

General Specifications

Field Connection Specifications (for N-IO)



GS 33J62A20-01EN

[Release 6]

■ GENERAL

This general specifications (GS) describes how the N-IO I/O units and communication modules are connected with field devices.

■ SIGNAL CONNECTIONS

● Variation of signal connections

An N-IO I/O unit can be connected to the field device directly from the pressure clamp terminal or the spring clamp terminal on the base plate via the field cable or relaying the terminal board via a dedicated cable. A communication module can be connected to a field device with a dedicated cable or a pressure clamp terminal depending on the application. The tables below show signal connections of the base plates for N-IO I/O and communication modules.

Table Signal connections of N-IO I/O units

Model name	Module name	Number of I/O channels per module	Signal connection			Terminal board connection		Field cable specification
			Pressure clamp terminal	Spring clamp terminal	Cable connector	Cable	Terminal board	
A2BN3D -□1□□□	Base plate for adaptor (for N-IO, 16 channel, with adaptor, Pressure clamp terminal or spring clamp terminal)	16	X	—	—	—	—	(*4)
A2BN3D -□2□□□		16	—	X	—	—	—	(*4)
A2BN3D -□9□□□		16	—	—	X	AKB331 AKB651 (*1)	A2BM4 (*2)	(*4)
A2BN4D	Base plate for barrier (for N-IO, MTL barrier)	16	(*3)			—	—	(*3)
A2BN5D	Base plate for barrier (for N-IO, P+F barrier)	16	(*3)			—	—	(*3)

- X: Connectable —: Not connectable
- *1: Refer to the GS "Cables (for FIO)" (GS 33J60J10-01EN).
- *2: Refer to the GS "Terminal Boards (for N-IO)" (GS 33J62H50-01EN).
- *3: Refer to the GS "Base plates (for N-IO)" (GS 33J62F40-01EN).
- *4: Refer to "SIGNAL CABLES" section of this document.

Table Signal connections of communication modules

Model name	Module name	Number of communication ports per module	Field-side signal connection		Field cable specification
			Pressure clamp terminal	Spring clamp terminal	
ALR111	Serial communication module (RS-232C, 2 port, for N-IO/FIO)	2 ports	—	—	(*1)
ALR121	Serial communication module (RS-422/RS-485, 2 port, for N-IO/FIO)	2 ports	—	—	(*1)
ALE111	Ethernet communication module (for N-IO/FIO)	1 ports	—	—	(*2)
ALF111	FOUNDATION fieldbus communication module (for N-IO/FIO)	1 ports	X (*3)	—	(*4)
ALP121	PROFIBUS-DP communication module (for N-IO/FIO)	1 ports	—	—	(*5)
A2LP131	PROFINET Communication Module (for N-IO/FIO)	1 ports	—	—	(*6)
A2LP141	PROFINET Communication Module (for N-IO/FIO)	1 ports	—	—	(*6)

X: Connectable —: Not connectable

- *1: Yokogawa's genuine serial communication cables are also available.
Refer to the GS "Serial communication modules (for N-IO/FIO)" (GS 33J60G10-01EN) for details.
- *2: General-purpose ethernet crossover cable (connector: RJ-45)
- *3: A pressure clamp terminal connection is available by attaching ATF9S terminal block.
- *4: Connection to the terminal board (AEF9D) is enabled by using the dedicated cable (AKB336).
- *5: Compliant with IEC61158-2 type 3 (PROFIBUS).
- *6: Compliant with IEC61158-2 type 10 (PROFINET).

■ SIGNAL CABLES

● Field cable for A2BN3D

Applicable cables

An appropriate cable that matches the installation environment must be used by referring to the TI "CENTUM VP installation guidance" (TI 33J01J10-01EN).

Recommended Cable Thickness

Terminal	Sleeve	Cable nominal cross sectional area (mm ²)
Pressure clamp terminal	Not used	0.5 to 2.5 (AWG 20 to 14)
	Used	
Spring clamp terminal	Not used	
	Used	

Cable termination processing

• Without a sleeve

Terminal	Cable nominal cross sectional area (mm ²)	Peel-off length (mm)
Pressure clamp terminal	0.5 to 2.5 (AWG 20 to 14)	7
Spring clamp terminal	0.5 to 2.5 (AWG 20 to 14)	7

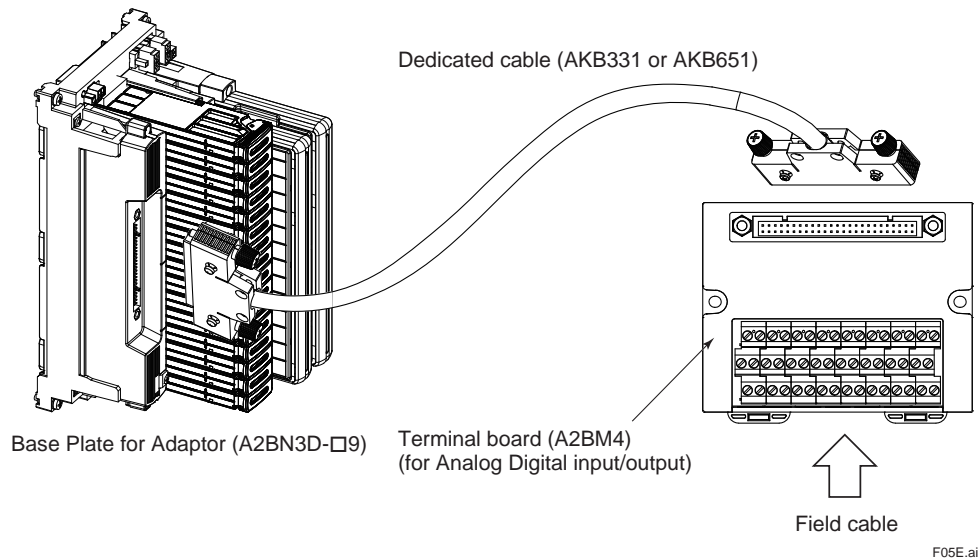
• With a sleeve

When using a sleeve, a cable must have terminal processing in accordance with the instructions of the sleeve manufacturer. Use one of the following sleeves is recommended.

Sleeve without insulating cover (DIN 46 228/1) Sleeve with insulating cover (DIN 46 228/4)

Cable nominal cross sectional area (mm ²)	Using a sleeve with insulating cover			Using a sleeve without insulating cover	
	Peel-off length (mm)	Sleeve dimensions		Peel-off length (mm)	Sleeve dimensions
		Total length (mm)	Contact section length (mm)		Total length (mm)
0.5	10	14	8	6	6
0.75	10	14	8	6	6
1.0	10	14	8	6	6
1.5	10	14	8	7	7
2.5	10	14	8	7	7

● Field wiring to base plate relaying terminal board



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Figure Field wiring to base plate relaying terminal board

Applicable cables

An appropriate cable that matches the installation environment must be used by referring to the TI “CENTUM VP installation guidance” (TI 33J01J10-01EN).

Dedicated cable

AKB331 or AKB651

Recommended Cable Thickness

Terminal	Sleeve	Cable nominal cross sectional area (mm ²)
Pressure clamp terminal	Not used	0.5 to 2.5 (AWG 20 to 14)
	Used	

Cable termination processing

- Without a sleeve

Terminal	Cable nominal cross sectional area (mm ²)	Peel-off length (mm)
Pressure clamp terminal	0.5 to 2.5 (AWG 20 to 14)	7

- With a sleeve

When using a sleeve, a cable must have terminal processing in accordance with the instructions of the sleeve manufacturer. Use one of the following sleeves is recommended.

Sleeve without insulating cover (DIN 46 228/1) Sleeve with insulating cover (DIN 46 228/4)

Cable nominal cross sectional area (mm ²)	Using a sleeve with insulating cover			Using a sleeve without insulating cover	
	Peel-off length (mm)	Sleeve dimensions		Peel-off length (mm)	Sleeve dimensions
		Total length (mm)	Contact section length (mm)		Total length (mm)
0.5	10	14	8	6	6
0.75	10	14	8	6	6
1.0	10	14	8	6	6
1.5	10	14	8	7	7
2.5	10	14	8	7	7

● **Field cable for ALF111**

Applicable cables

An appropriate cable that matches the installation environment must be used by referring to the TI “CENTUM VP installation guidance” (TI 33J01J10-01EN).

Recommended cable thickness

Terminal	Sleeve	Cable nominal cross sectional area (mm ²)
Pressure clamp terminal	–	0.82 (AWG 18)

Cable termination processing

- Without a sleeve

Terminal	Cable nominal cross sectional area (mm ²)	Peel-off length (mm)
Pressure clamp terminal	0.82 (AWG 18)	11

- With a Sleeve

It is recommended to use any one of the following sleeves.

Sleeve without insulating cover (DIN 46 228/1) Sleeve with insulating cover (DIN 46 228/4)

Cable nominal cross sectional area (mm ²)	Using sleeve with insulating cover			Using a sleeve without insulating cover	
	Peel-off length (mm)	Sleeve dimensions		Peel-off length (mm)	Sleeve dimensions
		Total length (mm)	Contact section length (mm)		Total length (mm)
0.82	12	16	10	10	10

● **Field cable for ALR121**

Applicable cables

An appropriate cable that matches the installation environment must be used by referring to the TI “CENTUM VP installation guidance” (TI 33J01J10-01EN).

Recommended cable thickness

Terminal	Cable nominal cross sectional area (mm ²)
M4 crimp terminal (Solderless lug terminal)	0.32 to 1.25 (AWG22 to 16)

Cable termination processing

- Solderless lug specifications

Cable nominal cross sectional area (mm ²)	Screw used (mm)	Hole diameter (mm)	Lug outside diameter (mm)	Lug length (mm)	Insulation covering inside diameter (mm)	Dimension “C” (mm)
0.32 to 1.25	4 (*1)	4.3 or more	8.2 or less	Approx. 21	3.6 or more	7.0 or more

*1: Recommended tightening torque is 1.2 N·m.

■ TERMINAL CONNECTION SPECIFICATIONS

● A2BN3D

For the base plate for adaptor (A2BN3D), the I/O adaptor to be mounted and the terminal to be connected vary by the connecting devices. For the field connection, there are two ways of the direct field wiring to the terminal on A2BN3D and connecting field signal to A2BN3D via the dedicated cable and terminal board. See the table below to select an I/O adaptor and connect the signal cable to the appropriate terminal. Refer to “I/O adaptors (for N-IO)” (GS 33J62F30-01EN) for the details of the I/O adaptors.

Table Terminal numbers and signal types for A2MMM843 (1/2)

Adaptor (model)	Terminal number (*1)	Signal type					
Current input/voltage input adaptor (A2SAM105) (*2)	<input type="checkbox"/> A	2-wire transmitter input +	4-wire transmitter Current input +	Voltage input +			
	<input type="checkbox"/> B	2-wire transmitter input –	4-wire transmitter Current input –	Voltage input –	—	—	—
	<input type="checkbox"/> C	—	—	—			
	<input type="checkbox"/> D	—	—	—			
Current output/voltage output adaptor (A2SAM105)	<input type="checkbox"/> A	Current output +	Voltage output +	—			
	<input type="checkbox"/> B	Current output –	Voltage output –	—	—	—	—
	<input type="checkbox"/> C	—	—	—			
	<input type="checkbox"/> D	—	—	—			
mV/TC/RTD input adaptor (A2SAT105) (*3)	<input type="checkbox"/> A	Thermocouple/ mV input +	RTD input A (*4)	Potentiometer input 100% (*4)			
	<input type="checkbox"/> B	Thermocouple/ mV input –	RTD input B	Potentiometer input Variable	—	—	—
	<input type="checkbox"/> C	—	RTD input B (*4)	Potentiometer input 0% (*4)			
	<input type="checkbox"/> D	—	—	—			
Pulse input signal adaptor (A2SAP105)	<input type="checkbox"/> A	—	Power supply type 2-wire power supply	Power supply type 3-wire power supply	Dry contact input + (*5)	Dry contact input + (*6)	—
	<input type="checkbox"/> B	2-wire (voltage) +	Power supply type 2-wire signal	Power supply type 3-wire +	Dry contact input – (*5)	Dry contact input – (*6)	Dry contact input + (*7)
	<input type="checkbox"/> C	2-wire (voltage) –	Connect to A2EXR001 (*8)	Power supply type 3-wire –	—	Connect to A2EXR001 (*6)	Dry contact input – (*7)
	<input type="checkbox"/> D	—	Connect to A2EXR001 (*8)	—	—	Connect to A2EXR001 (*6)	—
Digital input adaptor (A2SDV105)	<input type="checkbox"/> A	Voltage input +	—				
	<input type="checkbox"/> B	Voltage input –	—				
	<input type="checkbox"/> C	—	Dry contact input + (*9)	—			
	<input type="checkbox"/> D	—	Dry contact input – (*9)	—			
Digital output adaptor (A2SDV505)	<input type="checkbox"/> A	Digital output + (*9)					
	<input type="checkbox"/> B	Digital output – (*9)	—	—			
	<input type="checkbox"/> C	—					
	<input type="checkbox"/> D	—					

Table Terminal numbers and signal types for A2MMM843 (2/2)

Adaptor (model)	Terminal number (*1)	Signal type					
Relay output adaptor (A2SDV506)	<input type="checkbox"/> A	Relay output (NO) + (*10)	—				
	<input type="checkbox"/> B	Relay output (COM) –	Relay output (COM) –	—		—	—
	<input type="checkbox"/> C	—	Relay output (NC) + (*10)				
	<input type="checkbox"/> D	—	—				
Pass-through I/O signal adaptor (A2SMX801)	<input type="checkbox"/> A	I/O pass-through +					
	<input type="checkbox"/> B	I/O pass-through –	—	—		—	—
	<input type="checkbox"/> C	—					
	<input type="checkbox"/> D	—					
Pass-through I/O signal adaptor (A2SMX802)	<input type="checkbox"/> A	3-wire transmitter Current input +	4-wire transmitter Current input +	Open drain (DO sink)			
	<input type="checkbox"/> B	3-wire transmitter Current input – (*9)	4-wire transmitter Current input – (*11)	—		—	—
	<input type="checkbox"/> C	Field power supply + (*9)	Field power supply + (*9)	Field power supply + (*9)			
	<input type="checkbox"/> D	—	Field power supply – (*9) (*11)	—			

: represents channel number (1 to 16). —: Means that the terminal is not used. Do not connect any signal it.

Note: For details on the connection configuration, refer to the TI “CENTUM VP Installation guidance” (TI 33J01J10-01EN).

- *1: Terminal-D is available for A2BN3D-□1□□□, -□2□□□ (Unavailable for A2BN3D-□9□□□).
- *2: When the power supply is turned off or overcurrent is detected, the current input loop becomes a high impedance state.
- *3: A2SAT105 is available for A2BN3D-□1□□□, -□2□□□ (Unavailable for A2BN3D-□9□□□).
- *4: The resistance values of the connecting cables must match.
- *5: Used when the frequency is 0 to 5 kHz.
- *6: Used when the frequency is 0 to 10 kHz.
For details of the A2EXR001 specification, refer to the GS “I / O adaptor (for N-IO)” (GS 33J62F30-01EN).
For details of connection, refer to the TI “CENTUM VP Installation Guidance” (TI 33J01J10-01EN).
- *7: Used when the frequency is 0 to 800 Hz.
- *8: For details of the A2EXR001 specification, refer to the GS “I / O adaptor (for N-IO)” (GS 33J62F30-01EN).
For details of connection, refer to the TI “CENTUM VP Installation Guidance” (TI 33J01J10-01EN).
- *9: Connect the field power supply to the base plate.
- *10: Normal state, the status output is OFF.
- *11: In the internal circuit, terminals B and D have a common potential.

Table Terminal numbers and signal types for A2MDV843

Adaptor (model)	Terminal number (*1)	Signal type	
Digital input adaptor (A2SDV105)	□A	Voltage input +	—
	□B	Voltage input –	—
	□C	—	Dry contact input + (*2)
	□D	—	Dry contact input – (*2)
Digital output adaptor (A2SDV505)	□A	Digital output + (*2)	—
	□B	Digital output – (*2)	—
	□C	—	—
	□D	—	—
Relay output adaptor (A2SDV506)	□A	Relay output (NO) + (*3)	—
	□B	Relay output (COM) –	Relay output (COM) –
	□C	—	Relay output (NC) + (*3)
	□D	—	—
Pass-through I/O signal adaptor (A2SMX801)	□A	I/O pass-through +	—
	□B	I/O pass-through –	—
	□C	—	—
	□D	—	—
Pass-through I/O signal adaptor (A2SMX802)	□A	Open drain (DO sink)	—
	□B	—	—
	□C	Field power supply + (*2)	—
	□D	—	—

□: represents channel number (1 to 16). —: Means that the terminal is not used. Do not connect any signal it.

*1: Terminal-D is available for A2BN3D-□1□□□, -□2□□□ (Unavailable for A2BN3D-□9□□□).

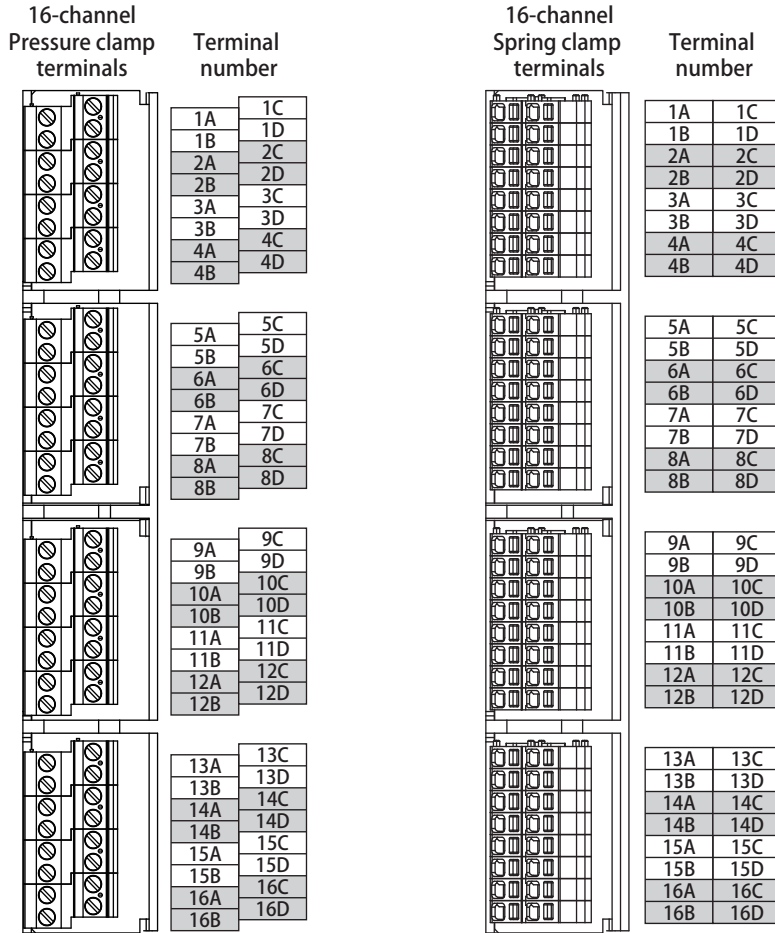
*2: Connect the field power supply to the base plate.

*3: Normal state, the status output is OFF.

■ TERMINAL ARRANGEMENT

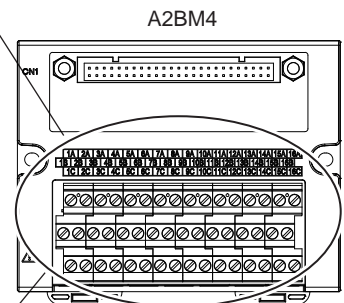
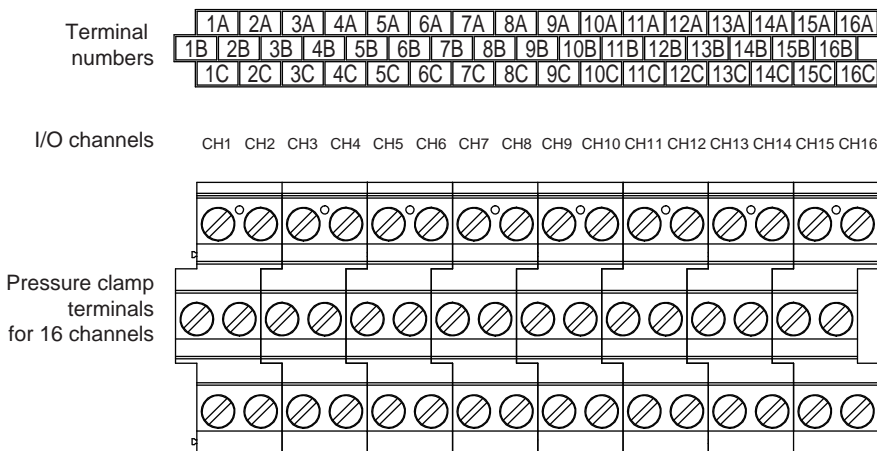
● A2BN3D

For a base plate for adaptor (A2BN3D), select either the pressure clamp terminal, spring clamp terminal, or cable connector to connect the field signals. For the pressure clamp terminal and the spring clamp terminal, connect directly the field signals to the terminal blocks. For a cable connector, connect the field signals through the analog digital I/O terminal board (A2BM4). The following figures show the terminal arrangement.



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● A2BM4



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● **ALF111**

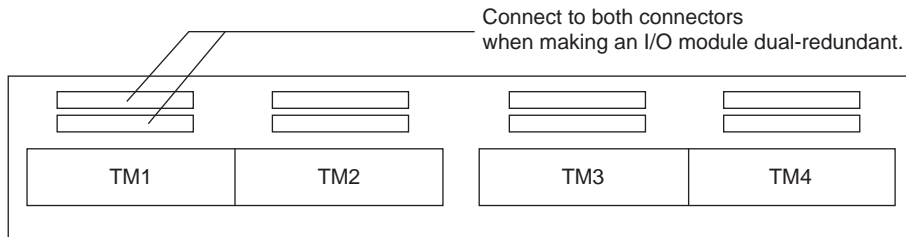
A pressure clamp terminal connection is available by attaching a Terminal Block ATF9S to ALF111.

Signal name	Terminal number
FBUS1+	1
FBUS1-	2
FBUS1+	3
FBUS1-	4
FBUS2+	5
FBUS2-	6
FBUS2+	7
FBUS2-	8
FBUS3+	9
FBUS3-	10
FBUS3+	11
FBUS3-	12
FBUS4+	13
FBUS4-	14
FBUS4+	15
FBUS4-	16

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■ **TERMINAL BOARDS**

● **AEF9D**



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ALF111 connects to the terminal board (AEF9D) by using the dedicated cable (AKB336).
 TM1, TM2, TM3, TM4

Signal name	FBUS1+	FBUS1-	FBUS2+	FBUS2-	FBUS3+	FBUS3-	FBUS4+	FBUS4-	N.C.
Terminal number	1+	1-	2+	2-	3+	3-	4+	4-	N.C.
Signal name	FBUS1+	FBUS1-	FBUS2+	FBUS2-	FBUS3+	FBUS3-	FBUS4+	FBUS4-	N.C.

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Note: Connect the YCB138 to lower terminals if the terminals must be terminated without using a bus power supply (such as MTL5995) containing a terminator.
 Install a Fieldbus Termination (YCB138) to an empty port when connecting a dual-redundant ALF111 to a terminal board.
 Note: The terminal N.C. in the figure is an unused terminal; wiring is not required.

■ **TRADEMARK ACKNOWLEDGMENT**

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