**Table  I/O Module and Signal Connection**

| Model | Module type | Number of I/O points channels per module | Signal connection | | |
|---|---|---|---|---|---|
| | | | Pressure clamp terminal | Dedicated cable (*1) | MIL cable |
| **–** | **Analog I/O modules** | | | | |
| SAI143 | Analog input module (4 to 20 mA, module isolation) (*2) | 16 | X | X | X |
| SAV144 | Analog input module (1 to 5 V/ 1 to 10 V, module isolation) (*2) | 16 | X | X | X |
| SAI533 | Analog output module (4 to 20 mA, module isolation) (*2) | 8 | X | X | X |
| SAT145 | TC/mV input module (isolated channels) | 16 | – | X | – |
| SAR145 | RTD input module (isolated channels) | 16 | – | X | – |
| **–** | **Digital I/O modules** | | | | |
| SDV144 | Digital input module (contact input, module isolation) (*2) | 16 | X | X | X |
| SDV521 | Digital output module (24 V DC/2 A, module isolation) (*2) | 4 | – | X | – |
| SDV526 | Digital output module (100 to 120 V AC, module isolation) (*2) | 4 | – | X | – |
| SDV531 | Digital output module (24 V DC, module isolation) (*2) | 8 | X | X | X |
| SDV53A | Digital output module (48 V DC, module isolation) (*2) | 8 | – | X | – |
| SDV541 | Digital output module (24 V DC, module isolation) (*2) | 16 | X | X | X |
| **–** | **Communication modules** | | | | |
| ALR111 | Serial communication module | 2 ports | – | X (D-sub 9-pin) (*3) | – |
| ALR121 | Serial communication module | 2 ports | – | X (M4 terminal block 10-pole) (*3) | – |
| ALE111 | Ethernet communication module | 1 port | – | X (RJ-45) (*3) | – |

X:     Connectable                    –:     Not connectable

*1:     This cable for connecting I/O modules with terminal boards, and relay boards, is a Yokogawa Electric Corporation dedicated cable.
*2:     Depending on the I/O module's connection configuration, there are restrictions regarding current, cable length, and the like.
*3:     The dedicated signal cable can be connected directly to the I/O module without the terminal block.

**Table  Connection between I/O Module and Terminal Block**

| Model | Module type | Pressure clamp terminal (pressure clamp terminal block) | | Terminal board/Relay board, dedicated cable Upper : 19-inch Rack Mountable Type Lower : DIN Rail Mount Type | | MIL cable | |
|---|---|---|---|---|---|---|---|
| | | Single | Dual-redundant | Single | Dual-redundant | Single | Dual-redundant |
| SAI143 | Analog input | STA4S | STA4D | SEA4D (1 port), KS1 (1 unit) | SEA4D (2 ports), KS1 (2 units) | MIL connector | MIL connector (2 units) |
| | | | | SBA4D (1 port), KS1 (1 unit) | SBA4D (2 ports), KS1 (2 units) | | |
| SAV144 | Analog input | STA4S | STA4D | SEA4D (1 port), KS1 (1 unit) | SEA4D (2 ports), KS1 (2 units) | MIL connector | MIL connector (2 units) |
| | | | | SBA4D (1 port), KS1 (1 unit) | SBA4D (2 ports), KS1 (2 units) | | |
| SAI533 | Analog output | STA4S | STA4D | SEA4D (1 port), KS1 (1 unit) | SEA4D (2 ports), KS1 (2 units) | MIL connector | MIL connector (2 units) |
| | | | | SBA4D (1 port), KS1 (1 unit) | SBA4D (2 ports), KS1 (2 units) | | |
| SAT145 | TC/mV input | — | — | — | — | — | — |
| | | | | SBT4D (1 port), AKB331 (1 unit) (*2) | SBT4D (2 ports), AKB331 (2 units) (*2) | | |
| SAR145 | RTD input | — | — | — | — | — | — |
| | | | | SBR4D (1 port), AKB611 (1 unit) | SBR4D (2 ports), AKB611 (2 units) | | |
| SDV144 | Digital input | STB4S | STB4D | SED4D/SRM53D (*1)/ SRM54D (1 port), AKB331 (1 unit) (*2) | SED4D/SRM53D (*1)/ SRM54D (2 ports), AKB331 (2 units) (*2) | MIL connector | MIL connector (2 units) |
| | | | | SBD4D (1 port), AKB331 (1 unit) (*2) | SBD4D (2 ports), AKB331 (2 units) (*2) | | |
| SDV521 | | — | — | SED2D (1 port), AKB651 (1 unit) (*4) | SED2D (2 ports), AKB651 (2 units) (*4) | — | — |
| | | | | SBD2D (1 port), AKB651 (1 unit) (*4) | SBD2D (2 ports), AKB651 (2 units) (*4) | | |
| SDV526 | | — | — | SWD2D (1 port), AKB652 (1 unit) | SWD2D (2 ports), AKB652 (2 units) | — | — |
| | Digital output | | | — | — | | |
| SDV531 | | STB4S | STB4D | SED4D/SRM53D (1 port), AKB331 (1 unit) (*2) | SED4D/SRM53D (2 ports), AKB331 (2 units) (*2) | MIL connector | MIL connector (2 units) |
| | | | | SBD3D (1 port), AKB331/AKB651 (1 unit) (*2) (*4) (*5) | SBD3D (2 ports), AKB331/AKB651 (2 units) (*2) (*4) (*5) | | |
| SDV53A | | — | — | SED3D (1 port), AKB331 (1 unit) (*2) | SED3D (2 ports), AKB331 (2 units) (*2) | — | — |
| | | | | SBD3D (1 port), AKB331/AKB651 (1 unit) (*2) (*4) | SBD3D (2 ports), AKB331/AKB651 (2 units) (*2) (*4) | | |
| SDV541 (*3) | | STB4S | STB4D | SED4D/SRM54D (1 port), AKB331 (1 unit) (*2) | SED4D/SRM54D (2 ports), AKB331 (2 units) (*2) | MIL connector | MIL connector (2 units) |
| | | | | SBD4D/SBM54D (1 port), AKB331/AKB651 (1 unit) (*2) (*4) | SBD4D/SBM54D (2 ports), AKB331/AKB651 (2 units) (*2) (*4) | | |

Note:  A dual-redundant terminal block is used for connecting two adjacent I/O modules.
Note:  Cable connection covers (SCCC01 and SCCC02) are available for MIL connector connection.
*1:    SDV144 to be connected with SRM53D or SRM54D is for relay read back.
*2:    Use AKB331 style code S3 or later when connecting to SED3D, SBD3D or SBD4D.
*3:    Use SDV541 style code S3 and firmware revision numbers F1:1 F2:1 or later when connecting to SBM54D.
*4:    AKB651 can be used for connecting with SED2D, SBD2D, SBD3D or SBD4D.
*5:    AKB651 can be used for connecting with SDV531-L only.

**Table  Connection between Communication Module, Bus Interface, and Communication Cable**

| Module type | Model | Communication cable |
|---|---|---|
| **Communication module** | ALR111 | AKB131<br>AKB132<br>AKB135<br>AKB136 Other<br>(prepared by customers) |
| | ALR121 | AKB161<br>AKB162 Other<br>(prepared by customers) |
| | ALE111 | Ethernet Cable (*2)<br>(prepared by customers) |
| **Bus Interface** | SNT401 | Fiber-optic Cable<br>(prepared by customers) (*1) |
| | SNT501 | Fiber-optic Cable<br>(prepared by customers) (*1) |
| | SNT411 | Fiber-optic Cable<br>(prepared by customers) (*1) |
| | SNT511 | Fiber-optic Cable<br>(prepared by customers) (*1) |

*1:     For a fiber-optic cable, refer to ProSafe-RS Safety Instrumented System Overview (GS 32Q01B10-31E, GS 32Q01B20-31E).
*2:     Refer to Ethernet Communication Module (GS 32Q06K51-31E).

● **Current Consumption of I/O Modules**

**Table  Current Consumption of I/O Modules**

| Model | Module type | Maximum current consumption at 5 V DC (mA) | Maximum current consumption at 24 V DC (mA) |
|---|---|---|---|
| – | **Analog I/O modules** | | |
| SAI143 | Analog input module (16-channel, 4 to 20 mA, module isolation) | 320 | 550 |
| SAV144 | Analog input module (16-channel, 1 to 5 V/ 1 to 10 V, module isolation) | 300 | 140 |
| SAI533 | Analog output module (8-channel, 4 to 20 mA, module isolation) | 320 | 300 |
| SAT145 | TC/mV input module (16-channel, isolated channels) | 400 | 200 |
| SAR145 | RTD input module (16-channel, isolated channels) | 500 | 200 |
| – | **Digital I/O modules** | | |
| SDV144 | Digital input module (16-channel, contact input, module isolation) | 290 | 140 |
| SDV521 | Digital output module (4-channel, 24 V DC/2 A, module isolation) | 280 | 140 |
| SDV526 | Digital output module (4-channel, 100 to 120 V AC, module isolation) | 500 | 50 |
| SDV531 | Digital output module (8-channel, 24 V DC, module isolation) | 280 | 140 |
| SDV53A | Digital output module (8-channel, 48 V DC, module isolation) | 290 | 150 |
| SDV541 | Digital output module (24 V DC, 16-channel, module isolation) | 300 | 150 |
| – | **Communication modules** | | |
| ALR111 | Serial communication module (RS-232C, 2-port) | 500 | – |
| ALR121 | Serial communication module (RS-422/RS-485, 2-port) | 500 | – |
| ALE111 | Ethernet communication module (1-port) | 500 | – |
| – | **Bus interface module** | | |
| SEC402 | ESB bus coupler module | 500 | – |
| SEC401 | ESB bus coupler module | 500 | – |
| SNT401 | Optical ESB bus repeater master module | 500 | – |
| SNT501 | Optical ESB bus repeater slave module | 500 | – |
| SNT411 | Optical ESB bus repeater master module 5 km to 50 km (for SSC60□, SSC50□) | 500 | – |
| SNT511 | Optical ESB bus repeater slave module 5 km to 50 km (for SSC60□, SSC50□) | 500 | – |

# ■ NODE UNIT MOUNTING RESTRICTIONS (FOR AMBIENT TEMPERATURE 60 °C OR LOWER)

**Power supply capacity limitation**

Up to eight modules per unit can be mounted on SNB10D safety node unit and SSC60□/SSC50□/SSC10□ safety control unit; however, the number differs by power supply capacity. Use the Table "Coefficients of Module (temperature type)" to calculate the sum of Coefficient A and B, and figure out the number that both ∑(coefficient A) + ∑(coefficient B) and ∑(coefficient B) are satisfied within the value shown in the Table " Power Supply Capacity Limitation (temperature type, 60°C or lower)".  The values shown in the Table "Power Supply Capacity Limitation (temperature type, 60°C or lower)" differ by the installation environments such as for standard installation and explosion protection.

**Table  Coefficients of Module (temperature type)**

| Model | Coefficient A | | Coefficient B | |
|---|---|---|---|---|
| | Single | Dual redundant | Single | Dual redundant |
| SAI143-H□3 (2-wire setting) | 3 | 6 | 25 | 29 |
| SAI143-H□3 (4-wire setting) | 3 | 6 | 5 | 10 |
| SAI143-S□3 (2-wire setting) | 3 | 5 | 22 | 25 |
| SAI143-S□3 (4-wire setting) | 3 | 5 | 4 | 7 |
| SAI533-H□3 | 3 | 6 | 12 | 23 |
| SAV144-S□3 | 3 | 5 | 2 | 4 |
| SAT145-S□3 | 5 | 8 | 8 | 16 |
| SAR145-S□3 | 5 | 9 | 8 | 16 |
| SDV144-S□3 | 2 | 4 | 2 | 4 |
| SDV521-S□3 | 2 | 4 | 2 | 4 |
| SDV526-S33 | 5 | 10 | 3 | 5 |
| SDV531-L□3 | 2 | 4 | 2 | 4 |
| SDV53A-S□3 | 2 | 4 | 3 | 5 |
| SDV541-S□3 | 3 | 6 | 5 | 7 |
| Other (*1) | 5 | 10 | 0 | 0 |

*1:    SEC401, SEC402, SNT401, SNT501, SNT411, SNT511, ALR111, ALR121, ALE111

**Table  Power Supply Capacity Limitation (temperature type, 60°C or lower)**

| Model | Installation environment | Ambient temperature (°C) | ∑(coefficient A) +∑(coefficient B) | ∑(coefficient B) |
|---|---|---|---|---|
| SNB10D | Standard installations | -20 ≤ Ta ≤ 60 | – | ≤ 100 |
| | For FM NI and Type n installation in Class I, Division 2/Zone 2 area: | -20 ≤ Ta ≤ 50 | – | ≤ 100 |
| | | -20 ≤ Ta ≤ 60 | – | ≤ 88 |
| SSC60S SSC50S SSC10S | Standard installations | -20 ≤ Ta ≤ 60 | ≤ 121 | ≤ 85 |
| | For FM NI and Type n installation in Class I, Division 2/Zone 2 area: | -20 ≤ Ta ≤ 60 | ≤ 121 | ≤ 85 |
| SSC60D SSC50D SSC10D | Standard installations | -20 ≤ Ta ≤ 60 | ≤ 97 | ≤ 85 |
| | For FM NI and Type n installation in Class I, Division 2/Zone 2 area: | -20 ≤ Ta ≤ 60 | ≤ 97 | ≤ 85 |