General Specifications

GS 32P01B10-01EN

ProSafe-RS
Safety Instrumented System Overview
(for Vnet/IP)

■ GENERAL

ProSafe-RS is a safety instrumented system, to meet safety integrity level 3 (SIL3) specified by the IEC 61508 functional safety of electrical/electronic/programmable electronic safety-related systems by TÜV Rheinland, an external certification organization.

This document describes the system configuration, network specifications, and system requirements of the safety instrumentation system ProSafe-RS.

When integrated with CI Server instead of CENTUM, refer to the GS "Safety Instrumented System Overview (for Vnet/IP-Upstream)" (GS 32P01B30-01EN).

■ COMPONENTS

The ProSafe-RS system consists of a safety control station (SCS), an automation design server (AD Server), a safety engineering station (SENG), and network devices that communicate with each of the equipment.

The AD Server and the SENG are collectively called as automation design suite (AD Suite) and the AD Suite is used for engineering of the ProSafe-RS and provides an engineering environment for configuring and maintaining overall control systems, including plant instrumentation, safety instrumentation, and maintenance management.

● Safety Control Station (SCS)

SCS software offers safety control functions, sequence of events recorder (SOER) function, CENTUM VP integration function, and communication function which interfaces the SCS with other systems. The SCS hardware consists of a safety control unit and, N-IO nodes, N-IO field enclosure, and safety node units connected to a safety control unit.
The safety control unit connects to N-IO nodes via N-ESB or Optical ESB bus, or N-IO field enclosure via Optical ESB bus, or safety node units via ESB or Optical ESB bus.
An N-IO node consists of a node interface unit and N-IO I/O units. An N-IO I/O unit consists of a base plate and I/O modules. AI/AO/DI/DO functions can be set to the universal type I/O modules by the software configuration for each individual channel.
N-IO field enclosure is the remote enclosure equipped with N-IO node.
FIO I/O modules to be mounted on the safety control unit and the safety node unit are equipped with AI/AO/DI/DO/ communication functions by the module.

Safety control unit

S2SC70S Safety Control Unit (for N-IO/FIO, Rack Mountable Type)
S2SC70D Duplexed Safety Control Unit (for N-IO/FIO, Rack Mountable Type)
SSC60S Safety Control Unit (for FIO, Rack Mountable Type)
SSC60D Duplexed Safety Control Unit (for FIO, Rack Mountable Type)
SSC50S Safety Control Unit (for FIO, Rack Mountable Type)
SSC50D Duplexed Safety Control Unit (for FIO, Rack Mountable Type)

Software

RS4F1500 Safety Control Function (for S2SC70☐)
RS4F1505 Safety Control Function for SCS Simulator (for S2SC70☐)
RS4F1300 Safety Control Function (for SSC60☐)
RS4F1305 Safety Control Function for SCS Simulator (for SSC60☐)
RS4F1100 Safety Control Function (for SSC50☐)
RS4F1105 Safety Control Function for SCS Simulator (for SSC50☐)

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● Automation Design Server (AD Server)

AD Server manages engineering data such as RS project in the AD Suite using an automation design master database (ADMDB). Multiple RS projects can be managed in a single AD Server.

In the AD Server, work information can be shared among multiple users by centralizing management of the entire plant engineering information. The users can obtain design information corresponding to an actual system, which enables effective operation when maintaining or modifying the system.

Software: RS4E5000 Engineering Server Function

ProSafe-RS engineering information is managed as SCS projects for each SCS, and multiple SCS projects are managed together as an RS project. The engineering information in a plant can be put together into one RS project or divided into multiple RS projects, and the RS projects are managed in an AD project on the AD server.

An SCS project belongs to only one RS project, and an RS project belongs to only one AD project.

An RS project can consist of SCS projects for ProSafe-RS SCS certified up to SIL 3 as well as SCS projects for ProSafe-RS Lite SCS certified up to SIL 2.

An AD project requires one Project ID license.

Software: RS4CPJT Project ID License

● Safety Engineering Station (SENG)

SENG is a station to perform engineering and maintenance of the ProSafe-RS. The SENG consists of automation design organizer (AD Organizer), SCS manager, and other optional functions. The SENG and the AD Server can be installed in a single computer.

Software: RS4E5100 Safety System Engineering and Maintenance Function

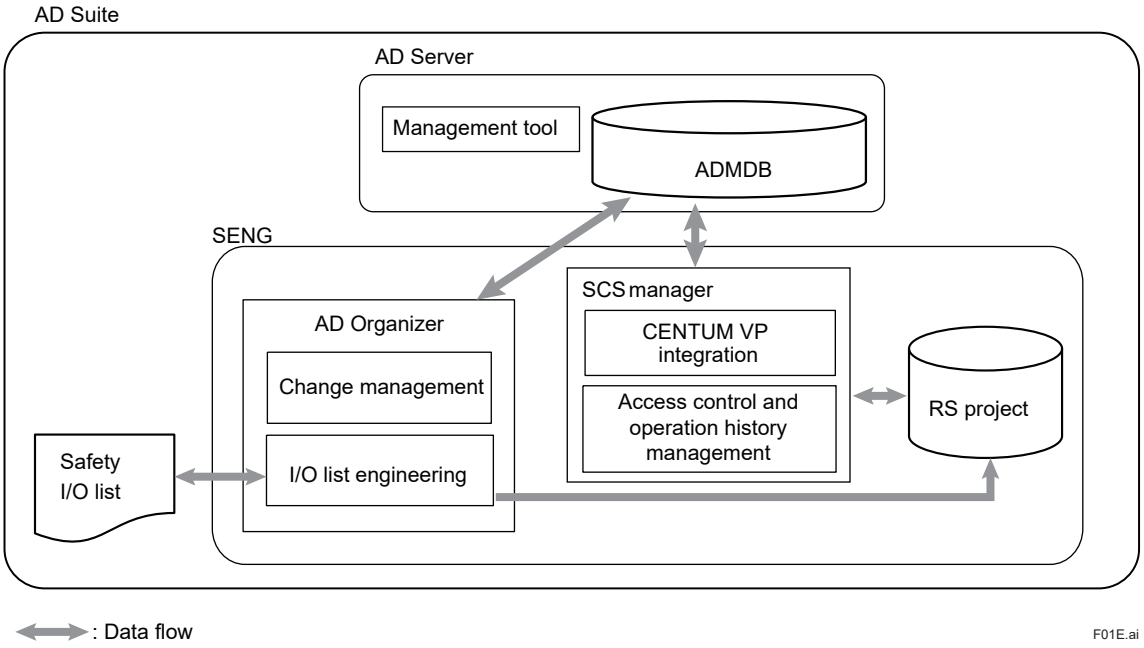


Figure Software configuration diagram

Automation design organizer (AD Organizer)

AD Organizer provides an interface to each tool for engineering and maintenance of the ProSafe-RS. The information on change histories of project data stored in the ADMDB can also be displayed.

SCS manager

SCS manager contains a basic function to configure and manage the ProSafe-RS, including project data creation, SCS application building, system test, and project data building/loading.
Functions necessary for maintenance support, such as displaying the SCS operating conditions and diagnostics information, are contained as well.

I/O list engineering
I/O list engineering is an optional function to create and manage a safety I/O list of I/O modules on the AD Suite. This engineering software manages the safety I/O list through the same interface as CENTUM VP's process I/O list.

By using the safety I/O list and Field Commissioning Support Package (*1) on-site field device connection tests and building applications can be performed simultaneously, which improves efficiency of engineering and reduces work hours.

Software: RS4E5210 I/O List Engineering Package

*1: Field Commissioning Support Package is software for automatic loop (input/output) inspection.

Change management
Change management is an optional function of the AD Suite to manage changes in engineering in document formats. Operational errors such as omission of application changes can be prevented by keeping the records of planning, execution, and testing of changes.

Software: RS4E5250 Change Management Package

CENTUM VP integration
CENTUM VP integration is an optional function of the SCS manager to define tag names for retrieving SCS data from the CENTUM VP station and define alarm information to notify the CENTUM VP.

Software: RS4E5600 CENTUM VP Integration Package

CENTUM VP R6.02 or later is required for integrating with CENTUM VP R6 system.

Access control and operation history management
Access control and operation history management are optional functions of the SCS manager to define an engineer's authority for operating an engineering station and recording its operation histories.

Software: RS4E5170 Access Control and Operation History Management Package

● Project I/O license

Project I/O license determines the number of logical I/Os that can be used in ProSafe-RS SCSs of an RS project. The number of logical I/Os is calculated from the number of input/output points defined in input/output modules and communication modules. For details on how to calculate the number of logical I/Os, refer to the GS "ProSafe-RS Project I/O License" (GS 32P03A10-01EN).

Software: RS4F3100 ProSafe-RS Project I/O license

The project I/O licenses for ProSafe-RS SCSs cannot be shared with those of the ProSafe-RS Lite SCSs. If ProSafe-RS Lite SCSs are included in the RS project, the ProSafe-RS Lite project I/O licenses are separately required.

● SOE viewer

SOE viewer is a standard function of the SENG to display events and diagnostics information acquired via the SOER function. The SOE viewer can also be used on a human interface station (HIS) of CENTUM VP or a computer connected to a control bus.

Software: RS4H2100 SOE Viewer Package

● Bypass Monitor (*1)

Bypass monitor is a function to display a list of information of override function blocks and variable where the field device input/output variables or internal variables are locked during field devices maintenance. SENG has the bypass monitor as a standard function. The bypass monitor can also be used on HIS of CENTUM VP R6.06 or later or a computer connected to a control bus.

Software: RS4H2300 Bypass Monitoring Package (*2)

*1: Called as Forced I/O Viewer by R4.10 or earlier.
*2: Called as Forced I/O Viewer Package by R4.10 or earlier.

● SOE OPC server

SOE OPC server is a server station to notify the events and diagnostics information acquired by the SOER function to OPC clients via the OPC interface. The SENG or a computer connected to the control bus can be used as an SOE OPC server.

Software: RS4H2200 SOE OPC Interface Package

● Network devices

Layer 2 switch (L2SW)
L2SWs with 1Gbps communication speed are required for the communications among devices connected to a Vnet/IP network. The Vnet/IP system area composed of the L2SWs is referred to as a Vnet/IP domain.

Layer 3 switch (L3SW)
L3SWs with 1Gbps communication speed are required for the communications between Vnet/IP domains.

For multiple-domain configuration, CENTUM VP engineering functions are required.

SNTP server
An SNTP server synchronizes time of devices connected to the Vnet/IP network to coordinated universal time (UTC).

Wide area communication router (WAC router)
A WAC router connects two Vnet/IP domains via a narrow-band wide area network (WAN), which enables bi-directional control data exchange between the remote Vnet/IP domains. A public network, a dedicated network, or a satellite communication can be used by the WAC router as a wide area network.

For engineering of the WAC router the CENTUM VP engineering function is required.

AW810D: Wide Area Communication Router

■ RELEVANT DOCUMENTS

For details about the SCS, SENG, and other related products, refer to the following General Specifications (GS).

Table ProSafe-RS models and the GS (1/2)

Items	Models	Scope	General Specifications
Safety Control Unit	S2SC70☐, SSC60☐, SSC50☐	(*1)	GS 32P06D10-01EN, GS 32Q06D10-31E, GS 32Q06D20-31E
Processor Module (for SSC60☐ and S2SC70☐), Processor Module Upgrade Kit (for SSC60☐ and S2SC70☐)	S2CP471, S2CP471KT	(*1)	GS 32P06D20-01EN
N-ESB Bus Coupler Modules	S2EN402, S2EN404	(*1)	GS 32P06E10-01EN
Node Interface Unit	S2NN30D	(*1)	GS 32P06F20-01EN
N-IO Base Plate, N-IO I/O Module	S2BN1D, S2BN4D, S2BN5D (*3) S2MMM843, S2MDV843	(*1)	GS 32P06F10-01EN, GS 32P06K10-01EN, GS 32P06K20-01EN, GS 32P06K30-01EN, GS 32P06K31-01EN, GS 32P06P10-01EN
N-IO field enclosure	S2NN70D,S2NN60D,S2CB60, A2CX100 (*4)	(*1)	GS 32P06Q10-01EN
Safety Node Unit	SNB10D	(*1)	GS 32Q06K10-31E
Dummy Cover	SDCV01	(*1)	GS 32Q06K10-31E
ESB Bus Coupler Module	SSB401	(*1)	GS 32Q06K10-31E
Unit for Optical Bus Repeater Module	SNT10D	(*1)	GS 32Q06K11-31E
FIO Analog I/O Modules	SAI143, SAV144, SAT145, SAR145, SAI533	(*1)	GS 32Q06J10-31E, GS 32P06K60-01EN, GS 32Q06K30-31E
FIO Digital I/O Modules	SDV144, SDV521, SDV526, SDV531, SDV53A, SDV541	(*1)	GS 32Q06J10-31E, GS 32P06K60-01EN, GS 32Q06K40-31E
Wiring Check Adapter for DI Module	SCB100, SCB110	(*2)	GS 32Q06K40-31E
Connector Cover for MIL cable	SCCC01, SCCC02	(*1)	GS 32Q06K30-31E, GS 32Q06K40-31E
Communication Module	ALR111, ALR121, ALE111	(*2)	GS 32P06K50-01EN, GS 32P06K51-01EN
Fire and Gas Communication Module	S2LP131	(*1)	GS 32P06K52-01EN
ESB Bus Coupler Module	SEC401, SEC402	(*1)	GS 32Q06L10-31E, GS 32Q06L11-31E
Optical ESB Bus Repeater Module	SNT401, SNT501, SNT411, SNT511	(*1)	GS 32Q06L15-31E, GS 32Q06L16-31E
Terminal Board (for N-IO)	A2BM4	(*1)	GS 32P06L20-01EN
Terminal Boards/Relay Boards	SEA4D, SED2D, SED3D, SED4D, SWD2D, SBA4D, S1BB4D, SBT4D, SBR4D, SBD2D, SBD3D, SBD4D, SRM53D, SRM54D, SBM54D	(*2)	GS 32Q06L20-31E
Cables	KS1, AKB331, AKB651, AKB652, AKB611, AKB131, AKB132, AKB135, AKB136, AKB161, AKB162, YCB301, S2KLF10, S2KPB10	(*2)	GS 32P06M10-01EN, GS 32Q06M10-31E

*1: These products are specified for ProSafe-RS, and cannot be used in ProSafe-RS Lite.
*2: These products can be used in ProSafe-RS and ProSafe-RS Lite in common.
*3: The system model for S2BN1D is S2ZN1D. The system model for S2BN4D is S2ZN4D. The system model for S2BN5D is S2ZN5D.
*4: The system model for S2NN70D is S2ZN70D. The system model for S2NN60D is S2ZN60D.

Table ProSafe-RS models and the GS (2/2)

Items	Models	Scope	General Specifications
Pressure Clamp Terminal Block	STB4S, STB4D, STA4S, STA4D	(*1)	GS 32Q06L30-31E
Power Supply Bus Unit	AEP7D, AEPV7D	(*2)	GS 33J60K40-01EN, GS 33J60K41-01EN
Safety Control Function, Safety Control Function for SCS Simulator	RS4F1100, RS4F1105, RS4F1300, RS4F1305, RS4F1500, RS4F1505	(*1)	GS 32P03B10-01EN, GS 32P03B20-01EN, GS 32P03B30-01EN
SOE Viewer Package	RS4H2100	(*2)	GS 32P02D10-01EN
SOE OPC Interface Package	RS4H2200	(*2)	GS 32P02D20-01EN
Bypass Monitoring Package	RS4H2300	(*2)	GS 32P02B20-01EN
Engineering Server Function, Safety System Engineering and Maintenance Function	RS4E5000, RS4E5100	(*2)	GS 32P04C10-01EN
I/O List Engineering Package	RS4E5210	(*2)	GS 32P04C20-01EN
Change Management Package	RS4E5250	(*2)	GS 32P04C30-01EN
CENTUM VP Integration Package	RS4E5600	(*2)	GS 32P04D10-01EN
Access Control and Operation History Management Package	RS4E5170	(*2)	GS 32P04D30-01EN
Project I/O License	RS4F3100	(*1)	GS 32P03A10-01EN
Electronic Instruction Manual	RS4C5400	(*2)	GS 32P01W10-01EN
Vnet/IP Interface card	VI702	(*2)	GS 33J50C10-01EN
Wide Area Communication Router	AW810D	(*2)	GS 33J50D20-01EN
IA System Products Virtualization Platform			GS 30A05B10-01EN
Vnet/IP Interface Package HY-V	RS4C3300	(*2)	GS 30A05B10-01EN
Vnet/IP Interface Package VM-W	RS4C3500	(*2)	GS 30A05B50-01EN
IT Security 3 software	RS2CITS	(*2)	GS 32P01C70-01EN

*1: These products are specified for ProSafe-RS, and cannot be used in ProSafe-RS Lite.
*2: These products can be used in ProSafe-RS and ProSafe-RS Lite in common.

■ RELEVANT SYSTEMS

● CENTUM VP

CENTUM VP is an integrated production control system used for monitoring and controlling plants in various industries such as oil refining, upstream, petrochemical and chemical, iron and steel, food, and power. For details of the CENTUM VP specifications, refer to the GS “Integrated Production Control System CENTUM VP System Overview” (GS 33J01A10-01EN).

● Plant resource manager (PRM)

PRM is a software package for managing field devices. An online and centralized automation asset management system, PRM helps both operators and maintenance personnel prevent downtime, and reduces maintenance cost.

PRM supports field devices with digital communication functions such as Foundation fieldbus devices, HART devices, and ISA100.11a field wireless devices as well as conventional analog devices with no digital communication function. For details of the PRM specifications, refer to the GS “Plant Resource Manager” (GS 30B05A10-01EN).

■ SYSTEM CONFIGURATION

SCSs and SENGs are connected to Vnet/IP via network equipment.
ProSafe-RS SCSs and ProSafe-RS Lite SCSs can be configured on the same Vnet/IP. When performing engineering of the ProSafe-RS SCSs and ProSafe-RS Lite SCSs, the AD server and the SENG can be used in common.

● Minimum system configuration

The minimum system configuration is composed of the following equipment:
SENG: 1 unit (including an AD Server)
SCS: 1 unit
L2SW: 2 units (one L2SW per bus and two switches for two buses are required.)

Note: The power supply must be wired in the way so that L2SWs of bus 1 and bus 2 are not down at the same time.

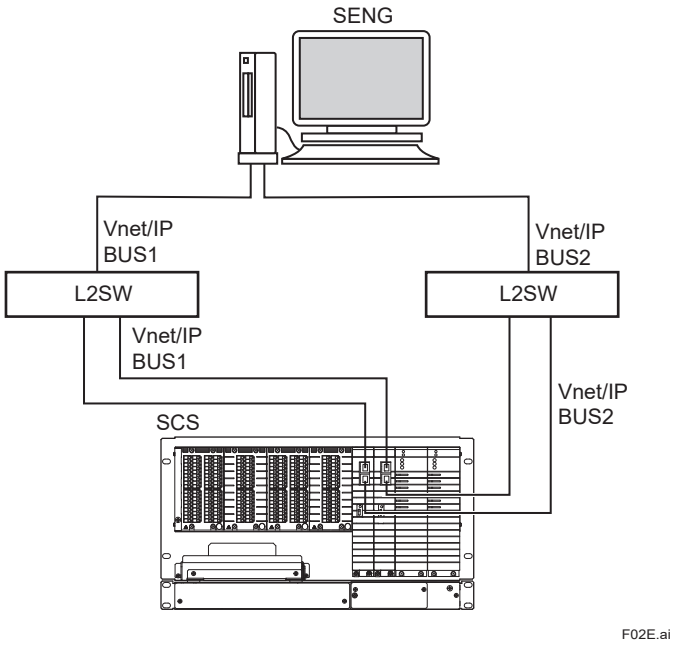


Figure Minimum system configuration

● Maximum system configuration

Vnet/IP domain: Maximum 16 domains (*1)
Vnet/IP station (*2): Maximum 64 stations per domain
Maximum 256 stations per system Vnet/IP

*1: For multiple-domain configuration, CENTUM VP engineering functions are required.
*2: Vnet/IP stations refer to components such as an SCS, an FCS, and a computer with Vnet/IP Interface Card (VI702).
When Vnet/IP stations of ProSafe-RS Lite are connected, the number of Vnet/IP stations includes the number of those.

For S2SC70☐ safety node unit:

Number of connectable devices: Max. 32 N-IO node units
Max. 108 N-IO I/O units
Max. 13 safety node units
Max. 110 FIO I/O modules
(Max. 55 pairs for dual-redundant configuration)
Max. 110 N-IO I/O units and FIO I/O modules (*1) (*2)

Note: As for the number of N-IO I/O node units and N-IO I/O units constituting the N-IO field enclosure,
Refer to “N-IO field enclosure” (GS 32P06Q10-01EN).
*1: In case of a single configuration, count the number of FIO I/O modules. In case of a dual-redundant configuration, count the number of pairs of FIO I/O modules.
*2: When 4 pairs of ESB bus coupler modules and N-ESB bus coupler modules are mounted on a safety control unit, the maximum 109 devices of N-IO I/O units and FIO I/O modules can be mounted on a SCS.

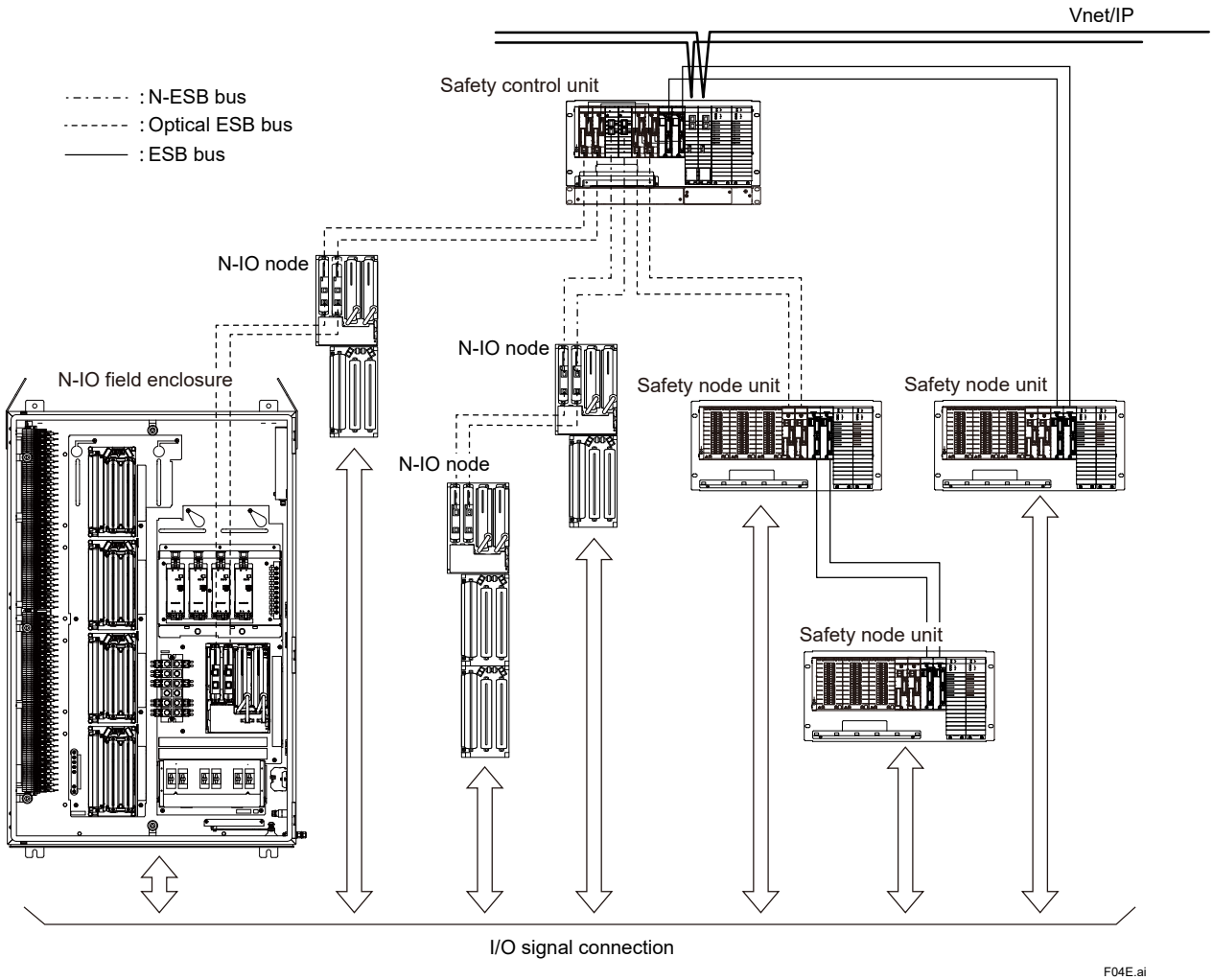


Figure System configuration for S2SC70☐

For SSC50☐ safety node unit:

Number of connectable devices: Max. 9 safety node units
Max. 78 FIO I/O modules
(Max. 39 pairs for dual-redundant configuration)

For SSC60☐ safety node unit:

Number of connectable devices: Max. 13 safety node units
Max. 110 FIO I/O modules
(Max. 55 pairs for dual-redundant configuration)

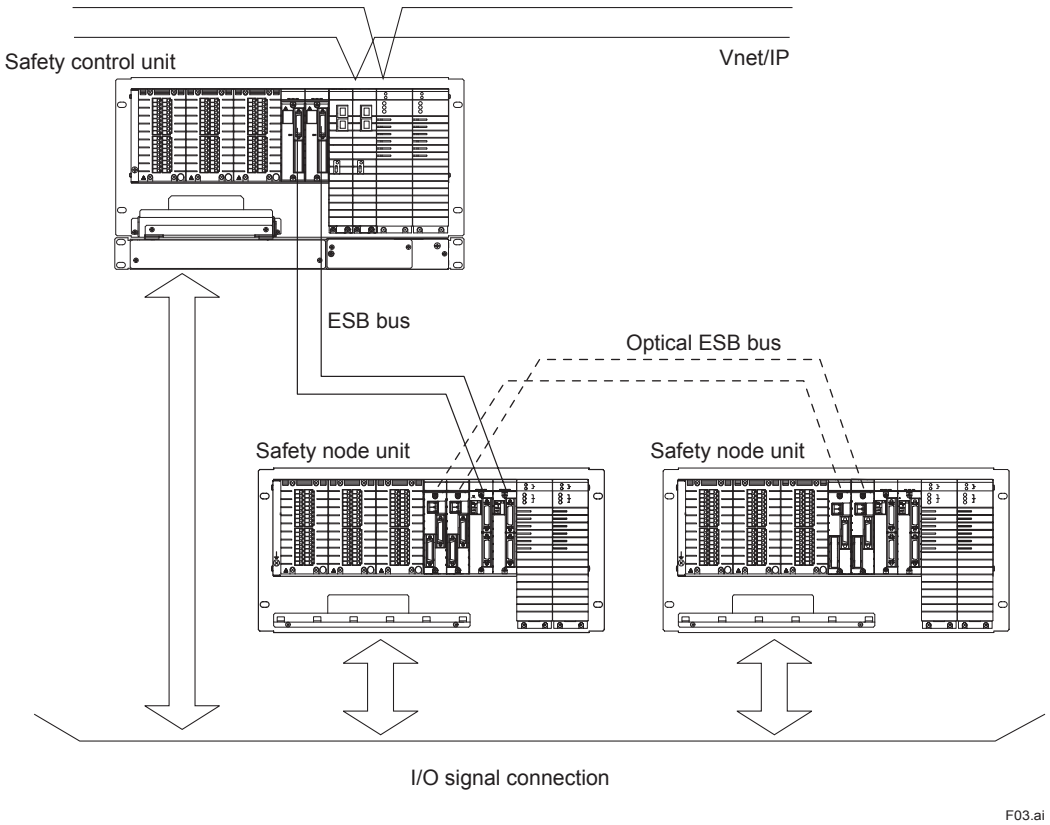
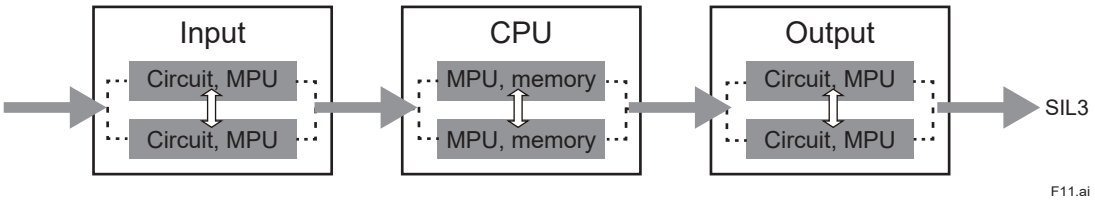


Figure System configuration for SSC50☐/SSC60☐

● Versatile Modular Redundancy (VMR)

SCS provides SIL3 on a single configuration, since CPU module and I/O Module equip high self-diagnostic and “Pair and Spare” architecture. Additionally, it is possible to configure redundancy for higher system availability and fault tolerance.



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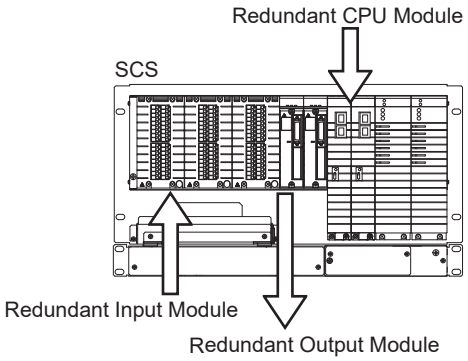

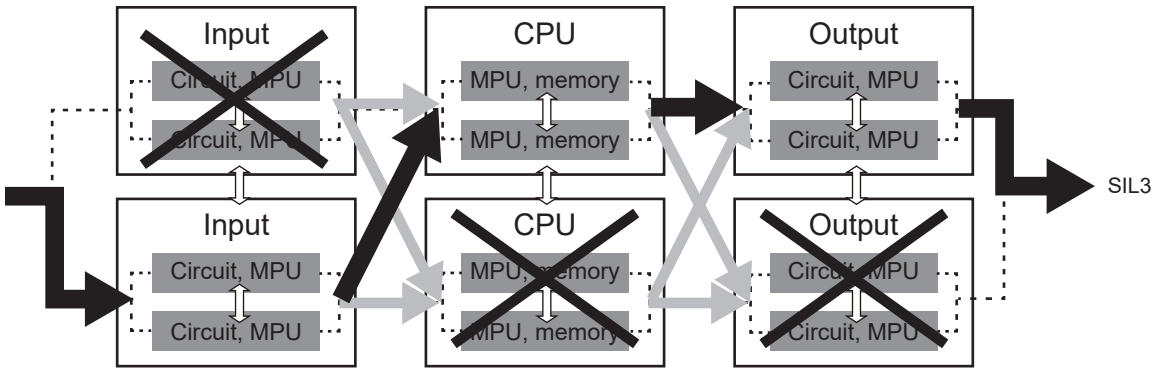

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Even if one of the input modules, CPU modules, or output modules fails, it is possible to continue operating the plant while maintaining SIL3 safety. And failed modules can also be replaced online.

Versatile Modular Redundancy (VMR) refers to the ability to flexibly configure redundancy on module-by-module basis to suit the operating environment. For example, it can be configured, such as only CPU module, or CPU module and Output module. Also, it is possible for Input/Output modules to mix single and redundant configurations to suit the field devices environment.

● CENTUM VP-integrated system

By integrating the ProSafe-RS with the CENTUM VP, operation and monitoring of the SCS from CENTUM VP's HIS is enabled. (*1)

*1: Summing of the SCS I/Os is not required for logical IO points of "VP6H1100 basic operation and monitoring function."

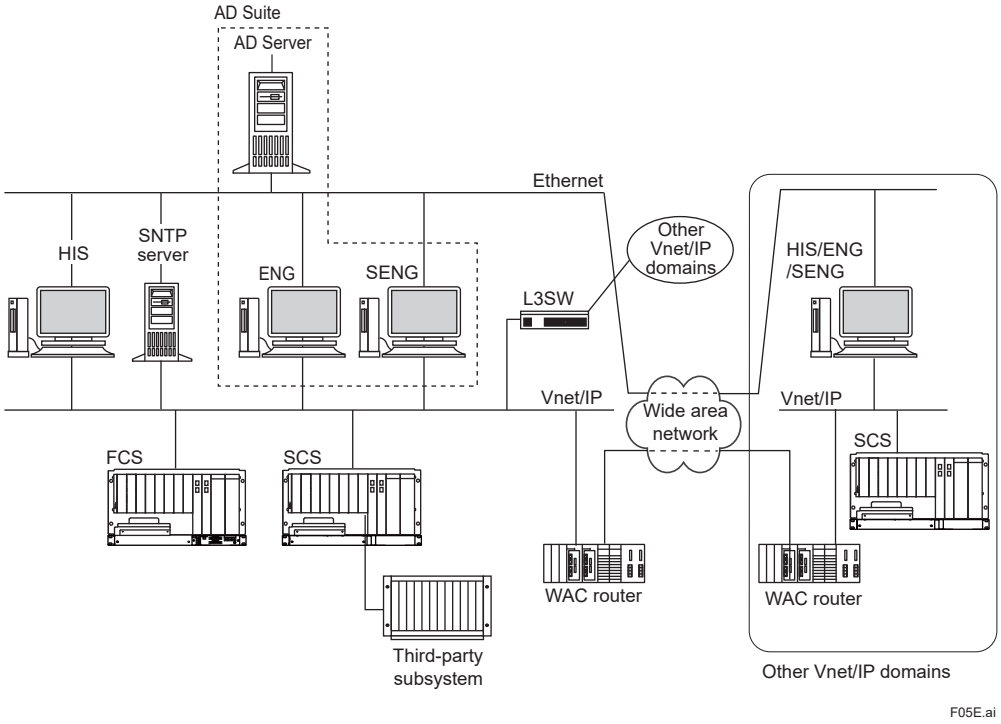


Figure Example of the ProSafe-RS and CENTUM VP integration system

Engineering of the SCS is performed from the SENG and engineering of the FCS and the HIS is done from the engineering station (ENG) of the CENTUM VP. Engineering for integrating the ProSafe-RS system with the CENTUM VP can be performed from both the SENG and the ENG. The SENG, ENG, and HIS can be installed in a single computer.

The combination in that case is shown below.

Table Compatibility between ProSafe-RS R4 and CENTUM VP installed on different computers and connected via Vnet/IP

CENTUM VP / ProSafe-RS	R6.01.10	R6.02.00 R6.03.00 R6.03.10	R6.04.00	R6.05.00 R6.06.00	R6.07.00 R6.07.10	R6.08.00	R6.09.00	R6.10.00	R6.11.00 R6.11.10 R6.12.00	R7.01.00	R7.01.10
R4.01.00 R4.02.00	-	V	V	V	V	V	V	V	V	V	V
R4.03.00	-	X	V	V	V	V	V	V	V	V	V
R4.03.10	-	X	X	V	V	V	V	V	V	V	V
R4.04.00	-	X	X	V	V	V	V	V	V	V	V
R4.05.00	-	X	X	X	V	V	V	V	V	V	V
R4.06.00	-	X	X	X	X	V	V	V	V	V	V
R4.07.00	-	X	X	X	X	X	V	V (*1)	V (*1)	V	V
R4.08.00	-	X	X	X	X	X	V (*2)	V	V	V	V
R4.09.00	-	X	X	X	X	X	X	X	V	V	V
R4.10.00	-	X	X	X	X	X	X	X	V (*3)	V	V
R4.11.00	-	X	X	X	X	X	X	X	V (*3)	V	V
R4.11.10 R4.12.00	-	X	X	X	X	X	X	X	X	V	V

V: Possible

X Possible. But depending on the functions added up to the target ProSafe-RS revision, it may not be recognized by the operating and monitoring functions of CENTUM VP. And the AD server of ProSafe-RS and the AD server of CENTUM VP cannot be shared.

-: Not possible
*1: The AD server of ProSafe-RS and the AD server of CENTUM VP can be shared. In this case, use ProSafe-RS R4.07.00 with the R4.07.02 patch software.
*2: The AD server of ProSafe-RS and the AD server of CENTUM VP can be shared. In this case, use CENTUM VP R6.09.00 with the R6.09.04 patch software.
*3: The AD server of ProSafe-RS and the AD server of CENTUM VP can be shared. In this case, use CENTUM VP R6.12.00.

Table Combination with ProSafe-RS R4 and CENTUM VP on the same computer

CENTUM VP / ProSafe-RS	R6.01.10	R6.02 .00	R6.03.00	R6.03.10 R6.04.00 R6.05.00	R6.06.00	R6.07.00 R6.07.10	R6.08.00	R6.09.00	R6.10.00	R6.11.00 R6.11.10 R6.12.00	R7.01.00	R7.01.10
R4.01.00	-	V	-	-	-	-	-	-	-	-	-	-
R4.02.00	-	V	-	V	-	-	-	-	-	-	-	-
R4.03.00 R4.03.10	-	-	-	V	-	-	-	-	-	-	-	-
R4.04.00	-	-	-	-	V	V	-	-	-	-	-	-
R4.05.00	-	-	-	-	V (*1)	V	-	-	-	-	-	-
R4.06.00	-	-	-	-	-	-	V	V	-	-	-	-
R4.07.00	-	-	-	-	-	-	V	V	V (*2)	-	-	-
R4.08.00 R4.09.00	-	-	-	-	-	-	-	V (*3)	V	-	-	-
R4.10.00	-	-	-	-	-	-	-	-	-	V	V (*4)	-
R4.11.00	-	-	-	-	-	-	-	-	-	V	V (*4)	-
R4.11.10 R4.12.00	-	-	-	-	-	-	-	-	-	-	V (*5)	V

V: Possible on a same computer
-: Not possible
*1: When using PROFIBUS-DP communication module ALP121 in CENTUM VP, SENG of ProSafe-RS and ENG of CENTUM VP do not work in a same computer. Please upgrade to the CENTUM VP R6.07 or later, or please place the SENG of ProSafe-RS on a different computer.
*2: Use ProSafe-RS R4.07.00 with the R4.07.02 patch software.
*3: Use CENTUM VP R6.09.00 with the R6.09.04 patch software.
*4: It is impossible to place a same computer when the R7.01.03 patch software is installed.
*5: Use CENTUM VP R7.01.00 with the R7.01.03 patch software.

Use the CENTUM VP of version R6.02 or later for operation and monitoring of S2SC70☐ from an HIS.

● Connecting other systems

The ProSafe-RS can be connected with other systems via Modbus communication using a serial communication module or an Ethernet communication module. The Modbus communication is interference-free function which will not interfere with a safety loop.
The ProSafe-RS can be connected with other systems by usings a safety subsystem communication function. The safety subsystem communication function handles a safety data used in a safety loop and a non-safety data used in an interference-free function.

Subsystem communication function
Read/write of data from subsystem such as PLCs can be performed by using the SCS as the Modbus communication master station.

Modbus slave communication function
The SCS data can be read/written from other system's Modbus master by using the SCS as the Modbus communication slave station.

Safety subsystem communication function
Read/write of data from subsystems which support safety subsystem communication can be performed by using the SCS as the communication master station.
The safety subsystem communication function includes fire and gas communication function using a fire and gas communication module (*1).
*1: Fire and gas communication module is available with ProSafe-RS R4.03.10 or later.

For communication specifications, refer to the GS "ALR111/ALR121 Serial Communication Module" (GS 32P06K50-01EN), "ALE111 Ethernet Communication Module" (GS 32P06K51-01EN) or "S2LP131 Fire and Gas Communication Module" (GS 32P06K52-01EN).

● Supporting virtualization platform

SENG in R4.04 or later works on virtualizaton platform. For the details, refer to the GS “IA System Product Virtualization Platform” (GS 30A05B10-01EN).

● Setting IT security

By using automatic setting of the IT security functions, the system security of the ProSafe-RS can be enhanced. For performing this function, the CENTUM VP R4.01 or later and the PRM R3.02 or later are required when the systems are integrated.

With R4.11.10 or later, by applying IT Security Version 3, security measures with a wider range of coverage than before can be implemented.

Software: RS2CITS IT Security 3 software

■ NETWORK SPECIFICATIONS

The ProSafe-RS uses Vnet/IP and Ethernet for communications among configured devices.

● Vnet/IP (control network)

Vnet/IP is a gigabit Ethernet-based and dual-redundant control network which provides real-time communication with high reliability. The dual-redundant bus consists of a bus 1 and a bus 2. The bus 1 is normally used for transmitting control data. When the bus 1 fails, the communication path switches automatically and the bus 2 continues the control communication without stopping.

The following shows an example of a network connection.

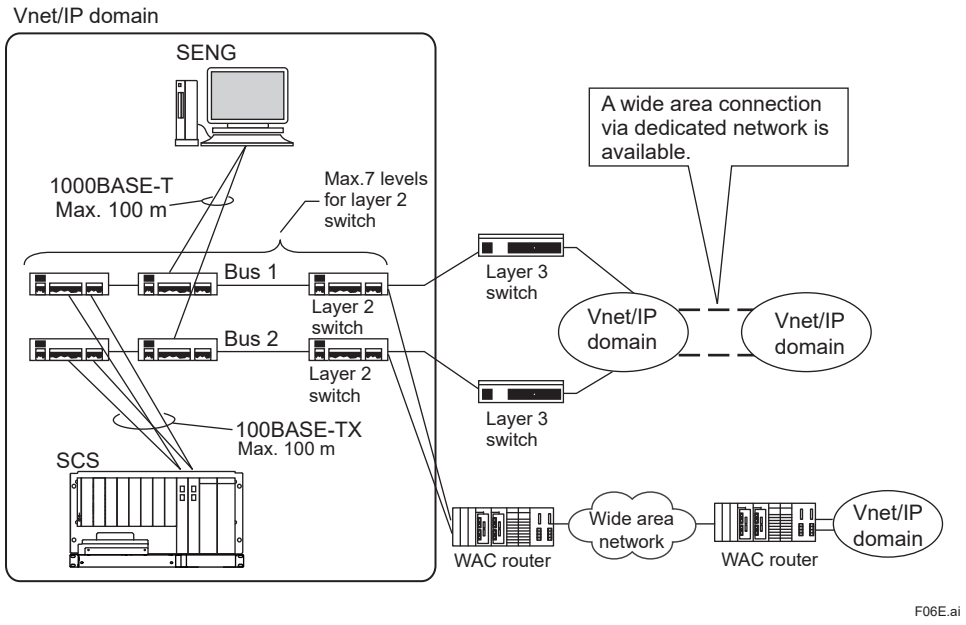


Figure Network configuration

In a Vnet/IP domain, SCS is connected to 1 Gbps L2SWs (*1) via an unshielded twist-pair (UTP) straight cable with the enhanced category 5 (CAT5e) or superior. Since each of the Vnet/IP bus is separated by the bus as an independent subnet, each bus must be equipped with the L2SW. Do not connect any two of the stations in a way to establish multiple communication paths when using star topology.

The number of installable L2SW between the stations in the same Vnet/IP domain is up to 7 levels per bus. (*2) Cascade connections in multiple layers are available.

*1: Maximum communication bandwidth of S2SC70☐/SSC60☐/SSC50☐ is 100 Mbps. Use 1 Gbps L2SW that can connect 100 Mbps devices.

*2: When using ring topology, the sum of L2SW and L3SW between of the stations must be kept up to 7 levels no matter where a failure is occurred in the network in the domain.

Control communication

Communication method: Read/write communication, message communication, link transmission
Link transmission period: 100 ms

Transmission specifications

Network topology: Star topology, Ring topology (*1) (*2)
Transmission redundancy: Dual-redundant (for control network communication only)
Transmission cable: Unshielded twist-pair (UTP) with the enhanced category 5 or superior (*3)

Connection	Transmission standard	Speed	Maximum distance
Between component(s) and a layer 2 switch	100BASE-TX (IEEE802.3u)	100 Mbps (*4)	100 m
	1000BASE-T (IEEE802.3ab)	1 Gbps	
Between layer 2 switches	1000BASE-T (IEEE802.3ab)	1 Gbps	100 m
	1000BASE-LX (IEEE802.3z)	1 Gbps	5 km (*5)
Between a layer 2 switch and a layer 3 switch	1000BASE-T (IEEE802.3ab)	1 Gbps	100 m
	1000BASE-LX (IEEE802.3z)	1 Gbps	5 km (*5)

*1: The ring topology can be configured within the network domain only; however, L3SWs can be applied as a network device to configure the ring topology.
*2: The ring topology is applicable to the system which is integrated with CENTUM VP. Since a network failure in the ring topology is detected by the L2SW or L3SW, the failure must be monitored on an HIS via an FCS.
*3: In case where 100BASE-TX and 1000BASE-T standards are met. An optical fiber compatible with 1000BASE-LX standard conforms to the L2SW specifications.
*4: In case of connecting the L2SW with S2SC70☐/SSC60☐/SSC50☐
*5: 1000BASE-LX standard defines the transmission distance as up to 5km for a single-mode optical fiber. In case further distance is required, contact YOKOGAWA sales office.

Specifications between Instruments

Distance between the two arbitrary stations in a domain: Maximum 40 km

Note: Only one pair of media converters (SFP Modules) can be connected for establishing the communication among control stations such as SCS, SENG, and HIS, and layer 2 switches.

Inter-SCS safety communication specifications

The SCS can perform inter-SCS communication with other SCSs in the same domain as well as in different domains, which is referred to as safety communication. The inter-SCS safety communication allows configuration of a safety loop up to SIL3 between ProSafe-RS SCSs via a control network. A safety loop up to SIL2 can also be configured between ProSafe-RS SCS (*1) and ProSafe-RS Lite SCS, and between ProSafe-RS Lite SCSs.

*1: It has been supported since ProSafe-RS R4.06.

The number of other SCSs where inter-SCS safety communication can be performed by a single SCS is up to 16. (*1)

*1: In case the SCS performs bi-directional communications or a multiple communications, the number of SCSs becomes less than 16.

In addition to Inter-SCS safety communication, the SCS has SCS link transmission communication that reports data to multiple SCSs in the same domain periodically and simultaneously. The SCS link transmission communication allows configuration of a safety loop up to SIL 3 between ProSafe-RS SCSs. A safety loop up to SIL 2 can also be configured between ProSafe-RS SCS and ProSafe-RS Lite SCS, and between ProSafe-RS Lite SCSs.

It is possible to communicate with the FCS of CENTUM VP. The communication with FCS is Interference-free.

● Ethernet (information network)

Ethernet is a network used for file transfer and information communication among the AD Server, SENG, HIS/ENG for CENTUM VP, and other general-purpose Ethernet instruments.

Communication protocol

Based on IEEE802.3

■ I/O COMMUNICATIONS BUS

● N-ESB bus, optical ESB bus, and ESB bus

An N-ESB bus, an optical ESB bus, and an ESB bus are used as I/O communication buses for connecting the safety control unit with N-IO nodes (*1) or safety node units.

*1: An N-IO node consists of a node interface unit (S2NN30D) and up to 6 N-IO I/O units.

Bus connection specifications:

N-ESB bus

Number of connectable nodes: 32 N-IO nodes (for S2SC70☐) (*1)
Maximum number of hops: 16 (for star connection)
Maximum number of hops: 16 (for chain connection) (*2)

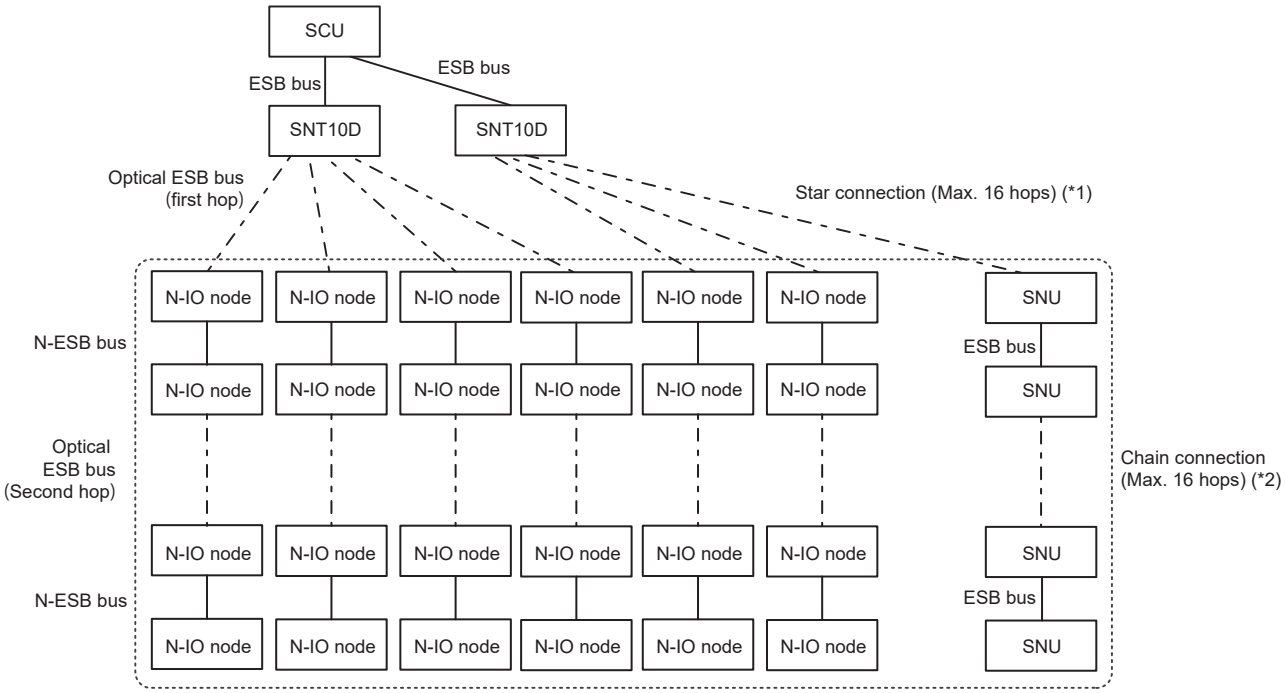
*1: N-IO nodes can be connected to the low levels of N-ESB bus coupler modules (S2EN402/S2EN404). N-ESB bus coupler modules are mounted in pairs to the safety control unit, and up to 8 modules can be mounted in the safety control unit. Refer to “ProSafe-RS Outline of I/O Modules (for FIO)” (GS 32P06K60-01EN) for restrictions on mounting N-ESB bus coupler modules.
*2: When the node interface units are connected in series (chain connection), keep the electricity turned on.

Optical ESB bus and ESB bus

Number of connectable nodes:
32 N-IO nodes and 13 safety node units (for S2SC70☐)
13 safety node units (for SSC60☐)
9 safety node units (for SSC50☐)
Optical ESB bus connection type:
Maximum number of hops: 16 (for star connection) (*1)
Maximum number of hops: 16 (for chain connection) (*2) (*3)
ESB bus connection type:
Maximum number of hops: 9 (for chain connection)

*1: Up to 24 hops for star connection is available only when S2SC70S or S2SC70D is used as a safety control unit and star connection is configured with SNT4☐☐ via SEC402 (Supported by R4.04 or later.)
*2: Up to 16 hops for chain connection of optical ESB bus is available when connecting N-IO nodes with optical ESB bus only. Up to 2 hops for chain connection of optical ESB bus is available when N-ESB bus and optical ESB bus are used in combination or connecting FIO nodes in the same chain connection.
*3: When the node interface units are connected in series (chain connection), keep the electricity turned on.

The following figure shows an example of star type and chain type connections using optical ESB buses.



SCU: Safety control unit SNU: Safety node unit

Note: When the electricity is shut down for one of the node interface units connected in series, the communications in between the node interface units and I/O modules stop beyond the node interface unit. In case electricity cut off occurs to some of the nodes connected in series, due to the difference in power line, connect the node interface units in parallel.

*1: Up to 24 hops for star connection is available only when S2SC70S or S2SC70D is used as a safety control unit and star connection is configured with SNT4□□ via SEC402 (Supported by R4.04 or later.)

*2: Up to 16 hops for chain connection of optical ESB bus is available when connecting N-IO nodes with optical ESB bus only. Up to 2 hops for chain connection is available when N-ESB bus and optical ESB bus are used in combination or connecting FIO nodes in the same chain connection.

Figure Optical ESB bus connection

Transmission specifications

N-ESB bus

Transmission:	Dual-redundant only
Transmission speed:	100 Mbps (equivalent to IEEE802.3 100BASE-TX)
Transmission cable:	UTP straight cable of CAT5e or better (ANSI standard TIA/EIA-568-B compliant)
Connector:	8-pin 8-core modular connector (ISO/IEC 8877, RJ45)
Maximum Cable length:	100 m (*1)

*1: This is the distance between individual nodes. An N-ESB bus cable can be routed only in the cabinet or within the cabinets bayed together. An optical ESB bus cable must be used instead of an N-ESB bus cable when a cable is routed outside of the cabinet.

Optical ESB bus

Transmission: Dual-redundant only
Transmission speed: 192 Mbps
Transmission cable: Optical fiber cable
Maximum transmission distance: 50 km

The specification of the optical fiber cable is as shown below.

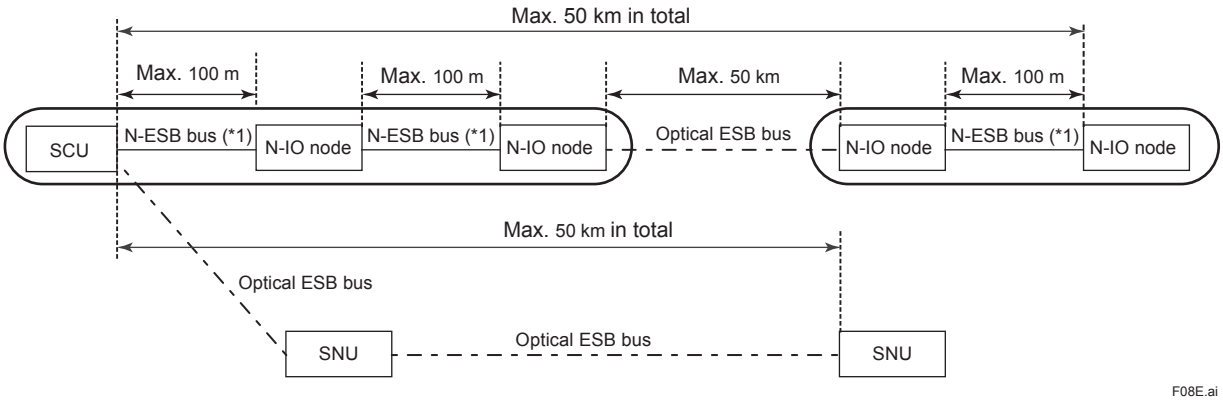
		Optical fiber specifications
Optical connector type		LC (compliant with IEC 61754-20)
Max. Permissible optical loss	**5 km**	0 to 10 dB@1.3 µm
	5-50 km	3 to 16 dB at 1.55 µm (*1)
Optical fiber	**Type**	Quartz single-mode optical fiber (*2)
	Required number of cores	2
	Max. Length	50 km

*1: When the optical attenuation in the following connections is less than 3 dB.
*2: JIS C 6835 SSMA -9.3/125 or IEC 60793-2-50 B1.1 type

ESB bus

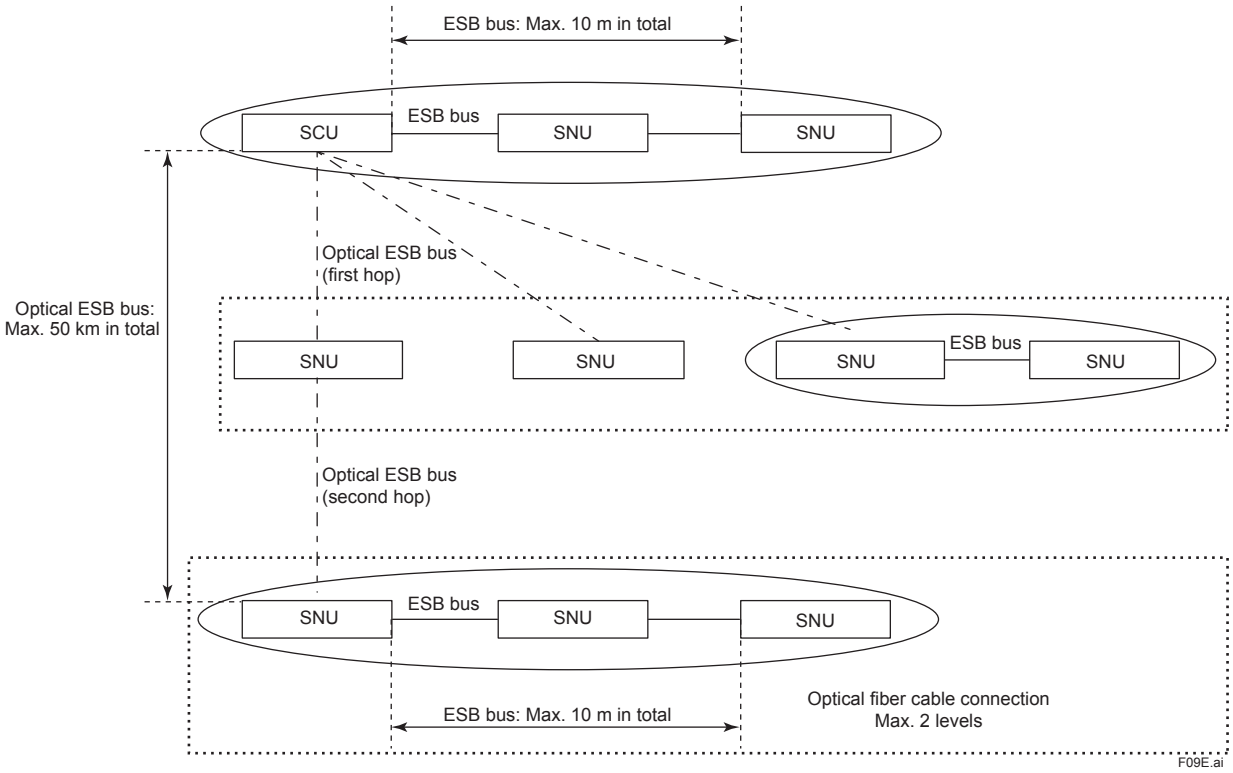
Transmission: Dual-redundant only
Transmission speed: 128 Mbps
Transmission cable: ESB bus cable (YCB301)
Maximum Transmission distance: 10 m

The following figures show connection diagrams using optical ESB bus, N-ESB bus, and ESB bus.



SCU: Safety control unit
SNU: Safety node unit
*1: An N-ESB bus cable can be routed only in the cabinet or within the cabinets bayed together.
An optical ESB bus cable must be used instead of an N-ESB bus cable when a cable is routed outside of the cabinet.

Figure N-ESB bus and optical ESB bus connections



SCU: Safety control unit
SNU: Safety node unit

Figure Optical ESB bus and ESB bus connection

● F-SB bus

An F-SB bus is used as an I/O communication bus for connecting the N-IO node's node interface unit with N-IO I/O units.

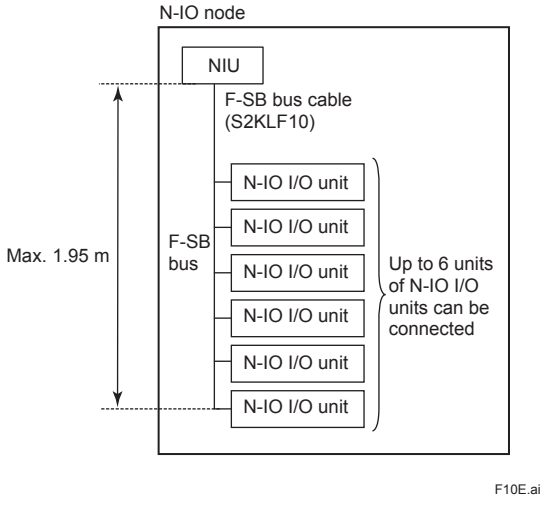
Bus connection specifications

Number of connectable nodes: 6 N-IO I/O units per N-IO node (*1)

Transmission specifications

Transmission: Dual-redundant only
Transmission cable: F-SB bus cable (S2KLF10)
Maximum Transmission distance: 1.95 m

*1: An N-IO I/O unit consists of a base plate, I/O modules and so on.



NIU: Node interface unit

Figure F-SB bus connection

■ SYSTEM REQUIREMENTS

● Software requirements

Windows OS (R4.05 or before)

Release No.	Windows 10 Enterprise 2016 LTSB	Windows 7 Professional	Windows Vista Business	Windows Server 2016 Standard	Windows Server 2008 R2 Standard	Windows Server 2008 Standard
	64-bit	64-bit	32-bit	64-bit	64-bit	32-bit
	without SP	SP1	SP2	without SP	SP1	SP2
R4.01/ R4.02	-	X (*1)	X (*2)	-	X (*1)	X (*2)
R4.03.00 / R4.03.10	X (*3)	X	-	-	X (*1)	-
R4.04 / R4.05	X (*3)	X	-	X	X (*1)	-

X: Applicable -: Not applicable
Note: SP stands for Service Pack.
*1: The combination of ProSafe-RS and iDefine for ProSafe-RS cannot be installed.
*2: Usable only as an SOE Viewer and SOE OPC Server.
*3: Windows 10 IoT Enterprise 2016 LTSB is also supported.

Windows OS (R4.06 or later)

Release No.	Windows11 Enterprise LTSC 2024	Windows 10 Enterprise LTSC 2021	Windows 10 Enterprise LTSC 2019	Windows 10 Enterprise 2016 LTSB	Windows Server 2022 Standard	Windows Server 2019 Standard	Windows Server 2016 Standard
	64-bit	64-bit	64-bit	64-bit	64-bit	64-bit	64-bit
	without SP	without SP	without SP	without SP	without SP	without SP	without SP
R4.06	-	-	X (*1)	X (*2)	-	-	X
R4.07	-	-	X (*1)	X (*2)	-	X	X
R4.08/R4.09	-	-	X (*1)	X (*2)	-	X (*3)	X
R4.10/R4.11	-	X (*4)	X (*1)	X (*2)	X (*5)	X (*3)	X
R4.12	X (*6)	X (*4)	X (*1)	X (*2)	X (*5)	X (*3)	X

X: Applicable -: Not applicable
Note: SP stands for Service Pack.
*1: Windows 10 IoT Enterprise LTSC 2019 is also supported.
*2: Windows 10 IoT Enterprise 2016 LTSB is also supported.
*3: Windows Server IoT 2019 Standard is also supported.
*4: Windows 10 IoT Enterprise LTSC 2021 is also supported.
*5: Windows Server IoT 2022 Standard is also supported.
*6: Windows 11 IoT Enterprise LTSC 2024 is also supported.

Microsoft Office Products

The following table shows the correspondence between ProSafe-RS release numbers and Microsoft Excel/Microsoft Word versions when Microsoft Excel and/or Microsoft Word coexist with ProSafe-RS software.

Release No.	Microsoft Excel / Microsoft Word Version									
	2007 SP3	2010 SP2	2013 SP1 (*1)		2016 (*1)		2019 (*1)		2021 (*1)	
	-	-	32-bit	64-bit	32-bit	64-bit	32-bit	64-bit	32-bit	64-bit
R4.01 to R4.02	X	X	X	-	X	-	-	-	-	-
R4.03 to R4.05	-	-	X	-	X	-	-	-	-	-
R4.06	-	-	X	X	X	X	X (*2)	X (*2)	-	-
R4.07	-	-	X	X	X	X	X (*3)	X (*3)	-	-
R4.08 to R4.09	-	-	-	-	X	X	X (*3)	X (*3)	-	-
R4.10/R4.11	-	-	-	-	X (*4)	X (*4)	X (*5)	X (*5)	X (*5)	X (*5)
R4.12	-	-	-	-	-	-	-	-	X (*5)	-

X: Applicable -: Not applicable

Note: SP stands for Service Pack.

*1: Only the volume license version is guaranteed to work.

*2: Works with Windows 10 Enterprise LTSC 2019 and Windows 10 IoT Enterprise LTSC 2019.

*3: Works with Windows 10 Enterprise LTSC 2019, Windows 10 IoT Enterprise LTSC 2019, Windows Server 2019 Standard, and Windows Server IoT 2019 Standard.

*4: Works with Windows 10 Enterprise 2016 LTSB and Windows Server 2016 Standard.

*5: Works with Windows 10 Enterprise LTSC 2021, Windows 10 IoT Enterprise LTSC 2021, Windows 10 Enterprise LTSC 2019, Windows 10 IoT Enterprise LTSC 2019, Windows 11 Enterprise LTSC 2024, Windows 11 IoT Enterprise LTSC 2024, Windows Server 2022 Standard, Windows Server IoT 2022 Standard, Windows Server 2019 Standard, and Windows Server IoT 2019 Standard.

● Hardware requirements

Common specification

The software runs on a computer that meets the following specifications:

CPU	Refer to the requirement by the software and the OS	
Main memory	Refer to the requirement by the software and the OS	
Storage (*4)	Sum of the requirements by the software and the OS (*1)	
	When the operation history database is stored for access control and operation history management package, minimum 60 GB free space is required in addition.	
	When the change management package is used, minimum 10 GB free space is required in addition.	
Display	For a square monitor	Resolution of SXGA (1280 x 1024) or higher, true color (16.77 million colors or more)
	For a wide monitor	Resolution of WXGA+ (1440 x 900) or higher, true color (16.77 million colors or more)
Graphics	DirectX 9 equivalent graphics processing unit. The following shall be supported. • Windows Driver Display Model (WDDM) driver • Pixel Shader 2.0 • 32 bits/pixel • 128 MB graphics memory	
Expansion slot	One PCI Express slot is used for the Vnet/IP interface card. (*2)	
Mouse	Required	
Optical disc drive	DVD-ROM (*3)	

*1: When the software for ProSafe-RS and other systems such as CENTUM VP reside in a single computer, sum up the free space required for each product.

*2: This card is required when connecting a computer to Vnet/IP network.

*3: This is required for installing the software and licenses.

*4: SSD is supported by ProSafe-RS/ProSafe-RS Lite R4.11 or later and Windows 10 LTSC 2021 or later/Windows 11 LTSC 2024 or later/Windows Server 2022 or later.

RS4E5000 Engineering server function
RS4E5000 Engineering server function runs on a computer which meets the following specifications.

For Windows 7 / Windows 10 / Windows 11

CPU	Intel Core i5 equivalent or higher
Main memory	Minimum 8 GB
Storage (*1)	Minimum 100 MB× No. of SCS of free space

*1: SSD is supported by ProSafe-RS/ProSafe-RS Lite R4.11 or later and Windows 10 LTSC 2021 or later/Windows 11 LTSC 2024 or later.

For Windows Server 2008 R2 / Windows Server 2016 / Windows Server 2019 / Windows Server 2022

CPU	Xeon 4 core 2.2 GHz equivalent or higher
Main memory	Minimum 8 GB
Storage (*1)	Minimum 100 MB× No. of SCS of free space

*1: SSD is supported by ProSafe-RS/ProSafe-RS Lite R4.11 or later and Windows Server 2022 or later.

RS4E5100 Safety system engineering and maintenance function
RS4E5100 Safety system engineering and maintenance function runs on a computer which meets the following specifications.
When RS4E5100 is installed in the same computer where RS4E5000 has been installed, the operation environment has to conform to the RS4E5000 (For storage, sum of the free space required for each product.)

For Windows 7 / Windows 10 / Windows 11

CPU	Intel Core i5 equivalent or higher
Main memory	Minimum 8 GB
Storage (*1)	Minimum 60 GB of free space

*1: SSD is supported by ProSafe-RS/ProSafe-RS Lite R4.11 or later and Windows 10 LTSC 2021 or later/Windows 11 LTSC 2024 or later.

For Windows Server 2008 R2 / Windows Server 2016 / Windows Server 2019 / Windows Server 2022

CPU	Xeon 4 core 2.2 GHz equivalent or higher
Main memory	Minimum 8 GB
Storage (*1)	Minimum 60 GB of free space

*1: SSD is supported by ProSafe-RS/ProSafe-RS Lite R4.11 or later and Windows Server 2022 or later.

RS4H2100 SOE viewer package / RS4H2200 SOE OPC interface package / RS4H2300 bypass monitoring package (*1)
RS4H2100 SOE viewer package, RS4H2200 SOE OPC interface package, and RS4H2300 bypass monitoring package run on a computer which meets the following specifications.
When RS4H2100 SOE viewer package and/or RSH2200 SOE-OPC interface package are installed in the same computer where RS4E5000 or RS4E5100 is installed, the operation environment and the storage capacity have to conform to the respective package.

*1: Called as Forced I/O Viewer Package by R4.10 or earlier.

For Windows 7 / Windows 10 / Windows 11

CPU	Core2 Duo minimum 2.13 GHz
	Xeon dual core minimum 2.0 GHz
Main memory	Minimum 4 GB
Storage (*1)	Required: Minimum 20 GB of free space
	Recommended: Minimum 40 GB of free space

*1: SSD is supported by ProSafe-RS/ProSafe-RS Lite R4.11 or later and Windows 10 LTSC 2021 or later/Windows 11 LTSC 2024 or later.

For Windows Server 2008 R2 / Windows Server 2016 / Windows Server 2019 / Windows Server 2022

CPU	Xeon dual core minimum 2.93 GHz
Main memory	Minimum 4 GB
Storage (*1)	Required: Minimum 20 GB of free space
	Recommended: Minimum 40 GB of free space

*1: SSD is supported by ProSafe-RS/ProSafe-RS Lite R4.11 or later and Windows Server 2022 or later.

■ CRITERIA FOR THE INSTALLATION ENVIRONMENT

The table below shows the criteria of the ProSafe-RS installation environment.

Table Criteria of the installation environment for devices (1/2)

<table>
<tr><th colspan="2" rowspan="2">Item</th><th colspan="3">Specifications</th></tr>
<tr><th>Safety Control Unit (SCU)</th><th>Safety Node Unit, Unit for Optical Bus Repeater Module</th><th>N-IO Node (*1)</th></tr>
<tr><td rowspan="3">Temperature</td><td rowspan="2">Normal operation</td><td>-20 to 40ºC (*2)
(standard type SCU for Vnet/IP)</td><td rowspan="2">-20 to 70ºC (*3)</td><td rowspan="2">-40 to 70ºC (*4) (*5) (*6)</td></tr>
<tr><td>-20 to 70ºC (*3)
(wide range temperature type SCU for Vnet/IP)</td></tr>
<tr><td>Transportation</td><td colspan="3">–40 to 85 °C</td></tr>
<tr><td rowspan="2">Humidity</td><td>Normal operation</td><td colspan="3" rowspan="2">5 to 95 % RH (non-condensing) (*7)</td></tr>
<tr><td>Transportation/storage</td></tr>
<tr><td rowspan="2">Temperature change</td><td>Normal operation</td><td colspan="3">Within ±10 °C/h</td></tr>
<tr><td>Transportation/storage</td><td colspan="3">Within ±20 °C/h</td></tr>
<tr><td rowspan="6">Power supply</td><td>Voltage range</td><td colspan="2">100 to 120 V AC: –15 % to +10 %
220 to 240 V AC: –15 % to +10 %
24 V DC: –10 % to +20 %</td><td>100 to 120 V AC: –15 % to +10 %
220 to 240 V AC: –15 % to +10 %
24 V DC: –15 % to +20 %</td></tr>
<tr><td>Frequency</td><td colspan="3">50/60 Hz ± 3 Hz</td></tr>
<tr><td>Distortion factor</td><td colspan="3">10 % or less</td></tr>
<tr><td>Crest factor</td><td colspan="3">100 V system: 118 V or larger
220 V system: 258 V or larger</td></tr>
<tr><td>Momentary failure</td><td colspan="3">20 ms or less (when receiving rated AC voltage)</td></tr>
<tr><td>DC power supply ripple rate</td><td colspan="3">1 % P-P maximum</td></tr>
<tr><td colspan="2">Withstanding voltage (*8)</td><td colspan="3">1500 V AC for 1 minute (for 100 to 120/220 to 240 V AC)
500 V AC for 1 minute (for 24 V DC)</td></tr>
<tr><td colspan="2">Insulation resistance (*8)</td><td colspan="3">20 M Ω at 500 V DC</td></tr>
<tr><td colspan="2">Grounding</td><td colspan="3">Apply the grounding system which is defined by the rules and standards of the country or the region.</td></tr>
<tr><td colspan="2">Dust</td><td colspan="3">Maximum of 0.3 mg/m^3</td></tr>
<tr><td colspan="2">Corrosive gas</td><td colspan="3">ANSI/ISA S71.04 G3 (*9)</td></tr>
<tr><td rowspan="2">Noise</td><td>Electric field</td><td colspan="3">10 V/m maximum (80 MHz to 1 GHz)</td></tr>
<tr><td>Static electricity</td><td colspan="3">4 kV or less (direct discharge)
8 kV or less (aerial discharge)</td></tr>
</table>

Note: For S2NN70D (System model: S2ZN70D), S2NN60D (System model: S2ZN60D), S2CB60, and A2CX100, refer to GS “N-IO field enclosure” (GS 32P06Q10-01EN).
*1: An N-IO node consists of S2NN30D, S2BN1D, S2BN4D, S2BN5D, S2MMM843, S2MDV843, S2KPB10, and S2KLF10.
*2: 0 to 40°C when ALR111-S□1, ALR121-S□1, or ALE111-S□1 is mounted.
*3: 0 to 60°C when ALR111-S□1, ALR121-S□1, or ALE111-S□1 is mounted.
*4: For the normal operating temperature of S2BN4D and S2BN5D, refer to GS 32P06P10-01EN “Barrier Base Plate (for N-IO)”.
*5: When the Node interface unit (S2NN30D) with the following optical ESB bus specifications is used at an altitude of 2000 m or higher, the ambient temperature range is -40 to 60°C.
S2NN30D-□□□□□01□□ S2NN30D-□□□□□02□□ S2NN30D-□□□□□10□□
S2NN30D-□□□□□11□□ S2NN30D-□□□□□12□□ S2NN30D-□□□□□20□□
S2NN30D-□□□□□21□□ S2NN30D-□□□□□22□□
*6: The ambient temperature range of AKB cable used with S2BN1D-□9□□□ is -20 to 70°C.
*7: 5 to 85 % RH when the SRM53D/SRM54D/SBM54D is mounted.
*8: Between power and grounding terminals.
*9: SRM53D, SRM54D, and SBM54D are excluded.

Table Criteria of the installation environment for devices (2/2)

Item		Specifications		
		Safety Control Unit (SCU)	Safety Node Unit, Unit for Optical Bus Repeater Module	N-IO Node (*1)
Vibration	Continuous vibration	Amplitude: 1.75 mm (5 Hz to 9 Hz) Acceleration: 4.9 m/s^2 (9 Hz to 150 Hz)		Amplitude: 1.75 mm (5 Hz to 8.4 Hz) Acceleration: 4.9 m/s^2 (8.4 Hz to 150 Hz)
	Non-continuous vibration	Amplitude: 3.5 mm (5 Hz to 9 Hz) Acceleration: 9.8 m/s^2 (9 Hz to 150 Hz)		Amplitude: 3.5 mm (5 Hz to 8.4 Hz) Acceleration: 9.8 m/s^2 (8.4 Hz to 150 Hz)
	Seismic	Acceleration: 4.9 m/s^2 or less		
	Transportation (When packed)	Horizontal: 4.9 m/s^2 or less Vertical: 9.8 m/s^2 or less		
Impact		147 m/s^2, 11 ms		
Altitude (above sea level)		2000 m or less		3000 m or less (*5) (*6)

Note: For S2NN70D (System model: S2ZN70D), S2NN60D (System model: S2ZN60D), S2CB60, and A2CX100, refer to GS “N-IO field enclosure” (GS 32P06Q10-01EN).
*1: An N-IO node consists of S2NN30D, S2BN1D, S2BN4D, S2BN5D, S2MMM843, S2MDV843, S2KPB10, and S2KLF10.
*5: When the Node interface unit (S2NN30D) with the following optical ESB bus specifications is used at an altitude of 2000 m or higher, the ambient temperature range is -40 to 60°C.
S2NN30D-□□□□□01□□ S2NN30D-□□□□□02□□ S2NN30D-□□□□□10□□
S2NN30D-□□□□□11□□ S2NN30D-□□□□□12□□ S2NN30D-□□□□□20□□
S2NN30D-□□□□□21□□ S2NN30D-□□□□□22□□
*6: For the Altitude (above sea level) of S2BN4D and S2BN5D, refer to GS 32P06P10-01EN “Barrier Base Plate (for N-IO)”.

■ CONFORMITY STANDARDS

The hardware components of the ProSafe-RS comply with the standards as shown below.

- Functional safety Standards
- Programmable controllers Standards
- Application Standards
- Safety Standards
- EMC conformity Standards
- Standards for Hazardous Location Equipment
- Marine Standards
- Environmental Standards

For details of the conformity standards, refer to the GS “Standards Compliant Models” (GS 32P01B60-01EN).

■ SECURITY MEASURES

● Endpoint security service

Endpoint security service reduces the risk of being contracted by computers viruses and provides support for maintaining healthiness of the safety instrumented system throughout the plant’s lifecycle.

The endpoint security service provides services such as AV/OS implementation service, AV/OS update service, virus check service, and software backup service. For details, refer to the GS “Endpoint Security Service” (GS 43D02T30-02EN).

● Antivirus software

Yokogawa standard antivirus software is dedicated for Yokogawa control systems based on the Trellix’s intrusion prevention technologies. For details, refer to the GS “Basic Endpoint Security Solution” (GS 43D02T30-05EN).

● Whitelisting software

Standard whitelisting software for endpoint security is white-list method software provided for Yokogawa system products based on Trellix’s application control technology which restricts running of malicious and unauthorized programs by allowing only the programs that permissions are granted to run in advance. Being used together with “Yokogawa standard antivirus software”, the whitelisting software provides even more effective security measures. For details, refer to the GS “Standard Whitelisting Software for Endpoint Security” (GS 30A15A30-01E).

■ SOFTWARE LICENSE AGREEMENT, LIMITED WARRANTY, AND UPGRADE LICENSE

● Software license agreement

Prior to start using the ProSafe-RS release 4 and ProSafe-RS Lite software products, refer to the website below and agree on all the terms and conditions of the “ProSafe-RS Software License Agreement.”

ProSafe-RS release 4 software license agreement:

www.yokogawa.com/EndUserLicenseAgreement/

● Limited warranty

The ProSafe-RS release 4 and later versions and ProSafe-RS Lite software products are provided with the limited warranty which covers its software media only. Support services over vulnerability and nonconformance shall be provided by Product Maintenance License (PML) and Lifecycle Agreement, refer to the following GS for each.

- Product Maintenance License (GS 30A01F20-01EN)
- Lifecycle Agreement “Sustainable Plan” (GS 43D02H21-16EN)

● Upgrade license

From ProSafe-RS R4.03.10, upgrade license is required to revise software for revision up and applying a patch. This is attached to the product maintenance license. For the details, please refer to the GS “ProSafe-RS/ProSafe-RS Lite Upgrade license” (GS 32Y01B10-01EN) and “Product Maintenance License” (GS 30A01F20-01EN).

■ TRADEMARKS ACKNOWLEDGMENT

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■ WARNING AND DISCLAIMER

- In realization of the Safety Instrumented System (SIS), an appropriate competence management system is required to conform to the Functional Safety Management (FSM) defined in IEC 61508 and IEC 61511. Hence, YOKOGAWA cannot assure conformance of ProSafe-RS and other related YOKOGAWA products (“Products”) unless YOKOGAWA or YOKOGAWA’s authorized partners are fully involved in or control engineering, configuration, adaptation, maintenance, repair and other work in SIS lifecycle.
- In no event shall YOKOGAWA be liable for any result, claim, loss or damage whatsoever arising out of or in connection with use or inability to use of Products, if any part of engineering, configuration, adaptation, maintenance, repair, improvement, addition of functions, adjustment or other modification work for the Products is made or controlled by a person other than YOKOGAWA or YOKOGAWA’s authorized partners.
- Except for the limited warranties agreed upon in writing, YOKOGAWA disclaims all other warranties, express or implied, in fact or in law, including without limitation, warranties of merchantability, fitness for a particular purpose and non-infringement. If warranty is provided, repair or replacement of the Products is the exclusive remedy for breach of warranty.
- In no event shall YOKOGAWA be liable for any indirect or consequential loss or damage incurred arising out of or in relation to use or inability to use the Products regardless of whether foreseeable or not, whether arising in or for breach of contract, tort (including negligence), breach of statutory duty or otherwise or whether YOKOGAWA has been advised of the possibility thereof.