Yokogawa ALR121-S50

2-Port RS-422 RS-485 Communication Module

Yokogawa ALR121-S50 connects serial subsystems to a CENTUM field control station, allowing external device data to be used within the process-control system. It provides two RS-422/RS-485 ports for supported communication functions including Modbus RTU and FA-M3. Both ports use the same selected communication function, rather than acting as two independently programmable protocol gateways. ALR121-S50 can also participate in supported redundant-module arrangements, making protocol, baud rate and redundancy design central to replacement selection.



Technical Specifications

Product Identity	
Manufacturer	Yokogawa
Complete model	ALR121-S50
Dimensions (W × H × D)	32.8 × 130 × 142.9 mm
Functional Configuration	
Function	Serial subsystem communication
Interfaces	2 × RS-422/RS-485
Transmission	Half duplex; start-stop synchronization
Connections	RS-422 point-to-point; RS-485 multipoint
Modbus protocol / stations	RTU; maximum 30 subsystem stations per port
Port-function rule	Both ports use the same communication function
Wiring terminals	M4 screws; 5 poles × 2
Performance & Power	
Maximum transmission distance	1200 m total
Modbus speed	1200 / 2400 / 4800 / 9600 / 19200 bps
Current consumption	0.5 A
Environment	
Protection option	Standard version without explosion protection

Selected original manufacturer pages follow on pages 3–6.

Compatibility & Selection Guide

System compatibility. ALR121-S50 operates with the applicable AFV30/AFV40, A2FV50 and A2FV70 field control stations and corresponding VP6F1700/1800/1900 control functions. Engineering uses VP6E5100. Modbus RTU supports up to 30 subsystem stations per port. Verify the subsystem driver, data mapping and redundancy support; two ports on one module do not themselves create a redundant pair.

Wiring & Installation Reference

Signal and connection checks

Interface. RS-422 / RS-485 · Use the configured connection method

Terminals. 5 poles × 2; M4 screws · Use specified shielded cable or AKB161/162

Bus distance. 1200 m maximum total · Match subsystem and cable requirements

Module fit and configuration

Confirm the system position.. Match the field control unit, node type, complete module code and existing configuration before replacement.

Match termination and dimensions.. Use the specified terminal/cable interface and check the module envelope against the installed assembly.

Verify the configured function.. Confirm RS-422/RS-485, the common protocol selected for both ports, baud rate, data mapping and the installed redundancy arrangement.

Installation precautions. Use the same communication function on both ports of one module. Check the complete redundant-module and slot arrangement; one-shot data writing is unavailable during dual-redundant operation.

View connection specifications (PDF) · PDF page 3 | View mounting dimensions (PDF) · PDF page 6

Manufacturer sources: Models ALR111, ALR121 Serial Communication Modules (for N-IO/FIO).

■ STANDARD SPECIFICATIONS

The serial communication modules (ALR111 and ALR121) hardware specifications are as shown below.

Table Serial Communication Module Hardware Specifications

Item	Specifications	
Model	ALR111	ALR121
Interface	RS-232C	RS-422/RS-485
Connection method	Point-to-point	Point-to-point (RS-422) Multipoint (RS-485)
Communication function	Half-duplex	
Synchronization method	Start-stop synchronization	
Transmission speed	1200/2400/4800/9600/19200/38400 bps (*1)	
Transmission code	ASCII/binary	
Character length	7/8 bits	
Stop bit length	1/2 bits	
Parity check	None/even/odd	
Lag time after data transmission	1 ms (The lag time to start receiving data again after data transmission.)	
Transmission distance	Maximum 15 m	Maximum 1200 m (total extended length)
Installation method	Mounted on ANB10□, ANB11□, AFV10□, AFV30□, AFV40□, A2FV50□, or A2FV70□	
I/O wiring	AKB131, AKB132, AKB133, AKB134 cables, etc.	Cable with 3-pair shield, AKB161, or AKB162
Wiring connection	D-sub-9-pin (female x 2)	Clamped with terminal block's M4 screws (5 poles x 2)
Current consumption	0.5 A	
Weight	Approx. 0.30 kg	Approx. 0.30 kg

*1: The applicable transmission speed depends on the communication function, subsystems, and connection method.

An FCS collects data from subsystems or sets data with control calculations to subsystems using the builder functions by way of serial communication modules. A communication module selects only one communication function, thus two ports must have identical communication functions. It is not possible to select different communication function for every port. The communication functions and those transmission speeds for each communication module are as shown in the table below.

Table Communication Functions for Communication Modules

Communication function	ALR111	ALR121
FA-M3 communication	DR	DR
Modbus communication	DR	DR
MELSEC-A communication	DR	DR
YS communication with direct connection	NIL	SG
YS communication	NIL	SG
SLC500 communication	SG	SG
PLC-S communication	SG	SG

DR: Dual-redundant communication is applicable. SG: Only single communication is applicable. NIL: Not complied

Table Transmission Speed by the Communication Function

Communication function	Transmission speed (bps)
FA-M3 communication	1200/2400/4800/9600/19200/38400 (*1)
Modbus communication	1200/2400/4800/9600/19200
MELSEC-A communication	1200/2400/4800/9600/19200
YS communication (direct connection)	9600
YS communication	9600
SLC500 communication	1200/2400/4800/9600/19200
PLC-S communication	1200/2400/4800/9600/19200

*1: The transmission speed of 38400 bps is not available for some PC link modules.

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● Modbus Communication

Connected device: Serial transmission interface module
Connection method: Connect an ALR111 or ALR121 module communication port with serial transmission interface module
Applicable devices: By Yokogawa - STARDOM FCN, FCJ, and GC1000 Mark II (*1)
By Schneider Electric - Modicon484, 584, 584L, 884, 984, 984A, 984B, 984X, and Micro 84
By Yasukawa Electric - Memocon-SC U84, 584, 684H, 694H, R84H-M, GL60S, and GL20
Transmission protocol: Modbus protocol (RTU mode)
No. of subsystem stations: Max. 30 stations/port

*1: The communication with GC1000 Mark II is enabled via ASGW, and the number of port available for communication is one.

Table List of Applicable Devices

Device type	Device name	Communication capacity (per communication)	Read	Write
Bit device	Coil	125 words	Y (*2)	Y
	Input relay		Y	N
	Link relay (*1)		Y (*2)	Y
	Step status (*1)		Y	N
Word device	Input register	125 words	Y	N
	Maintenance register		Y (*2)	Y
	Constant register (*1)		Y (*2)	Y
	Step passing time (*1)		Y	N
	Link register (*1)		Y (*2)	Y
	Enhanced register (*1)		Y (*2)	Y
	4-byte register		Y	N
Other device	Specific coil	1 word	Y	N
	Communication status		Y	N

Y: Applicable
N: Not applicable
*1: These devices are for Memocon-SC GL60S.
*2: Data may not be readable depending on the functional codes.

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■ DUAL-REDUNDANCY OF COMMINUCATION

● Functional Overview

When the communication function complies, the dual-redundant configuration (*1) can be provided by setting the serial communication modules to dual-redundant.

Each of the ALR111 and ALR121 modules has two ports; however, the dual-redundant communication requires two communication modules.

The two sets of dual-redundant communication are enabled by two ports of ALR111/ALR121; however, the communication control is defined by each communication module. When one of the communication ports detects an error, both ports switch over the control/stand-by sides to the redundant module.

Note that the one-shot write specification cannot be used when dual-redundant communication is set.

*1: Refer to “Table Communication Functions Communication Modules.”

● Data Input Flow

Each of the two ALR111/ALR121 modules communicates with the subsystem and reads the subsystem input image data into the module. An FCS accesses the control communication module to read and use these data; however, it does not access the standby communication module. When the FCS detects a control communication module error or subsystem communication failure, the FCS switches its control to the standby module from which to read data.

● Data Output Flow

A control communication module outputs data to a subsystem. The control communication module writes data to the subsystem at the specified intervals when an FCS sets the data in it.

Meanwhile, the standby communication module re-reads and retains the output image data when it accesses the subsystem at the specified interval. This equalizes the data between the control and standby communication modules.

When an error is detected, the FCS switches its control to the stand-by module through which the FCS continues to output data to the subsystem.

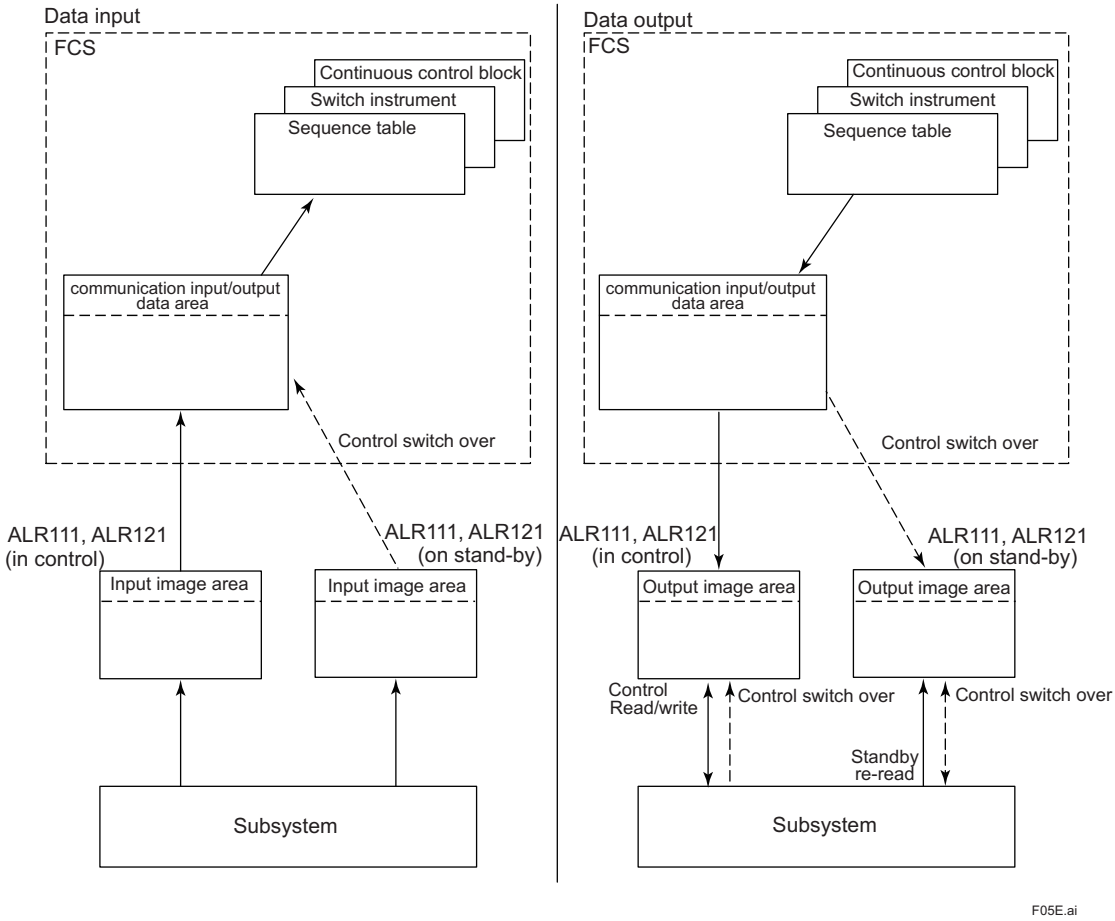
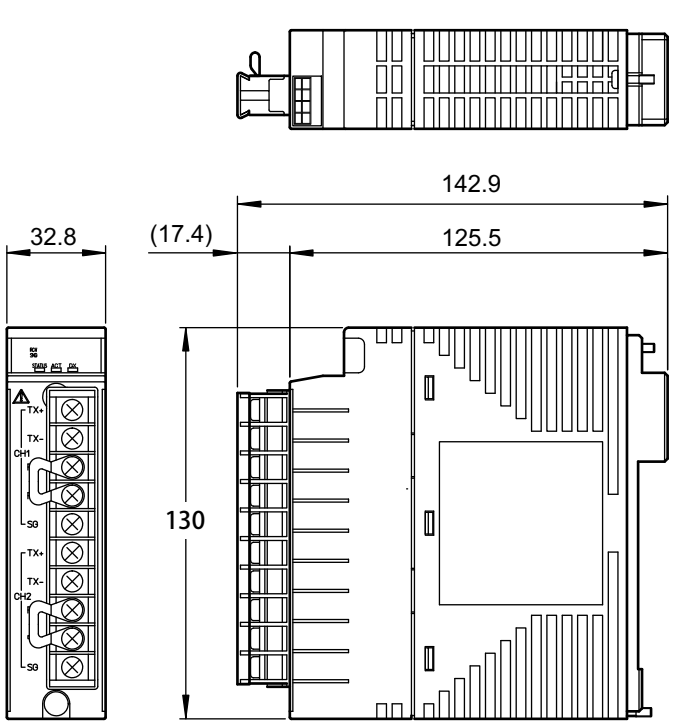


Figure Data Flow in Dual-redundant Configuration

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● **ALR121 Serial Communication Module (RS-422/RS485)**

Unit: mm



F08E.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.

■ MODEL AND SUFFIX CODES

		Description
Model	ALR111	Serial Communication Module (RS-232C, 2-port for N-IO/FIO)
Suffix Codes	-S	Standard type
	5	With no explosion protection
	E	With explosion protection
	0	Basic type
	1	With ISA Standard G3 option

		Description
Model	ALR121	Serial Communication Module (RS-422/RS-485, 2-port for N-IO/FIO)
Suffix Codes	-S	Standard type
	5	With no explosion protection
	E	With explosion protection
	0	Basic type
	1	With ISA Standard G3 option
	3	With ISA Standard G3 option and temperature (-20 to 70 °C) option

■ APPLICABLE STANDARDS

Refer to the GS “Integrated Production Control System CENTUM VP System Overview” (GS 33J01A10-01EN).

■ ORDERING INFORMATION

Specify models and suffix codes when ordering.
For selecting the right products for explosion protection, please refer to TI 33Q01J30-01E without fail.

■ TRADEMARKS

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