance	CiA 301 compliant
Current consumption	700 mA (5 V DC)
Weight	0.3 kg

Note: The cables and terminators must comply with PROFIBUS-DP standards (PROFIBUS Specifications IEC61158-2 type3).

Connectors (D-sub 9-pin, male)

Pin No	Signal Name	Function
1	–	Not used
2	CAN_L	CAN_L
3	CAN_GND	CAN ground
4	–	Not used
5	–	Not used
6	–	Not used
7	CAN_H	CAN_H
8	–	Not used
9	–	Not used

Note: Connectors are fastened using inch screw threads (No. 4-40 UNC).

```
  1  2  3  4  5
  O  O  O  O  O

    O  O  O  O
    6  7  8  9
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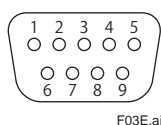
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Figure Pin No. of D-sub 9-pin Connectors on the Module

Applicable Cables
Cables used must comply with the CiA 301 specification.

Applicable Terminators
Terminators used must comply with the CiA 301 specification.

Note: The CANopen Communication Module (NFLC121) has no internal terminator so an external terminator is required.
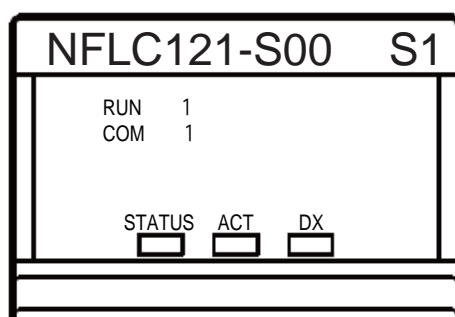
● LED Indicators

Operation Status LED Indicators

| LED Indicators	Color	Description
STATUS	Green	Lights when the hardware is normal.
ACT	Green	Lights when the module is running normally.
DX	Green	(Not used)

Communication State LED Indicators

LED Indicators	Color	Description
RUN	Green	Flashes when the communication function is being started.
	Green	Lights when the communication function is ready and normal.
COM	Green	Flashes (200 ms ON/1000 ms OFF) in STOPPED state
	Green	Flashes (200 ms ON/200 ms OFF) in PRE-OPERATIONAL state
	Green	Lights in OPERATIONAL state

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Figure LED Indicators of CANopen Communication Module (NFLC121)

■ EXTERNAL DIMENSIONS

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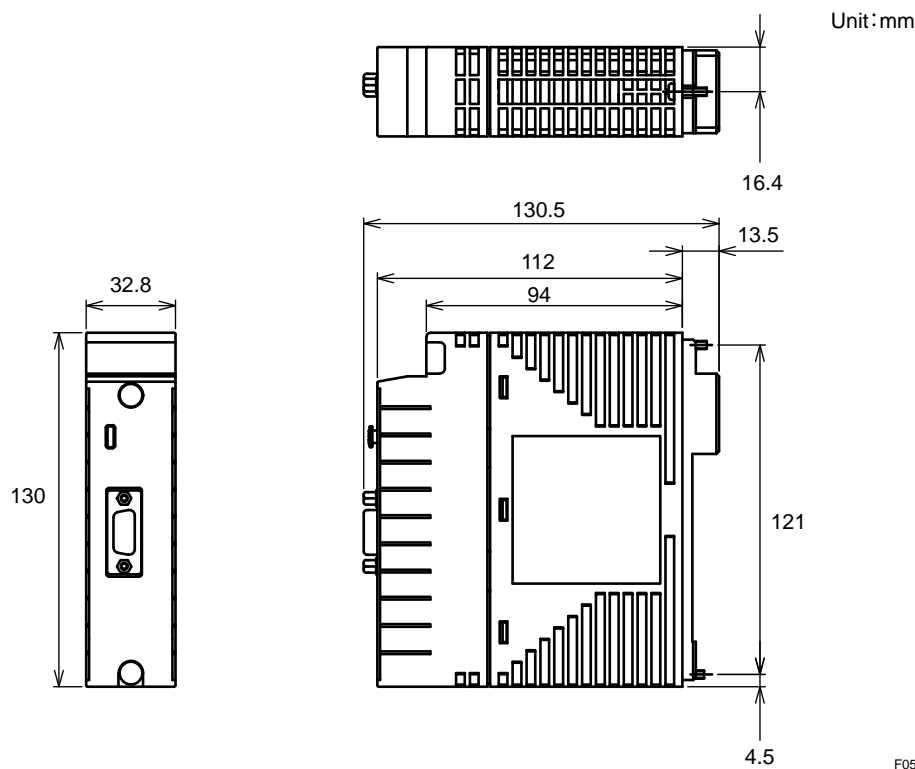
■ MODEL AND SUFFIX CODES

		Description
Model	NFLC121	CANopen Communication Module
Suffix Code	-S	Standard type
	0	Always 0
	0	Basic type
	1	With ISA Standard G3 option

■ RELATED DOCUMENTS

FCN Autonomous Controller Functions (FCN-500)	GS 34P02Q03-01E
FCN Autonomous Controller Hardware (FCN-500)	GS 34P02Q14-01E
Logic Designer	GS 34P02Q75-01E
Application Portfolios (FCN-500/FCN-RTU)	GS 34P02P20-02E
VDS	GS 34P02A02-01E
FCN-RTU Low Power Autonomous Controller Functions	GS 34P02Q02-01E
FCN-RTU Low Power Autonomous Controller Hardware	GS 34P02Q13-01E
FAST/TOOLS	GS 50A01A10-01EN

■ RESTRICTIONS AND PRECAUTIONS ON INSTALLATION

- When you install these I/O modules, ensure that the total required power does not exceed the rated output of the power supply module used.
- For further restrictions and precautions for module installation, see "FCN/FCJ Installation Guide" (TI 34P02Q91-01E).

■ ORDERING INFORMATION

Specify the model and suffix codes.

■ TRADEMARKS ACKNOWLEDGMENTS

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