MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

YOKOGAWA

SNT411-5F S2

LONG-RANGE OPTICAL ESB MASTER

Used with the applicable ProSafe-RS optical ESB configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Yokogawa GS 32Q06L15-31E, seventh edition, 2019; applicable SNT411/SNT511 specifications and installation restrictions.; Yokogawa IM 32Q06C10-31E, sections 4.5 and Table 4.5-2.

General Specifications

Models SNT411, SNT511
Optical ESB Bus Repeater Module
5 km to 50 km

ProSafe-RS

GS 32Q06L15-31E

■ GENERAL

The Optical ESB Bus Repeater Module converts ESB Bus, which connects among safety control unit, safety node unit and N-IO node, to optical signal.

ESB Bus transmission distance can be extended by connecting Optical ESB Bus Repeater Master Module (SNT411) and Optical ESB Bus Repeater Slave Module (SNT511) with an optical fiber cable.

The ESB bus transmission distance can be extended within the range of up to 50 km by connecting Optical ESB Bus Repeater Master Module (SNT411) at master side to N-ESB Bus Module (S2EN501) at slave side and N-ESB Bus Module (S2EN501) at master side to Optical ESB Bus Repeater Slave Module (SNT511) at slave side with an optical fiber cable.

● SNT411 Optical ESB Bus Repeater Master Module

This module is connected from ESB Bus Coupler Module (SEC401, SEC402) on the safety control unit or ESB Bus Interface Module (SSB401) on the safety node unit (SNB10D) through ESB Bus cable.

There are two types of ESB Bus Repeater Modules: with or without a terminator.

● SNT511 Optical ESB Bus Repeater Slave Module

This module is connected from Optical ESB Bus Repeater Master Module or N-ESB Bus Module through fiber-optic cable. Furthermore, it is connected through ESB Bus cable to ESB Bus Interface Module (SSB401) on the safety node unit (SNB10D).

■ STANDARD SPECIFICATIONS

Function:	ESB Bus optical transport function (Vnet/IP only)
Connection method:	Star type connection Chain type connection Available for both star and chain type connection.
Number of connecting stage:	Maximum two
Transmission distance:	5 km to 50 km (total two stages) Attenuate the optical power by 3-4 dB in between SNT411 and SNT511, S2EN501 and SNT511, or SNT411 and S2EN501. When the optical attenuation by the optical fiber cable is less than 3 dB, use an attenuator to reduce the attenuation by 3 dB. (*1)
Current consumption:	0.5 A
Weight:	Approx. 0.3 kg

*1: When both SNT411's and SNT511's style codes are S1, use an attenuator to reduce the attenuation by 1-2 dB.

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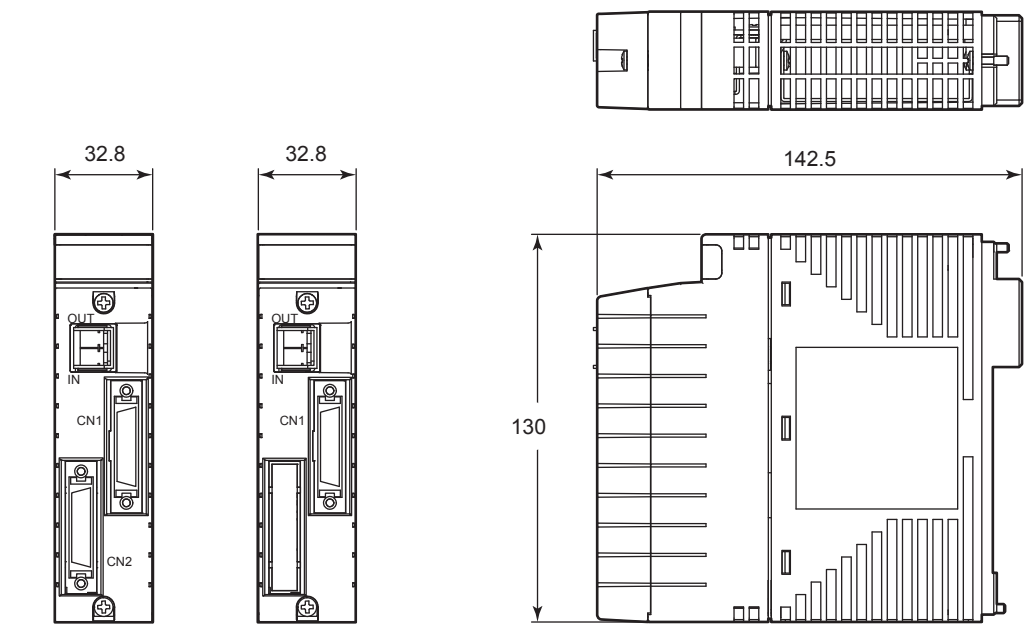
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GS 32Q06L15-31E
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■ EXTERNAL DIMENSIONS

SNT411, SNT511 Optical ESB Bus Repeater Module

Unit: mm



SNT411-☐☐/CU1N
(Without terminator)

SNT411-☐☐/CU1T
(With terminator)
SNT511

F01E.ai

Nominal Tolerances :

When the reference dimension is over 0.5 mm and equal or less than 120 mm, its nominal tolerance is ± 0.8 mm, while its combination of nominal tolerance is ± 1.5 mm.

When the reference dimension is over 120 mm, its nominal tolerance is in accordance with JEM 1459.

■ RESTRICTIONS AND CAUTIONS FOR MOUNTING

- Combination of SNT411 and SNT511 or that of SNT401 and SNT501 can be placed in the same SCS at the same time.
- Mount a set of Optical ESB Bus Repeater Module for duplex on a pair of continuous slots. The module for ESB Bus 1 is always mounted on a slot with odd number, and the module for ESB Bus 2 on a slot with even number.
- When mounting on SNT10D at 60 to 70 °C, leave two slots next to Power supply module and mount one set in every two slots, and leave two slots between one set SNT☐11. Unit for Optical Bus Repeater Module (SNT10D) is a unit to install Optical ESB Bus Repeater Modules. Refer to “Unit for Optical Bus Repeater Module (Rack Mountable Type)” (GS 32Q06K11-31E).
- For restrictions regarding mounting S2SC70☐, SSC60☐, SSC50☐ and SNB10D, refer to “ProSafe-RS Outline of I/O Modules (for FIO)” (GS 32P06K60-01EN).
- Serial communication modules (ALR111 and ALR121) cannot be mounted on SNB10D placed more than 5 km away via optical ESB bus repeater module.

■ System Requirements

Optical ESB Bus Repeater Module can be used from the following revisions or later.

SENG: R1.03

SCS: R1.03

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■ EXAMPLE OF CONNECTION STRUCTURE

● Example of Chain Type Connection

For chain type connection, there are two structures: one is to mount the optical modules on Safety Control Unit and Safety Node Unit; the other is to mount the optical modules on the dedicated SNT10D (Unit for Optical Bus Repeater Module). It is also possible to mix these two structures for connection. There are two occasions: using SNT10D and not using SNT10D.

Example of not using SNT10D

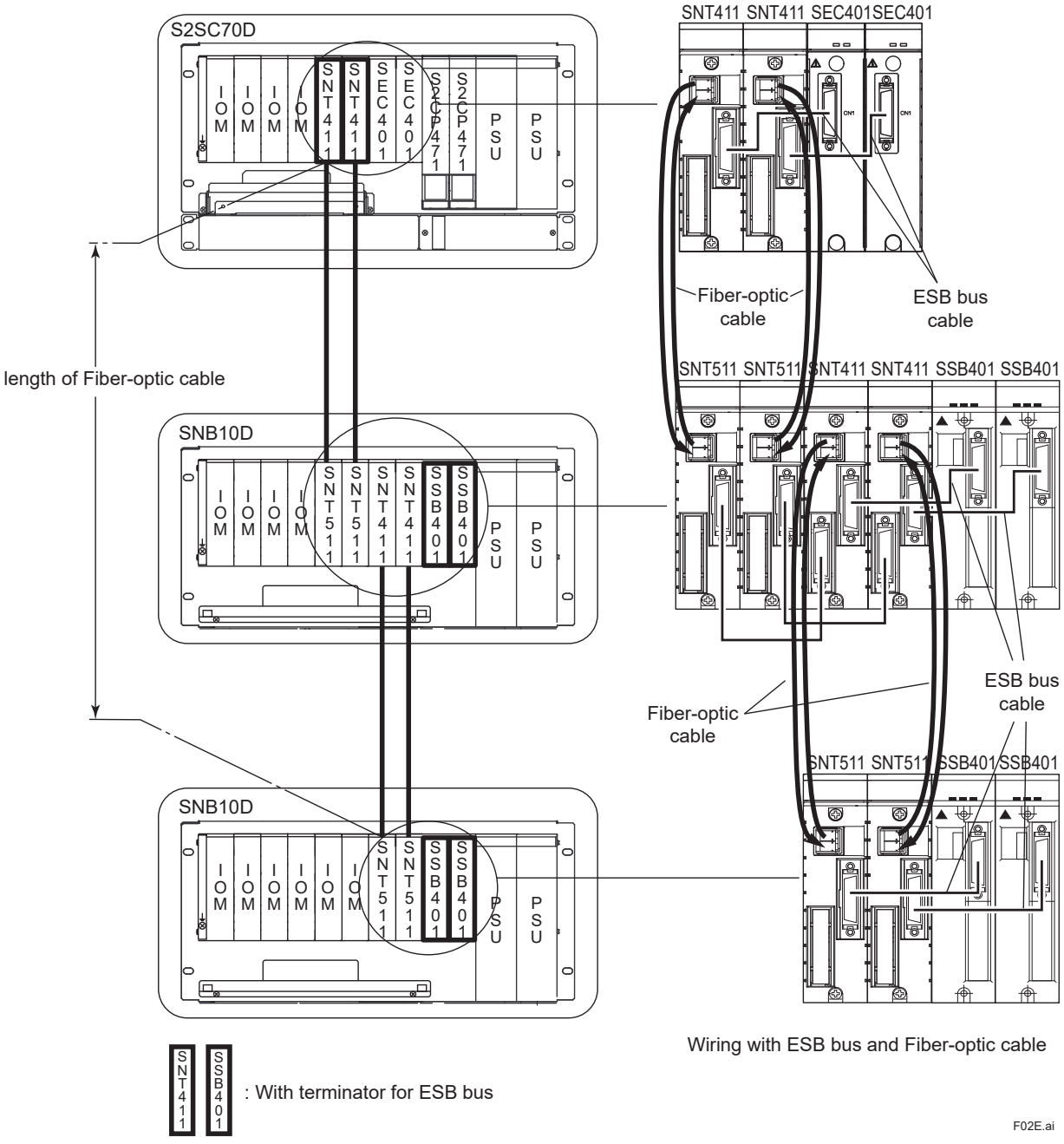


Figure Example of Chain Type Connection

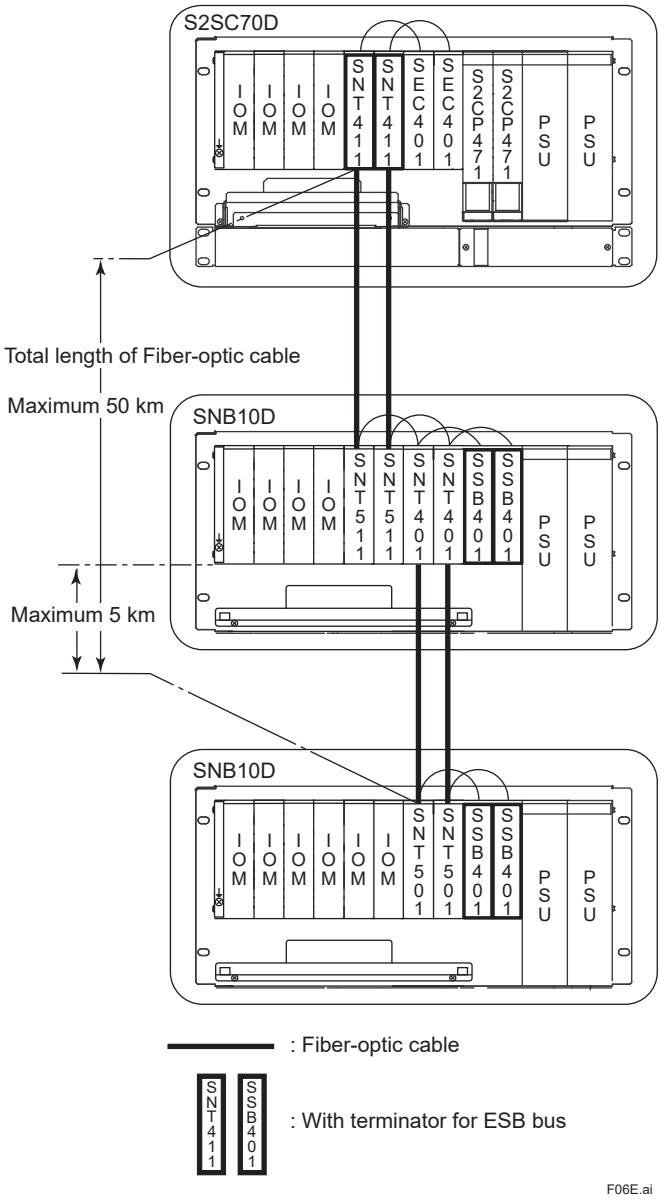
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● Total Length of Fiber-optic Cable

When SNT401/SNT501, SNT411/SNT511 and S2EN501 are mixed, fiber-optic cable is extendable maximum 50 km. There is a following restriction.

Example:

When combination of SNT401 and SNT501 and that of SNT411 and SNT511 are mixed and the length of cable for SNT401 and SNT501 is 5 km, the length of cable for SNT411 and SNT511 must be as long as 45 km (50 km – 5 km).



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■ MODEL AND SUFFIX CODES

		Description
Model	SNT411	Optical ESB Bus Repeater Master Module 5 km to 50 km
Suffix Codes	-5	With no explosion protection
	-E	With explosion protection
	3	ISA Standard G3 and temperature (–20 to 70 °C) (only for maintenance purpose)
	F	ISA Standard G3 and temperature (–20 to 70 °C) (for SNT511-☐F and S2EN501-☐2☐☐☐☐ (*1))
Option Codes	/CU1N	Connector unit for ESB bus [Part Number: S9345FA]
	/CU1T	Connector unit with terminator for ESB bus [Part Number: S9346FA]

		Description
Model	SNT511	Optical ESB Bus Repeater Slave Module 5 km to 50 km
Suffix Codes	-5	With no explosion protection
	-E	With explosion protection
	3	ISA Standard G3 and temperature (–20 to 70 °C) (only for maintenance purpose)
	F	ISA Standard G3 and temperature (–20 to 70 °C) (for SNT411-☐F and S2EN501-☐☐2☐☐☐ (*1))

Note: The suffix code of the module for bus 1 and the module for bus 2 must be same.
Note: When optical ESB bus repeater modules are connected via fiber-optic cable, the master side must be paired with the slave side as described below.

Master side	Slave side
SNT411-☐3	SNT511-☐3
SNT411-☐F	SNT511-☐F
SNT411-☐F	S2EN501-☐2☐☐☐☐
S2EN501-☐☐2☐☐☐	SNT511-☐F

*1: S2EN501 is a module installed in S2NN30D.

■ CONFORMITY STANDARDS

Refer to “ProSafe-RS Standards Compliant Models” (GS 32P01B60-01EN).

■ ORDERING INFORMATION

Specify the model and suffix codes when ordering.
For selecting the right products for explosion protection, please refer to TI 32S01J30-01E without fail.

■ TRADEMARKS

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4.5 Optical ESB Bus Repeater Module

An optical ESB bus repeater module converts electric signals sent through the ESB bus connecting safety control unit to the safety node unit and safety node unit to another safety node unit, into optical signals. As a result, it is possible to extend the transmission distance.

The optical ESB bus repeater module is connectable to safety control unit, safety node unit, and the unit for optical bus repeater module. The type of module (master or slave) determines which unit it is connectable to.

Types of Optical ESB Bus Repeater Module

The following models of optical ESB bus repeater modules are available: The optical ESB bus repeater module must always be dual-redundantly configured.

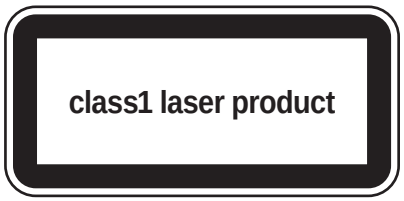
Table 4.5-1 Optical ESB Bus Repeater Module

Model	Name	Description
SNT401 SNT411	Optical ESB bus repeater master module	• Mountable units: Safety control unit SSC10S/SSC10D: SNT401 SSC60S/SSC60D, SSC50S/SSC50D: SNT401/SNT411 Safety node unit Unit for optical bus repeater module
		• Module types: Connector unit for ESB bus Connector unit with terminator for ESB bus
		• Total transmission maximum length of fiber-optic cable(*1) 5 km: SNT401 50 km: SNT411(*2)
SNT501 SNT511	Optical ESB bus repeater slave module	• Mountable units: Safety node unit Unit for optical bus repeater module
		• Total transmission maximum length of fiber-optic cable(*1) 5 km: SNT501 50 km: SNT511(*2)

*1: With SSC60S/SSC60D, SSC50S/SSC50D, even if the optical ESB bus repeater modules are used on two levels, the maximum extension length of the optical fiber cable is 50 km.
*2: The minimum length is 5 km.

CAUTION

This product is a laser class 1 product acceptable IEC 60825.



"1" if the module is mounted onto the safety control unit or the safety node unit.

- Switches 2 to 5: Always "0"
- Switches 6 to 8: Used for maintenance. Usually "0" for routine operation.



IMPORTANT

Make sure that the DIP switches are correctly set.

Fiber-Optic Cable Connector

This connector is used for fiber optic cable. Use the following fiber-optic cables.

Table 4.5-2 Fiber-Optic Cable Specifications

		Specifications
Optical connector type		Type LC (conforming to the IEC 61754-20)
Max. permissible optical loss		0 to 16 dB@1.3 µm: SNT401 and SNT501 3 to 16 dB@1.55 µm: SNT411 and SNT511 style S2 and higher(*1) 1 to 16 dB@1.55 µm: SNT411 and SNT511 style S1(*1)
Fiber-optic cable	Type	Quartz singlemode fiber (JIS C 6835 Type SSMA-9.3/125 or IEC 60793-2-50 Type B1.1)
	Number of cores	2-core
	Max. length	50 km: SNT411 and SNT511 5 km: SNT401 and SNT501

*1: When using SNT411 and SNT511 modules, if any of the SNT411 or SNT511 modules are style S2 or higher, make sure that the optical attenuation between the SNT411 and SNT511 modules is at least 3 dB. If the attenuation is less than 3 dB, use an attenuator.
If all of the SNT411 and SNT511 modules are style S1, make sure that the attenuation is at least 1 dB. If the attenuation is less than 1 dB, use an attenuator.
It is possible to mix styles S2 and S1.

ESB Bus Cable Connector

This connector is used for ESB bus cable (YCB301).

The connector unit with the terminator for the ESB bus is attached, since the optical ESB bus repeater slave module (SNT501/SNT511) is always at the end of the ESB bus.