JDB1651 Binary Input Module
Manual and Installation Instructions

Description

The **JDB1651** is an input expansion module compatible with the Johnson Controls family of Field Controllers and Network Controllers. It is designed to provide additional inputs for all compatible controllers that are programmed with the controller configuration tool (CCT). The device **JDB1651** provides indication of the binary input status via user defined red/green LEDs.

The **JDB1651** module is a DIN rail mountable device and includes the terminals for wiring the physical input points and the status and troubleshooting LEDs. The **JDB1651** module communicates with the host controller via the controllers SA (sensor/actuator) bus.

Configuring and commissioning of the **JDB1651** module is done using the Controller Configuration Tool (CCT).

Part Numbers and Designations

Part-No.	Designation	Description
00002937	JDB1651	Rail mounted Input/Output module

Parts Included

- One JDB1651 Input/Output Module with removable Terminal Plugs.
- One Installation Instructions sheet.

Installation

Observe these guidelines when installing the JDB1651 module(s):
- Transport the modules in the original container to minimize vibration and shock damage to the devices.
- Do not drop the JDB device or subject it to physical shock.
- Verify that all parts are shipped with the JDB modules.

Mounting

Follow these guidelines when mounting JDB1651 modules:
- Mount the JDB module in areas free of corrosive vapours and observe the environmental limitations listed in the *Technical Specifications* section.
- Do not mount the JDB 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 JDB modules communication.
- Mount the JDB 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 JDB 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 Technical Bulletin (LIT-12011034)* for further information.

To wire the JDB1651 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 JDB1651 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 JDB1651 module.
4. Download and commission the JDB1651 module. See *Configuring and Commissioning*. The point definitions are automatically downloaded into the JDB1651 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 controller.
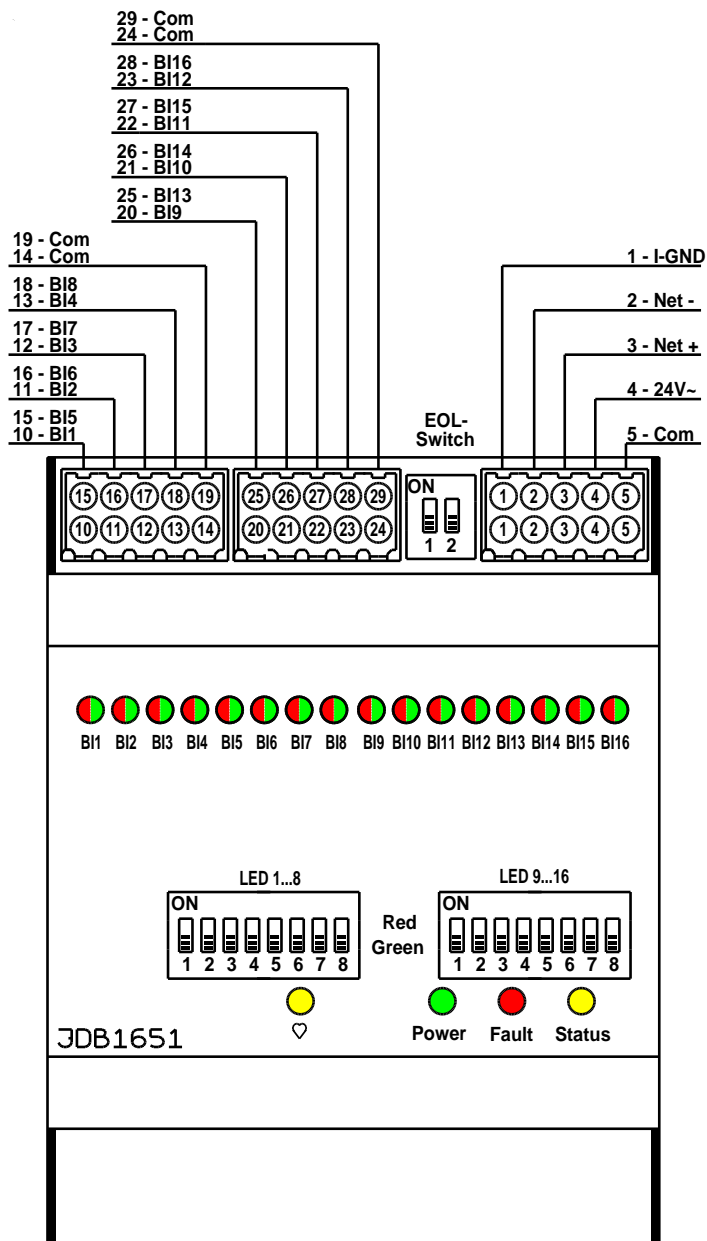
Figure 1: JDB1651 Module Wiring Interface

⚠ **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
Binary IN *(Terminals 10 - 29)*	BI *n*	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 power supply 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 Bus[1] *(Terminals 1 - 3)*	Net + Net –	Provides SA Bus communication network	Daisy-chained 366 m maximum length
	I-Gnd	Terminal for the I-Gnd 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 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)	
	0.35 mm^2 (22 AWG)	106.7 m (350 ft)	

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Setup and Adjustments
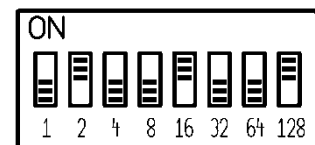
Determining the SA Bus Address

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 modules and other subordinate devices on the SA bus.

Set the address of the JDB1651 module using the Dual Inline Package (DIP) switches on the side of the JDB1651 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 Johnson Controls controllers and IOM modules (as master devices). controller address fixed = 4
128-254	**Valid range of addresses-for Romutec I/O-Modules (Subordinate devices)**
255	Default address – must be changed

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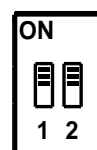**Setting the Address DIP switches**

SA Bus termination

The SA Bus End-of-Line termination switch allows you to designate the JDB1651 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 JDB1651 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

Encoding the LED Colour

The colour of each LED can be user selected by setting the DIP switches that are located on the front of the module JDB1651. Depending on the position of the switch, the LED will be red or green when the circuit is active. (See figure. 4).
With the switch set to the ON position the LED will be red, when the switch is set to OFF the LED will be illuminated in green.
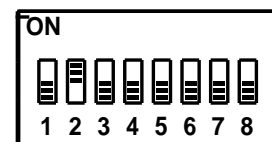
Figure 4:
LED 2 is red, other LEDs are green

Configuring and Commissioning

The parameters for configuring the JDB1651 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 JDB1651 with the appropriate address, it will automatically send the configuration data to this module.

When adding the JxBxx**51** devices to the SA Bus in the CCT it is necessary to select the equivalent JxBxx**10** 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
JDB1651	16BI Integral Status Indication red/green	JDB1610	I/O MODULE 16BI 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

The status of the binary inputs will be indicated by the LEDs independently from the SA-Bus connection of the JDB1651 module to a host controller. However until the configuration data is sent to the JDB1651 factory default settings are used for all polarity parameters i.e. polarity = NORMAL. This means that the LED on the front panel will be lit when the contact of the corresponding binary input is closed. This can be changed using CCT to modify the **Hardware Setup** attribute 'Polarity' to REVERSE, saving the changes and downloading the *.caf file to the controller. The host controller will update the configuration data in the JDB1651 module.

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

Troubleshooting

Use Table 7 to troubleshoot the JDB1651 module.

Table 7: Status LEDs of the JDB1651 module

Name	Colour	Normal	Descriptions
Power	Green	On Steady	Off Steady = No Power, 24VAC missing On Steady = Power is Supplied by Primary Voltage 24VAC
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 or Bootloader Mode
Status	Orange	Blink	Blink = Data Transmission (send, normal communication) Off Steady = No Data Transmission or auto baud in progress
♥ LED	Orange	Flicker	Flicker = Internal System Check ok Off Steady /On Steady = Restart or replace device

Technical Specifications

General Specifications

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
Standards Compliance	CE Directive 2014/30/EU CE Directive 2014/35/EU

JDB1651 Binary Input Module

Product Code Numbers	JDB1651 Binary Input Module
Supply Voltage	24 VAC ± 10% at 50 or 60 Hz
Power Consumption	12 VA maximum
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
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	JDB1651: 0.15 kg (0.33 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

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