

JAB6651 Input/Output Module

Manual and Installation Instructions

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Description

The **JAB6651** is an input/output expansion module compatible with the Johnson Controls family of Field Controllers and Network Controllers. It is designed to provide additional outputs for all compatible controllers that are programmed with the controller configuration tool (CCT). The **JAB6651** is designed to provide additional inputs and outputs for controllers (2 BI, 2 BO, 4 AI and 4 AO).

The **JAB6651** module is a DIN rail mountable device and includes the terminals for wiring the physical input and output points and troubleshooting LEDs. The **JAB6651** module communicates with the host controller via the controllers SA (sensor/actuator) bus.

Configuring and commissioning of the **JAB6651** module is done using the Controller Configuration Tool (CCT).



Part Numbers and Designations

Part-No.	Designation	Description
00002893	JAB6651	Rail mounted Input/Output module

Parts Included

- One JAB6651 Input/Output Module with removable Terminal Plugs.
- One Installation Instructions sheet.

Installation

Observe these guidelines when installing the JAB6651 module(s):

- Transport the modules in the original container to minimize vibration and shock damage to the devices.
- Do not drop the JAB device or subject it to physical shock.
- Verify that all parts are shipped with the JAB modules.

Mounting

Follow these guidelines when mounting JAB6651 modules:

- Mount the JAB module in areas free of corrosive vapours and observe the environmental limitations listed in the *Technical Specifications* section.
- Do not mount the JAB module on surfaces that are prone to vibration.
- Do not mount the modules in areas where electromagnetic emissions from other devices or wiring can interfere with JAB modules communication.
- Mount the JAB module so that no other parts or devices obstruct ventilation of or radiate heat into the modules housing.

Materials and Special Tools Needed

- One 45 mm (1.8 in.) or longer piece of DIN rail and appropriate hardware for mounting the DIN rail.
- Small straight blade screwdriver for securing the wires in the terminal blocks.
- Medium straight blade screwdriver for loosening the device from the DIN rail.

DIN Rail Mount Applications

To mount modules on a DIN rail:

1. Securely mount a 45 mm (1.8 in.) or longer section of DIN rail horizontally and centred in the required space. Allow sufficient space for cable and wire connections (minimum of 50 mm [2 inches] above and below the module, i.e. a total height of approximately 200 mm [8 inches]).
2. Hang the rail mounted devices by the DIN rail hook on the top track of the DIN rail, and position the module's DIN rail channel snugly against the tracks of the DIN rail.
3. The bottom mounting clip must click into place to fix the JAB module securely on the DIN rail.
4. To remove a module from the DIN rail, pull the bottom DIN clip carefully down to the extended position and lift the module off the DIN rail.

Wiring

Please pay attention to all specifications and guidelines documented by Johnson Controls concerning devices running on the MS/TP-Bus. Refer to the *MS/TP Communications Bus Overview Technical Bulletin (LIT-12011034)* for further information.

To wire the JAB6651 module:

1. Terminate wiring as per engineering drawing (see Figure 1) and connect other devices to the SA Bus as required. Wire the SA Bus in a daisy chain.
Note: If multiple Input/Output Modules are used, and the JAB6651 module is located at one end of the SA Bus daisy chain, set the End-of-Line (EOL) switch to Terminated on the last Module (see Figure 3).
2. Ensure the device address DIP switches are set to the appropriate hardware address (in the range of 128-254). See *Setup and Adjustments*.
3. Connect a 24Vac power supply to the JAB6651 module.
4. Download and commission the JAB6651 module. See *Configuring and Commissioning*. The point definitions are automatically downloaded into the JAB6651 module after the host controller has been put into operation by means of the CCT tool and the Input/output modules have been detected by the host controller.

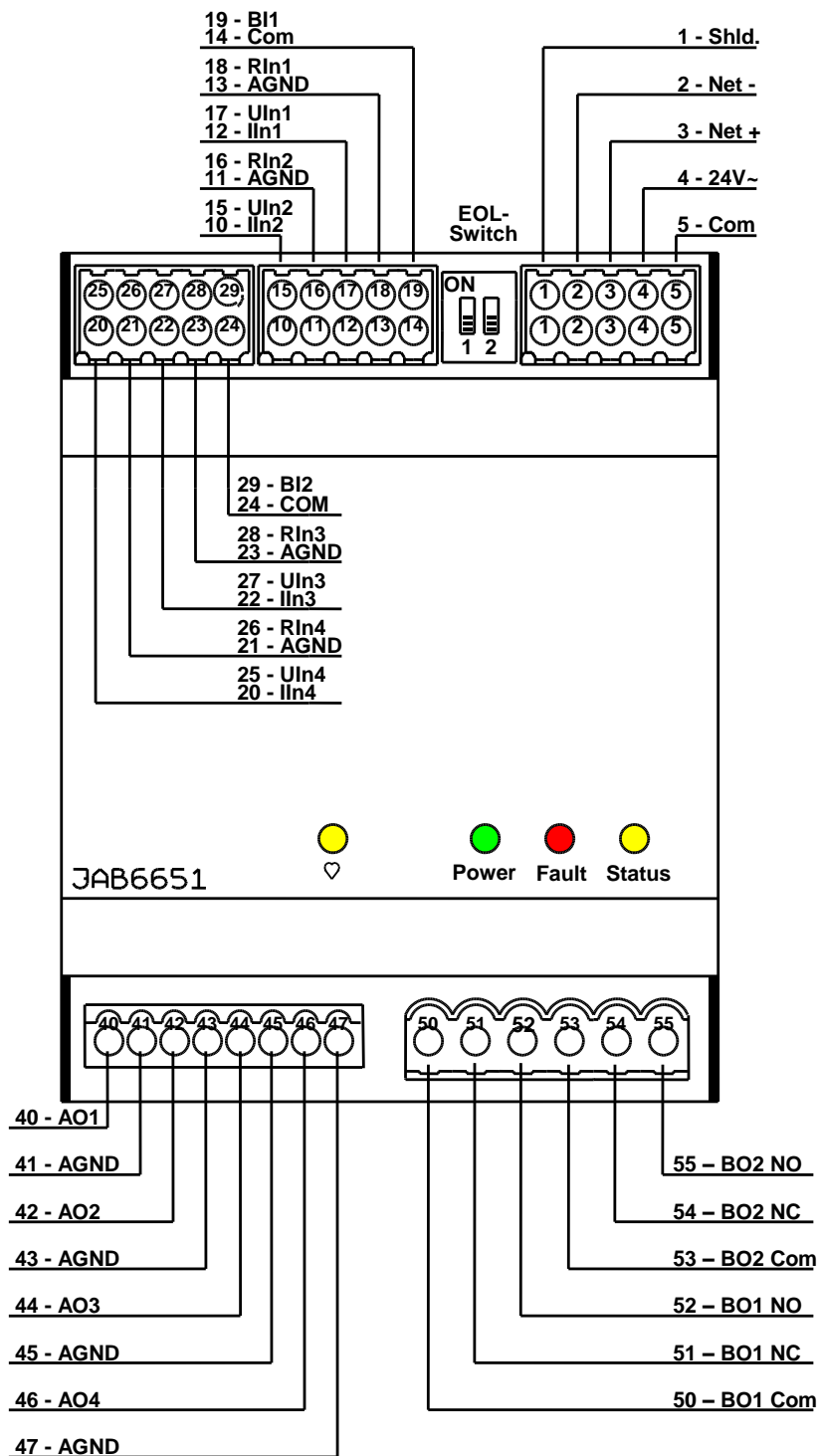


Figure 1: JAB6651 Module Wiring Interface



Note: The SHLD terminal on the SA Bus neither provides an electrically grounded connection or power source for other devices on the SA Bus. It only provides a convenient terminal for connecting the screens of the daisy-chained network cable.

Table 1: Romutec I/O-Modules Family Wiring List (Part 1 of 2):

Terminal Block	Label in Wiring Interface	Function and Electrical Ratings/Requirements	Wiring Requirements
Analog IN (Terminals 10 - 13, 15 - 18, 20 - 23 & 25 - 28)	UIn <i>n</i>	Analog Input, Voltage Mode Accepts a 0-10 VDC input signal, internal 75 kΩ pull-down	A
	IIn <i>n</i>	Analog Input, Current Mode Accepts a 0-20 mA input signal, internal 100 Ω load impedance	B
	RIn <i>n</i>	Analog Input, Resistive Mode Accepts a 0-600 kΩ input signal, internal 12V, 15 kΩ pull-up RTD: 1k Nickel [L & G], 1k Nickel [DIN], 1k Platinum, A99B Silicon Temperature Sensor	A
	AGND	The signal common for all Analog IN terminals; combined with BI-, AO- and power supply terminal commons	same as AI
Binary IN (Terminals 14/19 & 24/29)	BI <i>n</i>	Binary Input, Dry Contact Maintained Mode 0.01 s minimum pulse width (50 Hz at 50% duty cycle) Internal 35 V, 2.7kΩ pull-up	A
	COM	The signal common for all Binary IN terminals; combined with AI-, AO- and power supply terminal commons	
Analog OUT (Terminals 40 - 47)	AO <i>n</i>	Analog Output, Voltage mode, sources 0-10 VDC output voltage External 1kΩ minimum load required 10 VDC maximum output voltage, 10 mA maximum output current	A
	AGND	The signal common for all Analog OUT terminals; combined with AI-, BI- GND terminals and power supply terminal commons	
Binary OUT (Terminals 50 - 55)	BO <i>n</i> NO	Binary Output, up to 250 VAC Relay Contact Connects BO <i>n</i> NO to BO Com when activated <u>Characteristics (Resistive Load):</u> Initial contact resistance 100mΩ (at 1A / 24 VDC) Rated load 5 A at 250 VAC, 5 A at 30 VDC, 10 A at 125 VAC Max. switching voltage 277 VAC, 30 VDC Max. switching capacity 1250 VA (AC), 150 W (DC) Endurance 1x10 ⁵ ops (Rated Load), 1x10 ⁷ ops (no Load)	0.5-1.5 mm ² (20-16 AWG) stranded cable
	BO <i>n</i> NC	Binary Output, up to 250 VAC Relay Contact Disconnects BO <i>n</i> NC from BO Com when activated <u>Characteristics (Resistive Load):</u> Initial contact resistance 100mΩ (at 1A / 24 VDC) Rated load 3 A at 250 VAC, 3 A at 30 VDC, 5 A at 125 VAC Max. switching voltage 277 VAC, 30 VDC Max. switching capacity 750 VA (AC), 90 W (DC) Endurance 1x10 ⁵ ops (Rated Load), 1x10 ⁷ ops (no Load)	
	BO <i>n</i> Com	The output signal common for Binary OUT terminals; isolated from all other terminal commons, including BO terminal commons	

Table 2: Romutec I/O-Modules Family Wiring List (Part 2 of 2):

Terminal Block / Function Group	Label in Wiring Interface	Function and Electrical Ratings / Requirements	Wiring Requirements
SA Bus¹⁾ (Terminals 1 - 3)	Net + Net -	Provides SA Bus communication network	Daisy-chained 366 m maximum length
	Shld	Terminal for the shield of the SA Bus cable	0.5 mm ² to 1.5 mm ² [0.75 mm ² recommended]
24~ Power (Terminals 4 & 5)	24~	AC Supply Input, Supply 24 VAC ± 10%	0.75 mm ² to 1.5 mm ² [1.0 mm ² recommended]
	COM	The 24~ Power common; combined with AI-, AO- and BI- terminal commons	

¹⁾ The SA Bus specifications in this table are for MS/TP bus communications at 38.4k. For more information, refer to the Johnson Controls *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.

Table 3: Wire Gauge and Length Guidelines

Guideline	Cable Size	Maximum Length	Assumptions
A	1.5 mm ² (16 AWG)	457.2 m (1,500 ft)	100 mV maximum voltage drop
	1.0 mm ² (17 AWG)	304.8 m (1000 ft)	
	0.75 mm ² (18 AWG)	228.6 m (750 ft)	
	0.5 mm ² (20 AWG)	152.4 m (500 ft)	
B	1.5 mm ² (16 AWG)	228.6 m (750 ft)	100 mV maximum voltage drop
	1.0 mm ² (17 AWG)	152.4 m (500 ft)	
	0.75 mm ² (18 AWG)	114.2 m (375 ft)	
	0.5 mm ² (20 AWG)	76.2 m (250 ft)	

Setup and Adjustments

Determining the SA Bus Address

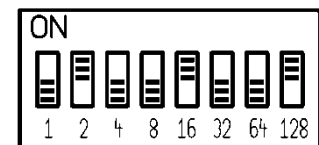
The SA bus address switch sets a unique address for this module on the SA bus. The default address setting is 255 (all ON). You must change this address.

Set consecutive addresses, 128 through 254, for JDB and JAB modules and other subordinate devices on the SA bus.

Set the address of the JAB6651 module using the Dual Inline Package (DIP) switches on the side of the JAB6651 module. The address equals the sum of the numbers set to ON. For example, if the second (2), the fifth (16), and the eighth (128) DIP switches are set to ON, the device address is 146 (2 + 16 + 128 = 146). See Figure 2.

Table 4: FC Bus/SA Bus Address Descriptions

Address	Description
0	Reserved for FC Bus supervisory controller
1-3	Reserved for peripheral devices. (e.g. for FEC local display, address fixed = 3)
4-127	Illegal addresses for Romutec I/O modules – Reserved for field equipment controllers (FEC) and Metasys® IOM master devices. NCE's address fixed = 4
128-254	Valid range of addresses-for Romutec I/O- Modules (Subordinate devices)
255	Default address – must be changed



**Figure 2:
Setting the Address DIP
switches**

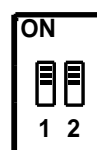
SA Bus termination

The SA Bus End-of-Line termination switch allows you to designate the JAB6651 module as the end of the SA Bus. The default position is OFF, i.e. not terminated, as shown in figure 3 (factory setting). If the JAB6651 module is at the end of a daisy chain of devices on the SA Bus, set **both** EOL switches to the ON position.

Note: The EOL switched should be either set to the default position as shown in Figure 3 or with both switches 1 and 2 set to ON when used as a SA Bus network terminator.

**Table 5: Valid values for EOL switches
Adjustment**

Value	Description
0	not terminated
1	adjustment not valid
2	adjustment not valid
3	terminated



**Figure 3:
Setting EOL switches**

Configuring the Analog Inputs

The activation of internal impedances/loads for each mode (i.e. current, voltage or resistive measuring mode) is done automatically when the configuration data is sent to the JAB6651 module by the host controller. No other adjustments or settings are required on the JAB6651.

Note: The factory setting for all the Analog Input channels is Voltage Mode 0-10 VDC.

Important: If one or more of the analog inputs is to be configured for resistive measuring mode, the following rules must be observed:



The four analog inputs are arranged in two groups, each group consists of two inputs (AI 1 + 2 and AI 3 + 4). A Resistance Temperature Device (RTD) must be initially configured for operation with inputs AI 2 or AI 4; the other input of the group then can be configured for any measurement mode, i.e. current or voltage mode as well as resistive measuring mode.



When setting up the RT Platinum 1K RTD, RT Nickel 1K RTD or RT Silicon A99B signals in CCT it is important to set the parameter '**Hardware Setup → Input Range High**' to 100.0 ohm. See figure 4. All other default settings are normally acceptable.

NOTE – Signal type 'RT 10K NTC Type L Thermistor' is **not** supported by Romutec modules.

Figure 4: CCT Screen – Setup of Resistive inputs

The screenshot shows the 'Details' window for 'JAB6651 AI4 PT1K'. The 'Hardware Setup' section is expanded, and the 'Input Range High' field is highlighted with a red box. The value is set to 100.0 ohm. Other fields in the 'Hardware Setup' section include Min Value (-46.0 deg C), Max Value (121.0 deg C), Input Range Low (0.0 ohm), Output Range Low (0.0 deg C), Output Range High (100.0 deg C), and Offset (0.0 deg C). The 'Display' section shows Units (deg C) and Display Precision (10ths). The 'BACnet' section shows Object Identifier (AI:10044). The 'Setup' section shows Use Default if Not Reliable (False) and Application COV (0.0000). The 'Object' section shows Name (JAB6651 AI4 PT1K) and Description (Miscellaneous Temperature). The 'Inputs' and 'Outputs' sections are also visible on the right side of the window.

Attribute	Value
Object	
Name	JAB6651 AI4 PT1K
Description	Miscellaneous Temperature
Setup	
Use Default if Not Reliable	False
Application COV	0.0000
BACnet	
Object Identifier	AI:10044
Display	
Units	deg C
Display Precision	10ths
Hardware Setup	
Min Value	-46.0 deg C
Max Value	121.0 deg C
Input Range Low	0.0 ohm
Input Range High	100.0 ohm
Output Range Low	0.0 deg C
Output Range High	100.0 deg C
Offset	0.0 deg C

Configuring and Commissioning

The parameters for configuring the JAB6651 are defined using the CCT Tool and will be stored together with the other controller application data in the *.caf file (Controller Application File). During commissioning this data is downloaded to the controller. Once the host controller has detected the JAB6651 with the appropriate address, it will automatically send the configuration data to this module.

When adding the JxBxx51 devices to the SA Bus in the CCT it is necessary to select the equivalent JxBxx10 model from the SA Bus Device list, see table 6.

Table 6: CCT Reference

Model Number	Description	CCT Reference	CCT Description
JDB8451	8BI, 4BO Integral Overrides	JDB8410	I/O MODULE 8BI w LEDs, 4 Relay w HOA
JDB6451	6BI, 4BO Integral Overrides (2 x 2-state drives)	JDB6410	I/O MODULE 6BI w LEDs, 2 Relay Pairs w HOA
JDB8051	8BI Integral Status Indication red/green	JDB8010	I/O MODULE 8BI w LEDs
JAB0451	4AO Integral Overrides	JAB0410	I/O MODULE 4AO w Manual Override
JAB6651	2BI, 2BO, 4AI, 4AO	JAB6610	I/O MODULE 4AI,2BI,4AO,2RO

For more information concerning the Controller Configuration Tool software (CCT), please refer to the *CCT Help*.

Troubleshooting

Use Table 7 as a guide to troubleshoot the JAB6651 module.

Table 7: Status LEDs of the JAB6651 module

Name	Colour	Normal	Descriptions
Power	Green	On Steady	Off Steady = No Power, 24V AC missing On Steady = Power is Supplied by Primary Voltage 24V AC
Fault	Red	Off Steady	Blink - 2 Hz = Download or start up in progress, not ready for normal operation Off Steady = No Faults On Steady = Device Fault
Status	Orange	Blink	Blink = Data Transmission (send, normal communication) Off Steady = No Data Transmission or auto baud in progress
♥ LED	Orange	On Steady	On Steady = Internal System Check ok Off Steady = Restart or replace device

Technical Specifications

JAB6651 I/O Module

Product Code Numbers	JAB6651 Input/Output Module
Supply Voltage	24 VAC \pm 10% at 50 or 60 Hz
Power Consumption	12 VA maximum
Ambient Operating Conditions	0 to 50°C (32 to 122°F); 10 to 90% RH non-condensing
Ambient Storage Conditions	0 to 70°C (32 to 158°F); 10 to 90% RH non-condensing
Terminations	Spring-type terminals for I/Os, power supply and MS/TP Bus
Device Addressing	DIP switch set (128-254). Addresses 0-127, 255 are reserved
Communications Bus	BACnet [®] MS/TP; 4-wire SA Bus ¹⁾ (only 3 wires used)
Mounting	35 mm DIN rail
Standards Compliance	CE Directive 2014/30/EU CE Directive 2014/35/EU
Dimensions (H x W x D)	92 x 72 x 70 mm (3.6 x 2.8 x 2.8 in.) Minimum space for mounting: 120 x 72 x 70 mm (4.7 x 2.8 x 2.8 in.)
Housing	Plastic housing, Plastic material: PC-GF10 Protection: IP20 (IEC529)
Weight	JAB6651: 0.190 kg (0.42 lb)

¹⁾ For more information, refer to the Johnson Controls *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.

The performance specifications are nominal and conform to acceptable industry standard. For application at conditions beyond these specifications, consult the local Romutec office. Romutec GmbH shall not be liable for damages resulting from misapplication or misuse of its products.

Latest Information and Firmware Updates will be available on the website www.romutec.de