General Specifications

Modbus Communication Portfolio

STARDOM APPF

GS 34P02P21-01E

■ GENERAL

This describes Modbus Communication Portfolio for STARDOM. Modbus Communication Portfolio easily allows FCN/FCJ to be Modbus-capable through serial or Ethernet communications.

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-100” refers to the autonomous controllers with NFCP100 CPU module.
- The term “FCN-RTU” refers to the low power autonomous controllers with NFCP050 CPU module.
- The term “FCJ” refers to the all-in-one type autonomous controllers.

■ FUNCTION SPECIFICATIONS

● Modbus Communication Portfolio

Modbus Communication Portfolio is a POU that enables FCN/FCJ autonomous controllers and Modbus communications protocol support devices to easily acquire and set data from and to each other through serial or Ethernet communications. The following communication modes and types are supported:

Communication type	Communication mode	Communication function
Serial	ASCII mode	Master / Slave
	RTU mode	Master / Slave
Ethernet	Modbus / TCP	Client / Server

● Connection with CENTUM CS 3000 using Modbus Communications

FCN/FCJ connects with CENTUM CS 3000 Field Control Station (hereinafter referred to as FCS) using Modbus Communication Portfolio. The dual redundant connection is enabled.

Communication type of FCS or FCN/FCJ

Communication type (Communication mode)	Communication function	
	FCS	FCN/FCJ
Serial (RTU mode)	Master	Slave
Ethernet (Modbus/TCP)	Client	Server

FCS requires the Communication Package below.

Communication Package of FCS

Commucnication type (Communication mode)	Communication Package of FCS
Serial (RTU mode)	Model LFS9153 “Modbus Communication Package (for ALR111, ALR121)” (*1)
Ethernet (Modbus/TCP)	Model LFS2453 “Modbus Communication Package (for ALE111)” (*2) (*3)

*1: For details, see GS 33Q03L40-33E.
*2: For details, see GS 33Q03L40-34E.
*3: To connect FCS with FCN that has duplexed CPU, CENTUM CS 3000 R3.08 or later is necessary.

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■ ACCESSIBLE RANGE

Each device can be accessed in its suited range.

● Accessible Device Ranges as Master or Client

If the FCN/FCJ operates as master or client, its accessible device ranges are:

Device	Data Type	Read/Write	Reference No.
Coil	Bit	Read/Write	000001 to 065536
Discrete Input	Bit	Read only	100001 to 165536
Input Register	Word	Read only	300001 to 365536
Holding Register	Word Long Float	Read/Write	400001 to 465536
Exception status	Bit	Read only	1 to 8

● Accessible Device Ranges as Slave or Server

If the FCN/FCJ operates as slave or server, its accessible device ranges from the master device or the client are:

Device		Data Type	Read/Write	Reference No.
Coil		Bit	Read/Write	00001 to 09999
Discrete Input		Bit	Read only	10001 to 19999
Input Register		Word	Read only	30001 to 39999
Holding Register	Standard	Word	Read/Write	40001 to 49999
	for 32bit	Word Long Float	Read/Write	40001 to 44999 45001 to 46999 47001 to 48999
Exception status		Bit	Read only	1 to 8

■ NUMBER OF ACCESSIBLE DATA SETS

The number of data sets accessible in one communication period is:

Function	Function code (Hex)	Data Type	Number of points in one communication period		
			ASCII mode Master/Slave	RTU mode Master/Slave	Modbus/TCP Client/Server
Read Coil	1 (0x01)	Bit	976 points	2000 points	2000 points
Read Discrete Input	2 (0x02)	Bit	976 points	2000 points	2000 points
Read Holding Register	3 (0x03)	Word	61 points	125 points	125 points
		Long (*4) Float (*4)	30 points	62 points	62 points
Read Input Register	4 (0x04)	Word	61 points	125 points	125 points
Write Single Coil (*3)	5 (0x05)	Bit	1 point	1 point	1 point
Write Single Register (*3)	6 (0x06)	Word	1 point	1 point	1 point
		Long (*4) Float (*4)	1 point	1 point	1 point
Read Exception status	7 (0x07)	Bit	8 points	8 points	8 points
Loop-back check (*1)	8 (0x08)	Word	1 point	1 point	1 point
Write Multiple Coils (*3)	15 (0x0F)	Bit	800 points	800 points	800 points
Write Multiple Registers (*3)	16 (0x10)	Word	59 points	100 points	100 points
		Long (*4) Float (*4)	29 points	50 points	50 points
Read Device Identification	43 (0x2B)	ASCII string	(*2)		

*1: The diagnostic code when a command is received is 0 (zero).
*2: Only basic device ID numbers, such as vender names, product codes, and revision numbers, are applicable.
*3: These function codes support broadcast communications. If the station parameter for each POU is set to 0 (zero), broadcast communications are executed. Broadcast communications are not supported in Ethernet.
*4: These function can be used only when Modbus communication protocol support devices is supporting the communication for 32 bit access.

■ LIST OF POU FUNCTIONS

● ASCII Mode Master

Tabel Communication task creation POU

POU	Function code (Hex)	Data Type	Function
SD_CMDBSM_AM_OPEN	–	–	ASCII mode master communication task creation

Tabel Reading and Writing POU

POU	Function code (Hex)	Data Type	Function
SD_CMDBSM_AM_BRD	1 (0x01)	Bit	Coil Input Reading
SD_CMDBSM_AM_BRD	2 (0x02)	Bit	Discrete Input Reading
SD_CMDBSM_AM_WRD	3 (0x03)	Word	Holding Register Reading
SD_CMDBSM_AM_I32RD		Long	
SD_CMDBSM_AM_F32RD		Float	
SD_CMDBSM_AM_WRD	4 (0x04)	Word	Input Register Reading
SD_CMDBSM_AM_BWRS	5 (0x05)	Bit	One Bit Coil Writing
SD_CMDBSM_AM_WWRS	6 (0x06)	Word	One Word Holding Register Writing
SD_CMDBSM_AM_I32WRS		Long	
SD_CMDBSM_AM_F32WRS		Float	
SD_CMDBSM_AM_REB	7 (0x07)	Bit	Exception Status Reading
SD_CMDBSM_AM_LPBK	8 (0x08)	Word	Loop-back Check
SD_CMDBSM_AM_BWR	15 (0x0F)	Bit	Coil Writing
SD_CMDBSM_AM_WWR	16 (0x10)	Word	Holding Register Writing
SD_CMDBSM_AM_I32WR		Long	
SD_CMDBSM_AM_F32WR		Float	
SD_CMDBSM_AM_DID	43 (0x2B)	ASCII string	Device ID Reading

● ASCII Mode Slave

Tabel Open POU for 16Bits Data Access

POU	Function code (Hex)	Data Type	Function
SD_CMDBSM_AS_OPEN	1 (0x01)	Bit	Coil Input Reading
	2 (0x02)	Bit	Discrete Input Reading
	3 (0x03)	Word	Holding Register Reading
	4 (0x04)	Word	Input Register Reading
	5 (0x05)	Bit	One Bit Coil Writing
	6 (0x06)	Word	One Word Holding Register Writing
	7 (0x07)	Bit	Exception Status Reading
	8 (0x08)	Word	Loop-back Check
	15 (0x0F)	Bit	Coil Writing
	16 (0x10)	Word	Holding Register Writing
	43 (0x2B)	ASCII string	Device ID Reading

Tabel Open POU for 32Bits Data Access

POU	Function code (Hex)	Data Type	Function
SD_CMDBSM_AS32_OPEN	1 (0x01)	Bit	Coil Input Reading
	2 (0x02)	Bit	Discrete Input Reading
	3 (0x03)	Word	Holding Register Reading
		Long	
		Float	
	4 (0x04)	Word	Input Register Reading
	5 (0x05)	Bit	One Bit Coil Writing
	6 (0x06)	Word	One Word Holding Register Writing
		Long	
		Float	
	7 (0x07)	Bit	Exception Status Reading
	8 (0x08)	Word	Loop-back Check
	15 (0x0F)	Bit	Coil Writing
	16 (0x10)	Word	Holding Register Writing
	43 (0x2B)	ASCII string	Device ID Reading

● RTU Mode Master

Table Open POU for Data Access

POU	Function code (Hex)	Data Type	Function
SD_CMDBSM_BM_OPEN	–	–	RTU mode master communication task creation

Table Read/Write POU

POU	Function code	Data Type	Function
SD_CMDBSM_BM_BRD	1 (0x01)	Bit	Coil Input Reading
SD_CMDBSM_BM_BRD	2 (0x02)	Bit	Discrete Input Reading
SD_CMDBSM_BM_WRD	3 (0x03)	Word	Holding Register Reading
SD_CMDBSM_BM_I32RD		Long	
SD_CMDBSM_BM_F32RD		Float	
SD_CMDBSM_BM_WRD	4 (0x04)	Word	Input Register Reading
SD_CMDBSM_BM_BWRS	5 (0x05)	Bit	One Bit Coil Writing
SD_CMDBSM_BM_WWRS	6 (0x06)	Word	One Word Holding Register Writing
SD_CMDBSM_BM_I32WRS		Long	
SD_CMDBSM_BM_F32WRS		Float	
SD_CMDBSM_BM_REB	7 (0x07)	Bit	Exception Status Reading
SD_CMDBSM_BM_LPBK	8 (0x08)	Word	Loop-back Check
SD_CMDBSM_BM_BWR	15 (0x0F)	Bit	Coil Writing
SD_CMDBSM_BM_WWR	16 (0x10)	Word	Holding Register Writing
SD_CMDBSM_BM_I32WR		Long	
SD_CMDBSM_BM_F32WR		Float	
SD_CMDBSM_BM_DID	43 (0x2B)	ASCII string	Device ID Reading

● RTU Mode Slave

Table Open POU for 16-bit Data Access

POU	Function code (Hex)	Data Type	Function
SD_CMDBSM_BS_OPEN	1 (0x01)	Bit	Coil Input Reading
	2 (0x02)	Bit	Discrete Input Reading
	3 (0x03)	Word	Holding Register Reading
	4 (0x04)	Word	Input Register Reading
	5 (0x05)	Bit	One Bit Coil Writing
	6 (0x06)	Word	One Word Holding Register Writing
	7 (0x07)	Bit	Exception Status Reading
	8 (0x08)	Word	Loop-back Check
	15 (0x0F)	Bit	Coil Writing
	16 (0x10)	Word	Holding Register Writing
	43 (0x2B)	ASCII string	Device ID Reading

Table Open POU for 32-bit Data Access

POU	Function code (Hex)	Data Type	Function
SD_CMDBSM_BS32_OPEN	1 (0x01)	Bit	Coil Input Reading
	2 (0x02)	Bit	Discrete Input Reading
	3 (0x03)	Word	Holding Register Reading
		Long	
		Float	
	4 (0x04)	Word	Input Register Reading
	5 (0x05)	Bit	One Bit Coil Writing
	6 (0x06)	Word	One Word Holding Register Writing
		Long	
		Float	
	7 (0x07)	Bit	Exception Status Reading
	8 (0x08)	Word	Loop-back Check
	15 (0x0F)	Bit	Coil Writing
	16 (0x10)	Word	Holding Register Writing
	43 (0x2B)	ASCII string	Device ID Reading

● Modbus/TCP Client

Table Open POU for Data Access

POU	Function code (Hex)	Data Type	Function
SD_CMDBSE_BC_OPEN	–	–	Modbus/TCP client communication task creation

Table Read/Write POU

POU	Function code	Data Type	Function
SD_CMDBSE_BC_BRD	1 (0x01)	Bit	Coil Input Reading
SD_CMDBSE_BC_BRD	2 (0x02)	Bit	Discrete Input Reading
SD_CMDBSE_BC_WRD	3 (0x03)	Word	Holding Register Reading
SD_CMDBSE_BC_I32RD		Long	
SD_CMDBSE_BC_F32RD		Float	
SD_CMDBSE_BC_WRD	4 (0x04)	Word	Input Register Reading
SD_CMDBSE_BC_BWRS	5 (0x05)	Bit	One Bit Coil Writing
SD_CMDBSE_BC_WWRS	6 (0x06)	Word	One Word Holding Register Writing
SD_CMDBSE_BC_I32WRS		Long	
SD_CMDBSE_BC_F32WRS		Float	
SD_CMDBSE_BC_REB	7 (0x07)	Bit	Exception Status Reading
SD_CMDBSE_BC_LPBK	8 (0x08)	Word	Loop-back Check
SD_CMDBSE_BC_BWR	15 (0x0F)	Bit	Coil Writing
SD_CMDBSE_BC_WWR	16 (0x10)	Word	Holding Register Writing
SD_CMDBSE_BC_I32WR		Long	
SD_CMDBSE_BC_F32WR		Float	
SD_CMDBSE_BC_DID	43 (0x2B)	ASCII string	Device ID Reading

● Modbus/TCP Server

Table Open POU for 16-bit Data Access

POU	Function code (Hex)	Data Type	Function
SD_CMDBSE_BS_OPEN	1 (0x01)	Bit	Coil Input Reading
	2 (0x02)	Bit	Discrete Input Reading
	3 (0x03)	Word	Holding Register Reading
	4 (0x04)	Word	Input Register Reading
	5 (0x05)	Bit	One Bit Coil Writing
	6 (0x06)	Word	One Word Holding Register Writing
	7 (0x07)	Bit	Exception Status Reading
	8 (0x08)	Word	Loop-back Check
	15 (0x0F)	Bit	Coil Writing
	16 (0x10)	Word	Holding Register Writing
	43 (0x2B)	ASCII string	Device ID Reading

Table Open POU for 32-bit Data Access

POU	Function code (Hex)	Data Type	Function
SD_CMDBSE_BS32_OPEN	1 (0x01)	Bit	Coil Input Reading
	2 (0x02)	Bit	Discrete Input Reading
	3 (0x03)	Word	Holding Register Reading
		Long	
		Float	
	4 (0x04)	Word	Input Register Reading
	5 (0x05)	Bit	One Bit Coil Writing
	6 (0x06)	Word	One Word Holding Register Writing
		Long	
		Float	
	7 (0x07)	Bit	Exception Status Reading
	8 (0x08)	Word	Loop-back Check
	15 (0x0F)	Bit	Coil Writing
	16 (0x10)	Word	Holding Register Writing
	43 (0x2B)	ASCII string	Device ID Reading

■ OPERATING ENVIRONMENT

● Hardware (FCN-500, FCN-100 and FCN-RTU)

Means of Communication		Module
Serial	RS-232-C	CPU module (*1) (NFCP501, NFCP502 and NFCP100: 1 port, NFCP050: 3 ports) RS-232-C communication module (*2) (*3) (*6) (NFLR111, 2 ports/module)
	RS-422/ RS-485	CPU module (NFCP050: 1 port) RS-422/RS-485 communication module (*2) (*3) (*5) (*6) (NFLR121, 2 ports/module)
Ethernet	Client	CPU module (NFCP501, NFCP502, NFCP100 and NFCP050, 32 channels maximum) (*4)
	Server	CPU module (NFCP501, NFCP502, NFCP100 and NFCP050, 4 clients maximum)

*1: If the CPU module (Model: NFCP501, NFCP502 and NFCP100) is duplexed, the serial port of the module cannot be used.
*2: The modules allow the CPU module to be duplexed.
*3: Up to eight RS-232-C and RS-422/RS-485 communication modules can be mounted on each FCN (Except FCN-RTU).
*4: Total number of the following POUs shall be up to 32 in FCN/FCJ since each POU occupies one channel.
- SD_FCXPE_OPEN (Ethernet Communication Function Block)
- SD_CMELSECE_OPEN and SD_CMELSECE_3E_OPEN (POU of MELSEC Communication Portfolio)
- SD_CFAM3E_OPEN (POU of FA-M3 Communication Portfolio)
- SD_CMDBSE_BC_OPEN (POU of Modbus Communication Portfolio)
*5: Up to 31 devices per serial port can be connected.
*6: FCN-RTU (Model: NFCP050) does not support RS-232-C and RS-422/RS-485 communication module.

● Hardware (FCJ)

Means of Communication		FCJ
Serial (RS-232-C)		Two ports
Ethernet	Client	Up to 32 channels (*1)
	Server	Up to 4 clients

*1: Total number of the following POUs shall be up to 32 in FCN/FCJ since each POU occupies one channel.
- SD_FCXPE_OPEN (Ethernet Communication Function Block)
- SD_CMELSECE_OPEN and SD_CMELSECE_3E_OPEN (POU of MELSEC Communication Portfolio)
- SD_CFAM3E_OPEN (POU of FA-M3 Communication Portfolio)
- SD_CMDBSE_BC_OPEN (POU of Modbus Communication Portfolio)

■ SOFTWARE DISTRIBUTION

● Modbus Communication Portfolio License

Autonomous Controller FCN-500
For FCN-500, the licenses are bundled with CPU module (Model: NFCP501/NFCP502).

Autonomous Controller FCN-100 and FCJ
Modbus Communication Portfolio License includes an order sheet with an order ID and password on it. After purchasing the product, access Yokogawa's Web site and enter your order ID and password to obtain your license ID.

Register the issued license ID in the FCN/FCJ system card to enable you to use Modbus Communication Portfolio.

Low Power Autonomous Controller FCN-RTU
For FCN-RTU, the licenses are bundled with CPU module (Model: NFCP050).

■ MODEL AND SUFFIX CODES (FOR FCN-100 and FCJ)

Note: Licenses for FCN-500 and FCN-RTU are bundled with CPU module.

		Description
Model	NT8035J	Modbus Communication Portfolio
Suffix Codes	-L	License
	W	Issued online via the Internet
	1	Always 1
	1	Always 1
	A	Standard

■ ORDERING INFORMATION

Specify the model and suffix codes when ordering.

For the type of software media supplied, refer to the separate GS, “Application Portfolios” (publication number GS 34P02P20-01E).

■ TRADEMARKS

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