

General Specifications

Model CFS9153
 Modbus Communication
 Package (for ALR111, ALR121)



GS 32S05E10-21E

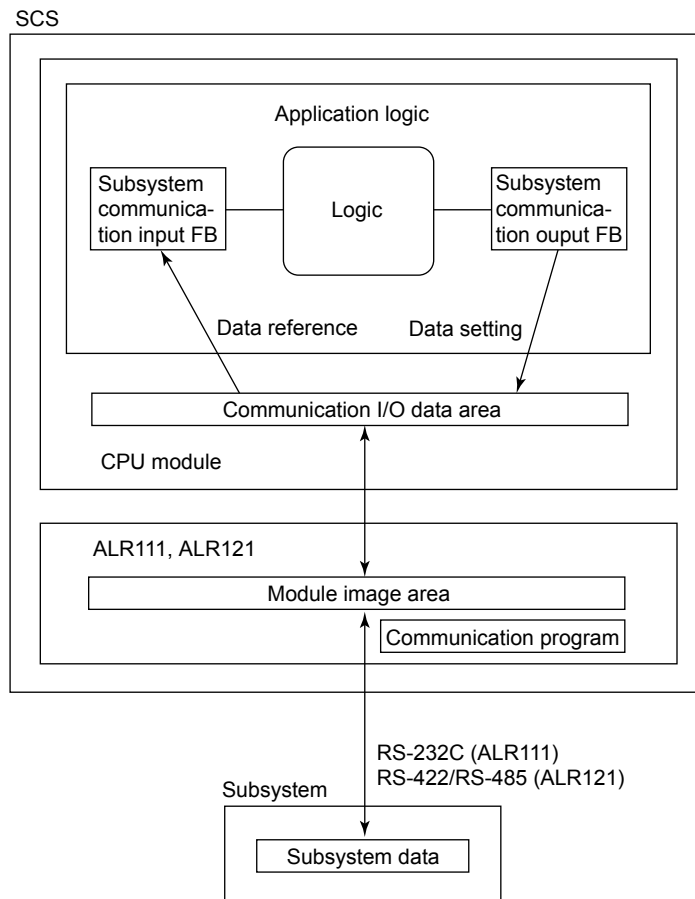
■ GENERAL

This GS provides the general specifications of Modbus communication package through which a safety control station (SCS) communicates with subsystems. An SCS can communicate with subsystems, such as sequencers, with the Modbus protocol via an interference-free serial communication module (ALR111, ALR121) that is installed in a safety control unit or safety node unit. This package allows application logic of SCS to read and write data in a subsystem. The Subsystem communication function is interference-free.

■ SUBSYSTEM COMMUNICATION (FOR ALR111, ALR121) SPECIFICATIONS

● Communications with Application Logic

Subsystem data are stored in a communication I/O data area in the SCS via the ALR111 or ALR121 module image area. Subsystem data in the communication I/O data area can be used in application logic via a subsystem communication input function block (FB) and a subsystem communication output FB. These FBs are interference-free function blocks for communicating with a subsystem.



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Figure Communication Data Flow

■ ALR111, ALR121 SERIAL COMMUNICATION MODULES SPECIFICATIONS

Subsystems are connected via an ALR111 or ALR121 serial communication module.

Total number of ALR111 and ALR121 modules:

Maximum of four modules/SCS: up to two pairs (two modules per set) possible for dual-redundant use.

Number of data items that can be communicated:

Maximum of 1000 words (*1)/ALR111 or ALR121

Number of subsystems that can be communicated:

Maximum of 30 subsystems per port

Communication interfaces:

ALR111: Two RS-232C ports with D-sub 9 pins

ALR121: Ten-pole terminal block for RS-422/RS-485 ports, (five poles per port)

*1: Restrictions per SCS:

Number of communications data items: 500

Connection method:

RS-232C: Point-to-point modem connection possible

RS-422/RS-485: Point-to-point/Multipoint

Synchronization method:

Start-stop synchronization

Transmission speed:

1200, 2400, 4800, 9600, 19200, or 38400 bps.

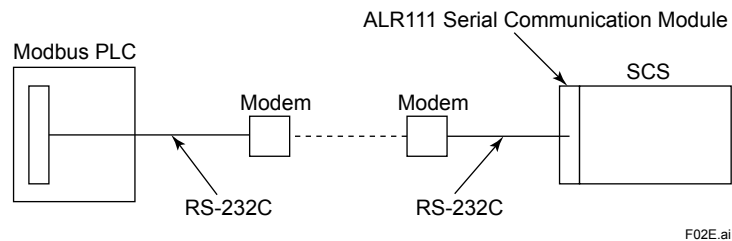


Figure Example of Modbus PLC Connections

●Relations with Modbus Slave Connection

The SCS provides Modbus slave communication function (*1), allowing communication with a Modbus master device connected via the ALR111 or ALR121 Serial Communication Module. Modbus slave communication enables the use of a maximum of two ALR111/ALR121 modules per SCS.

If the Modbus communication package is used, the SCS communicates with a subsystem as a Modbus master device, allowing the connection of up to four ALR111 and ALR121 modules, separately from Modbus slave communication.

However, both the Modbus communication package and Modbus slave communication cannot be shared within an ALR111 or ALR121 in operation. A dedicated use of the ALR111 or ALR121 is needed for each communication.

The ALR111 and ALR121 modules used for the Modbus communication package and Modbus slave communication have the same hardware and model names.

*1: This function is included in CFS1300/CFS1100 safety control functions package. For more details, see "ProSafe-RS Safety Instrumented System Overview" (GS 32R01B10-21E, GS 32S01B10-21E).

■ MODBUS COMMUNICATION PACKAGE SPECIFICATIONS

Connected device:

Serial Communication Module

How to connect:

Connected to the communication port of an ALR111 or ALR121 module

Protocol:

Modbus protocol (RTU mode)

Transferable internal data:

Bit devices: Coils, input relays

Word devices: Input registers, holding registers

Specific coils

Communication status

Data transferable in one communication:

Bit devices: 125 words

Word devices: 125 words

■ REDUNDANCY

Overview of Redundancy Features:

Where the connected subsystem is capable of making the serial communication redundant, the subsystem communication can be made redundant by using a pair of ALR modules. Although each ALR111 and ALR121 module has two ports, communication redundancy requires two modules.

Redundant communications with two subsystems can be performed with a pair of ALR111s or ALR121s using all of their ports. In this case, however, upon a communication failure, both lines always switch regardless of whether one of the lines has a problem. This is because the system switches between the in-service and stand-by modules, rather than between ports.

Data reading:

A pair of ALR111 or ALR121 modules always accesses read data asynchronously from a subsystem in redundant communication. Data in the in-service ALR111 or ALR121 are sent to the SCS communication input data area while the stand-by module (ALR111 or ALR121) accesses the read data from a subsystem but does not send the data to the communication input data area. If a failure in the in-service ALR111 or ALR121 module or a failure in communication with a subsystem is detected, the communication right will be switched over to stand-by module.

Data writing:

Data from the subsystem communication output FB in application logic is sent to the in-service ALR111 or ALR121 module via the communication output data area. The written data is then output to the subsystem from the module in-service. If a failure in the in-service ALR111 or ALR121 module or a failure in communication with subsystem is detected, the communication right is switched over to place the stand-by module in service and then the written data in the new in-service module is output.

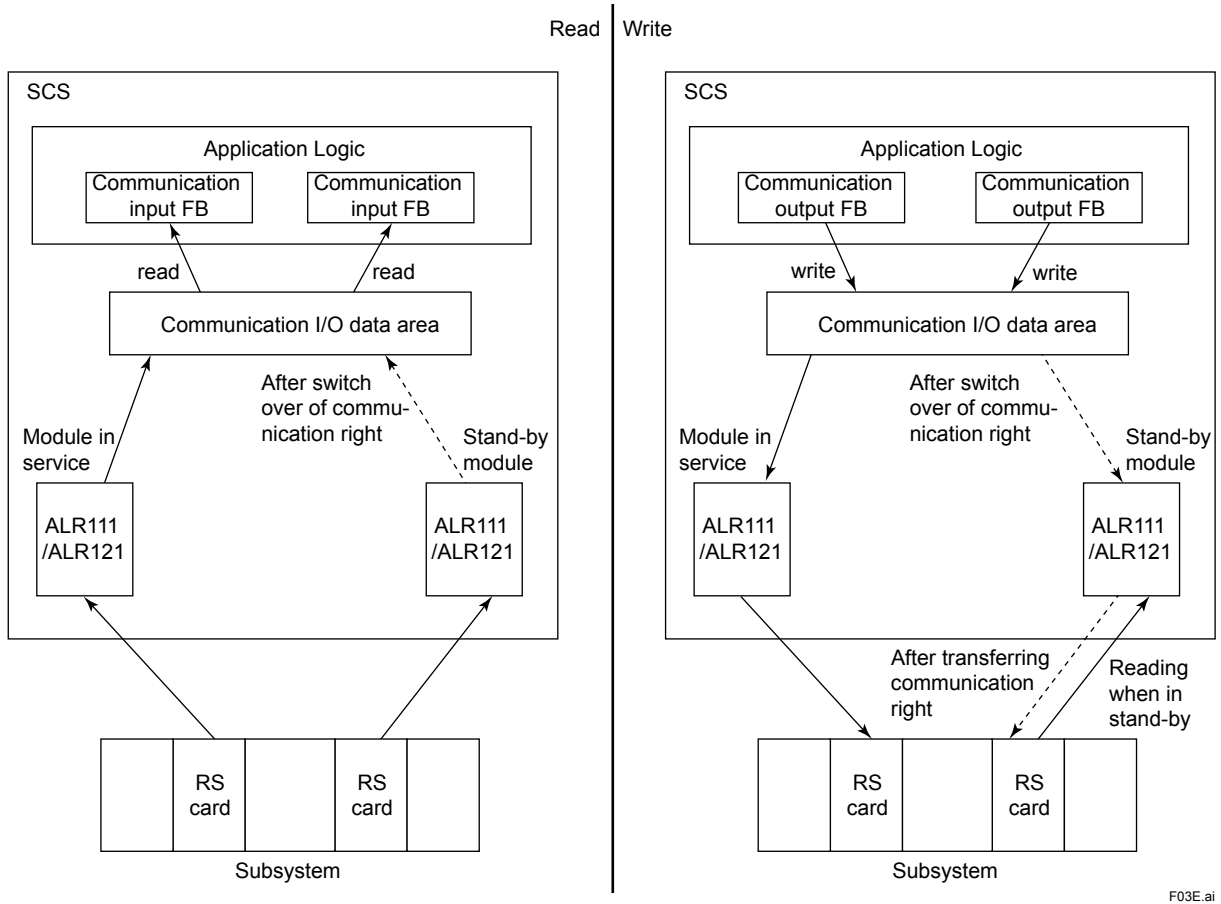


Figure ALR111/ALR121 Redundancy

●Hardware Configuration

Redundant communications can be configured by installing a pair of modules in the contiguous odd- and even-numbered slots within a safety control unit or safety node unit, as shown below.

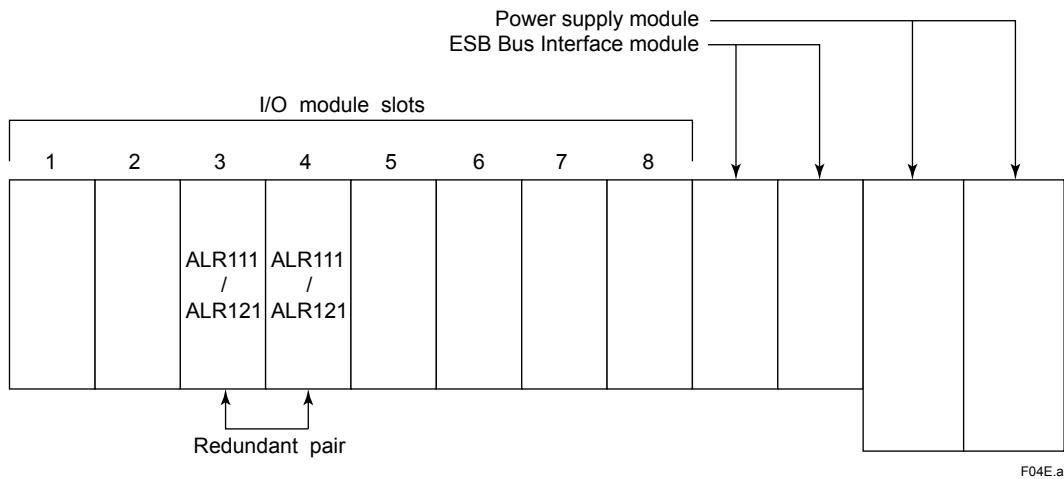


Figure Hardware Configuration (Example of Safety Node Unit)

■ OPERATING ENVIRONMENT

●Hardware Requirements

SSC60S, SSC60D, SSC50S, SSC50D, SSC10S, SSC10D

●Software Requirements

CFS1300 Safety Control Functions Package or CFS1100 Safety Control Functions Package (*1)

*1: Supported by CFS1100, R1.01.30 or later.

●Engineering Requirements

CHS5100 Safety System Generation and Maintenance Package (*1)

*1: Supported by CHS5100, R1.01.30 or later.

If this package is used in a system that integrates CS 3000 and ProSafe-RS, CS 3000 R3.07 or later is needed.

■ MODELS AND SUFFIX CODES

Modbus Communication Package (for ALR111, ALR121) (Basic software license)

		Description
Model	CFS9153	Modbus Communication Package (for ALR111, ALR121) [Media model: CHSKM02-V11]
Suffix Codes	-V	Software license
	1V	For single
	2V	For dual-redundant
	1	English version

■ ORDERING INFORMATION

Specify the model and suffix codes.

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