Installation Instructions

Compact Combination 24V dc Sink Input/Source Output BOOLEAN Control Module

Catalog Number 1769-BOOLEAN

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About This Publication

Use this document as a guide when installing a Compact Combination 24V dc Sink Input/Source Output BOOLEAN Control Module.

Publication 1769-IN077A-EN-P - May 2006

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://rockwellautomation.com/literature) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

WARNING 	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequences.
SHOCK HAZARD 	Labels may be located on or inside the equipment (for example, drive or motor) to alert people that dangerous voltage may be present.
BURN HAZARD 	Labels may be located on or inside the equipment (for example, drive or motor) to alert people that surfaces may be dangerous temperatures.

Prevent Electrostatic Discharge

ATTENTION

Electrostatic discharge can damage integrated circuits or semiconductors if you touch bus connector pins. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential.
- Wear an approved wrist-strap grounding device.
- Do not touch the bus connector or connector pins.
- Do not touch circuit components inside the module.
- If available, use a static-safe work station.
- When not in use, keep the module in its static-shield box.

Remove Power

ATTENTION

Remove power before removing or inserting this module. When you remove or insert a module with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices, causing unintended machine motion.
- causing an explosion in a hazardous environment.

Electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance.

Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only. The following WARNING statement applies to use in hazardous locations.

WARNING

EXPLOSION HAZARD

- Substitution of components may impair suitability for Class I, Division 2.
- Do not replace components or disconnect equipment unless power is switched off or the area is known to be non-hazardous.
- Do not connect or disconnect components unless power is switched off or the area is known to be non-hazardous.
- This product must be installed in an enclosure.
- All wiring must comply with Class I, Division 2 wiring methods of Article 501 of the National Electrical Code and/or in accordance with Section 18-1J2 of the Canadian Electrical Code, and in accordance with the authority having jurisdiction.

Environnements dangereux

Cet équipement est conçu pour être utilisé dans des environnements de Classe 1, Division 2, Groupes A, B, C, D ou non dangereux. La mise en garde suivante s'applique à une utilisation dans des environnements dangereux.

AVERTISSEMENT

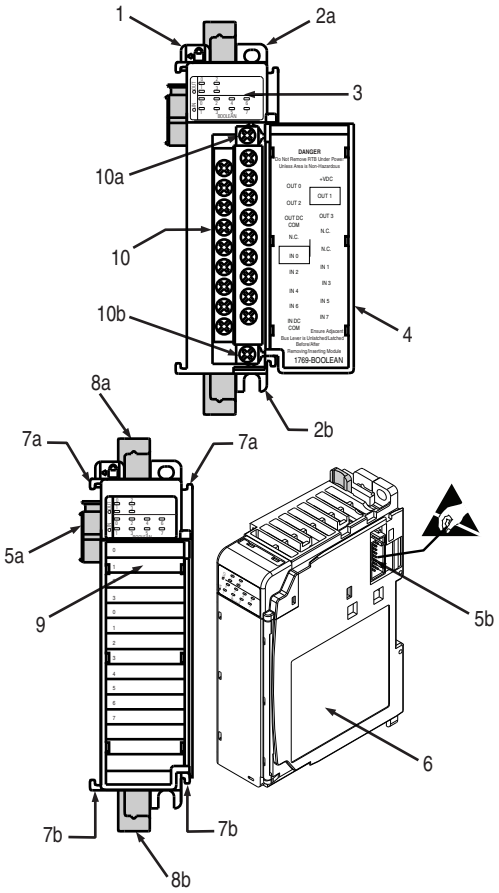
DANGER D'EXPLOSION

- La substitution de composants peut rendre cet équipement impropre à une utilisation en environnement de Classe 1, Division 2.
- Ne pas remplacer de composants ou déconnecter l'équipement sans s'être assuré que l'alimentation est coupée et que l'environnement est classé non dangereux.
- Ne pas connecter ou déconnecter des composants sans s'être assuré que l'alimentation est coupée ou que l'environnement est classé non dangereux.
- Ce produit doit être installé dans une armoire.

About the 1769-BOOLEAN Module

Compact I/O is suitable for use in an industrial environment when installed in accordance with these instructions. Specifically, this equipment is intended for use in clean, dry environments (Pollution degree 2[1]) and to circuits not exceeding Over Voltage Category II[2] (IEC 60664-1)[3].

Module Description



Item	Description
1	Bus lever (with locking function)
2a	Upper panel mounting tab
2b	Lower panel mounting tab
3	Module status LED
4	Module door with terminal identification label
5a	Movable bus connector with female pins
5b	Stationary bus connector with male pins
6	Nameplate label
7a	Upper tongue-and-groove slots
7b	Lower tongue-and-groove slots
8a	Upper DIN rail latch
8b	Lower DIN rail latch
9	Write-on label (user ID tag)
10	Removable terminal block (RTB) with finger-safe cover
10a	RTB upper retaining screw
10b	RTB lower retaining screw

(1) Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.

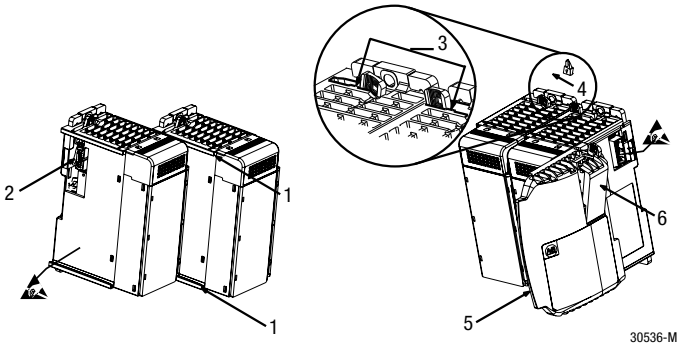
(2) Over Voltage Category II is the load level section of the electrical distribution system. At this level, transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.

(3) Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

Install the 1769-BOOLEAN Module

Attach the module to the controller or an adjacent I/O module before or after mounting. For mounting instructions, see Mount Module to Panel Using the Dimensional Template, or Mount Module to DIN Rail. To work with a system that is already mounted, see Replace a Single Module Within a System.

The following procedure shows you how to assemble the Compact I/O system.



1. Disconnect power.
2. Check that the bus lever of the module to be installed is in the unlocked (fully right) position.
3. Use the upper and lower tongue-and-groove slots (1) to secure the modules together (or to a controller).
4. Move the module back along the tongue-and-groove slots until the bus connectors (2) line up with each other.
5. Push the bus lever back slightly to clear the positioning tab (3).

   Use your fingers or a small screwdriver.
6. To allow communication between the controller and module, move the bus lever fully to the left (4) until it clicks, making sure it is locked firmly in place.

ATTENTION

When attaching I/O modules, it is very important that the bus connectors are securely locked together to be sure of proper electrical connection.

7. Attach an end-cap terminator (5) to the last module in the system by using the tongue-and-groove slots as before.

8. Lock the end-cap bus terminator (6).

IMPORTANT You must use a 1769-ECR or 1769-ECL right or left end cap to terminate the end of the serial communication bus.

Replace a Single Module Within a System

The module can be replaced while the system is mounted to a panel (or DIN rail).

1. Remove power.

   Refer to Remove Power on page 3.

2. Remove the upper and lower mounting screws from the module (or open the DIN latches using a flat-blade or Phillips-style screwdriver).

3. Move the bus lever to the right to disconnect (unlock) the bus.

4. On the right-side adjacent module, move its bus lever to the right (unlock) to disconnect it from the module to be removed.

5. Gently slide the disconnected module forward.

   If you feel excessive resistance, check that the module is disconnected from the bus and that both mounting screws are removed (or DIN latches opened).

TIP It may be necessary to rock the module slightly from front to back to remove it, or, in a panel-mounted system, to loosen the screws of adjacent modules.

6. Be sure that the bus lever on the module and on the right-side adjacent module are in the unlocked (fully right) position before installing the replacement module.

7. Slide the replacement module into the open slot.

8. Connect the modules by locking (fully left) the bus levers on the replacement module and the right-side adjacent module.

9. Replace the mounting screws (or snap the module onto the DIN rail).

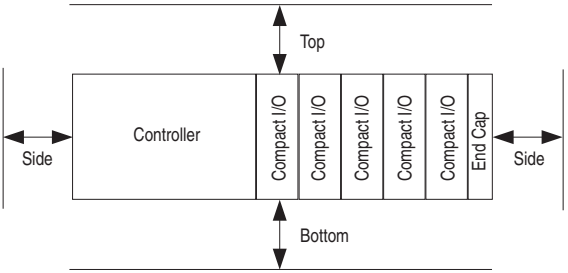
Mount Expansion I/O

ATTENTION

During panel or DIN rail mounting of all devices, be sure that all debris, that is, metal chips or wire strands, is kept from falling into the module. Debris that falls into the module could cause damage when cycling power.

Minimum Spacing

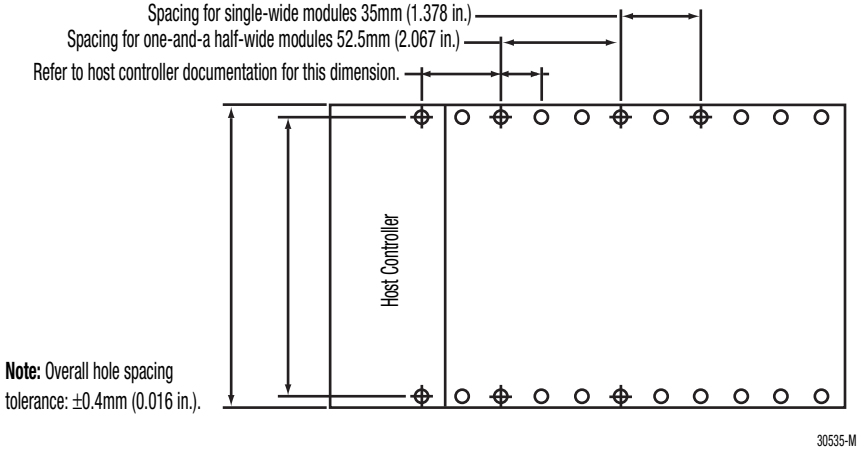
Maintain spacing from enclosure walls, wireways, or adjacent equipment. Allow 50 mm (2 in.) of space on all sides for adequate ventilation, as shown.



Mount Module to Panel

Mount the module to a panel using two screws per module. Use M4 or #8 panhead screws. Mounting screws are required on every module.

Mount Module to Panel Using the Dimensional Template



Locate holes every 17.5 mm (0.689 in.) to allow for a mix of single-wide and one-and-a-half-wide modules (for example, the 1769-OA16 module).

Mount Module to Panel Using Modules as a Template

This procedure lets you use the assembled modules as a template for drilling holes in the panel. Refer to Mount Module to Panel Using the Dimensional Template on page 8 if you have sophisticated panel-mounting equipment. Due to module-mounting hole tolerance, it is important to follow this procedure:

1. On a clean work surface, assemble no more than three modules.
2. Using the assembled modules as a template, carefully mark the center of all module-mounting holes on the panel.
3. Return the assembled modules to the clean work surface, including any previously mounted modules.
4. Drill and tap the mounting holes for the recommended M4 or #8 screws.
5. Place the modules back on the panel, and check for proper hole alignment.
6. Attach the modules to the panel using the mounting screws.

TIP If mounting more modules, mount only the last one of this group and put the others aside. This reduces the remounting time during drilling and tapping of the next group.

7. Repeat steps 1 to 6 for any remaining modules.

Mount Module to DIN Rail

The module can be mounted using these DIN rails:

- 35 x 7.5 mm (EN 50 022 - 35 x 7.5)
- 35 x 15 mm (EN 50 022 - 35 x 15)

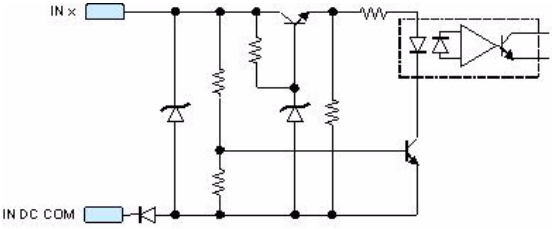
Before mounting the module on a DIN rail, close the DIN-rail latches. Press the DIN-rail mounting area of the module against the DIN rail. The latches will momentarily open and lock into place.

Wire the 1769-BOOLEAN Module

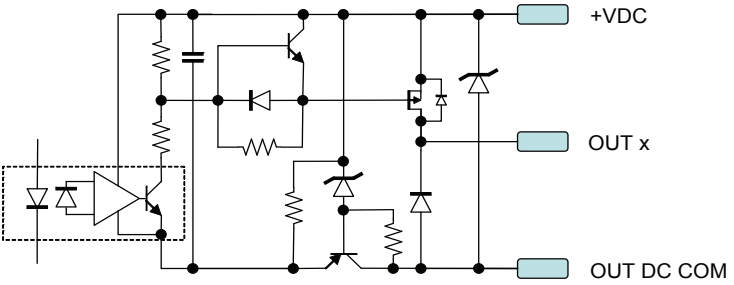
Each terminal accepts as many as two wires with these restrictions:

Wire Type		Wire Size	Terminal Screw Torque	Retaining Screw Torque
Solid	Cu-90 °C (194 °F)	2.08…0.34 mm^2 (14…22 AWG)	0.68 Nm (6 in-lb)	0.46 Nm (4.1 in-lb)
Stranded	Cu-90 °C (194 °F)	1.31…0.34 mm^2 (16…22 AWG)	0.68 Nm (6 in-lb)	0.46 Nm (4.1 in-lb)

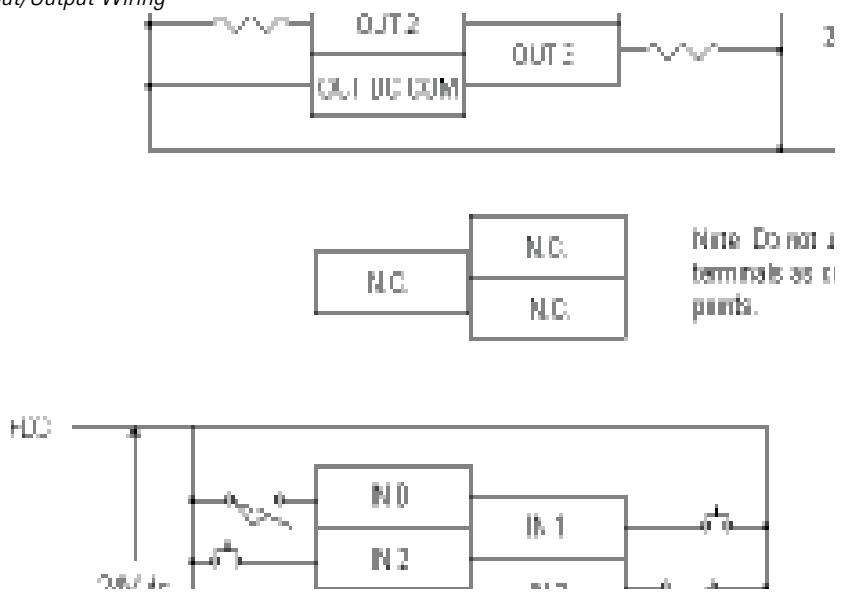
Simplified Input Circuit Diagram



Simplified Output Circuit Diagram



Input/Output Wiring



Ground the 1769-BOOLEAN Module

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel. Additional grounding connections from the module's mounting tabs or DIN rail (if used) are not required unless the mounting surface cannot be grounded. Refer to Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication 1770-4.1, for additional information.

Configure the 1769-BOOLEAN Module

The following I/O memory mapping lets you configure the 1769-BOOLEAN module.

Output Data File

For each module, slot x, word 0 in the output data file contains the control program's directed state of the module's output points when operated in Direct Control mode. Direct Control mode is active when an output's disable BOOLEAN (DB_x) bit is set in the configuration data file. Word 1 contains the control program's directed states of the virtual inputs, which can be used in controlling the module's output points via BOOLEAN expressions.

Word	Bit Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0													OUT 3	OUT 2	OUT 1	OUT 0
1									V7	V6	V5	V4	V3	V2	V1	V0

Shaded bit positions must be set to 0.

OUTx = Output state in Direct Control mode; 1 = output on, 0 = output off.

Vx = Virtual inputs 0…7.

Input Data File

For each module, slot x, word 0 in the input data file contains the state of the module's real input points. Word 1 in the input data file contains the state of the module's output data (output data echo). During normal operation, this word represents the values that the outputs are directed to by the control program (in Direct Control mode) or by the module (in BOOLEAN Control mode).

Word	Bit Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0									IN7	IN6	IN5	IN4	IN3	IN2	IN1	IN0
1													O3	O2	O1	O0

Shaded bit positions must be set to 0.

INx = State of module's real inputs 0…7.

Ox = Data echo of directed states of module outputs 0…3; 1 = output on, 0 = output off.

Configuration Data File

The manipulation of bits from this file is normally done with programming software (for example, RSLogix 500 software or RSNetWorx for DeviceNet software) during initial configuration of the system. In that case, graphical screens provided by the programming software simplify configuration.

Some systems, like the 1769-ADN DeviceNet adapter system, also allow the bits to be altered as part of the control program using communication rungs. In that case, it is necessary to understand the bit arrangement. Words 0 and 1 of the configuration data file set the input control parameters for the module. Words 2 to 7 set the alternate output state operation of the module. Each output point's operating parameters are controlled by a group of eight words.

Word	Bit Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0														Input Filter		
1	IT_I7	EI_I7	IT_I6	EI_I6	IT_I5	EI_I5	IT_I4	EI_I4	IT_I3	EI_I3	IT_I2	EI_I2	IT_I1	EI_I1	IT_I0	EI_I0
2																PFE
3																
4													PM3	PM2	PM1	PM0
5													PV3	PV2	PV1	PV0
6													FM3	FM2	FM1	FM0
7													FV3	FV2	FV1	FV0
8											IT_O0			EI_O0		DB_0
9	Operand_A_0															
10	Operand_B_0															
11	Operand_C_0															
12											Operator_2_0				Operator_1_0	
13	Output Delay 0															
14	Output Duration 0															
15																
16											IT_O1			EI_O1		DB_1
17	Operand_A_1															
18	Operand_B_1															
19	Operand_C_1															

Word	Bit Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
20											Operator_2_1				Operator_1_1	
21							Output Delay 1									
22							Output Duration 1									
23																
24											IT_02			EI_02		DB_1
25											Operand_A_2					
26											Operand_B_2					
27											Operand_C_2					
28											Operator_2_2				Operator_1_2	
29							Output Delay 2									
30							Output Duration 2									
31																
32											IT_03			EI_03		DB_3
33											Operand_A_3					
34											Operand_B_3					
35											Operand_C_3					
36											Operator_2_3				Operator_1_3	
37							Output Delay 3									
38							Output Duration 3									
39																

Shaded bit positions must be set to 0.

Input filter: Real input point filter selection. See page 15.

EI_Ix: Enable input interrupt; 1 = interrupt enabled, 0 = interrupt disabled.

IT_Ix: Input interrupt type; 1 = generate interrupt on real input point transition from on to off, 0 = generate interrupt on real input point transition from off to on.

PFE: Program to fault enable; 1 = fault value applied, 0 = program value applied.

PMx: Program mode; 1 = hold last state, 0 = user-defined safe state.

PVx: Program value; 1 = output on, 0 = output off.

FMx: Fault mode; 1 = hold last state, 0 = user-defined safe state.

FVx: Fault value; 1 = output on, 0 = output off.

DB_x: Output Control; 1 = output in Direct Control mode, 0 = output in BOOLEAN Control mode.

EI_Ox: Enable output interrupt; 1 = interrupt enabled, 0 = interrupt disabled.

IT_Ox: Output interrupt type. See page 16.

Operand_A_x: BOOLEAN operand A. See page 17.

Operand_B_x: BOOLEAN operand B. See page 17.

Operand_C_x: BOOLEAN operand C. See page 17.

Operator_1_x: BOOLEAN operator 1. See page 19.

Operator_2_x: BOOLEAN operator 2. See page 19.

Output delay x: Delay time from BOOLEAN expression transition from false to true until output directed to transition from off to on. See page 20.

Output duration x: Pre-determined output pulse duration time. Time from output directed to transition from off to on until output directed to transition from on to off. See page 21.

Word			Bit Position															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Input Filter	8 ms														0	0	0
		0 s														0	0	1
		100 µs														0	1	0
		200 µs														0	1	1
		500 µs														1	0	0
		1 ms														1	0	1
		2 ms														1	1	0
		4 ms														1	1	1

Shaded bit positions must be set to 0.

Word			Bit Position															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8, 16, 24, 32	Output Control (DB_x)	Direct Control																1
		BOOLEAN Control																0
	Enable Output Interrupt	Enable														1		
		Disable														0		
	Output Interrupt Type	BOOLEAN Expression FALSE to TRUE											0	0				
		Output Directed OFF to ON											0	1				
		BOOLEAN Expression TRUE to FALSE											1	0				
		Output Directed ON to OFF											1	1				

Darker shaded bit positions must be set to 0.

Word			Bit Position															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
9, 10, 11	Operand_A_0 Operand_B_0 Operand_C_0	None											0	0	0	0	0	0
		Real Input 0											0	0	0	0	0	1
		Inverted Real Input 0											0	0	0	0	1	0
		Real Input 1											0	0	0	0	1	1
		Inverted Real Input 1											0	0	0	1	0	0
17, 18, 19	Operand_A_1 Operand_B_1 Operand_C_1	Real Input 2											0	0	0	1	0	1
		Inverted Real Input 2											0	0	0	1	1	0
		Real Input 3											0	0	0	1	1	1
		Inverted Real Input 3											0	0	1	0	0	0
25, 26, 27	Operand_A_2 Operand_B_2 Operand_C_2	Real Input 4											0	0	1	0	0	1
		Inverted Real Input 4											0	0	1	0	1	0
		Real Input 5											0	0	1	0	1	1
		Inverted Real Input 5											0	0	1	1	0	0
33, 34, 35	Operand_A_3 Operand_B_3 Operand_C_3	Real Input 6											0	0	1	1	0	1
		Inverted Real Input 6											0	0	1	1	1	0
		Real Input 7											0	0	1	1	1	1

Word			Bit Position															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
		Inverted Real Input 7											0	1	0	0	0	0
		Virtual Input 0											0	1	0	0	0	1
		Inverted Virtual Input 0											0	1	0	0	1	0
		Virtual Input 1											0	1	0	0	1	1
		Inverted Virtual Input 1											0	1	0	1	0	0
		Virtual Input 2											0	1	0	1	0	1
		Inverted Virtual Input 2											0	1	0	1	1	0
		Virtual Input 3											0	1	0	1	1	1
		Inverted Virtual Input 3											0	1	1	0	0	0
		Virtual Input 4											0	1	1	0	0	1
		Inverted Virtual Input 4											0	1	1	0	1	0
		Virtual Input 5											0	1	1	0	1	1
		Inverted Virtual Input 5											0	1	1	1	0	0
		Virtual Input 6											0	1	1	1	0	1
		Inverted Virtual Input 6											0	1	1	1	1	0
		Virtual Input 7											0	1	1	1	1	1

Word			Bit Position															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
		Inverted Virtual Input 7											1	0	0	0	0	0

Shaded bit positions must be set to 0. Entering a binary value greater than 100000 (greater than 32 decimal) results in a configuration error.

Word			Bit Position															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
12, 20, 28, 36	Operator_ 1_0 Operator_ 1_1 Operator_ 1_2 Operator_ 1_3	None															0	0
		OR															0	1
		AND															1	0
		XOR															1	1
	Operator_ 2_0 Operator_ 2_1 Operator_ 2_2 Operator_ 2_3	None											0	0				
		OR											0	1				
		AND											1	0				
		XOR											1	1				

Darker shaded bit positions must be set to 0.

Word			Bit Position															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
13, 21, 29, 37	Output Delay 0	0 ms							0	0	0	0	0	0	0	0	0	0
		1 ms							0	0	0	0	0	0	0	0	0	1
	Output Delay 1	2 ms							0	0	0	0	0	0	0	0	1	0
		3 ms							0	0	0	0	0	0	0	0	1	1
	Output Delay 2	4 ms							0	0	0	0	0	0	0	1	0	0
		5 ms							0	0	0	0	0	0	0	1	0	1
	Output Delay 3	6 ms							0	0	0	0	0	0	0	1	1	0
		7 ms							0	0	0	0	0	0	0	1	1	1
		...																
		993 ms							1	1	1	1	1	0	0	0	0	1
		994 ms							1	1	1	1	1	0	0	0	1	0
		995 ms							1	1	1	1	1	0	0	0	1	1
		996 ms							1	1	1	1	1	0	0	1	0	0
		997 ms							1	1	1	1	1	0	0	1	0	1
		998 ms							1	1	1	1	1	0	0	1	1	0
		999 ms							1	1	1	1	1	0	0	1	1	1
		1000 ms							1	1	1	1	1	0	1	0	0	0

Shaded bit positions must be set to 0. Entering a binary value greater than 1111101000 (greater than 1000 decimal) results in a configuration error.

Word			Bit Position															
			15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
14, 22, 30, 38	Output Duration 0	None[1]							0	0	0	0	0	0	0	0	0	0
		1 ms							0	0	0	0	0	0	0	0	0	1
	Output Duration 1	2 ms							0	0	0	0	0	0	0	0	1	0
		3 ms							0	0	0	0	0	0	0	0	1	1
	Output Duration 2	4 ms							0	0	0	0	0	0	0	1	0	0
		5 ms							0	0	0	0	0	0	0	1	0	1
	Output Duration 3	6 ms							0	0	0	0	0	0	0	1	1	0
		7 ms							0	0	0	0	0	0	0	1	1	1
		...																
		993 ms							1	1	1	1	1	0	0	0	0	1
		994 ms							1	1	1	1	1	0	0	0	1	0
		995 ms							1	1	1	1	1	0	0	0	1	1
		996 ms							1	1	1	1	1	0	0	1	0	0
		997 ms							1	1	1	1	1	0	0	1	0	1
		998 ms							1	1	1	1	1	0	0	1	1	0
		999 ms							1	1	1	1	1	0	0	1	1	1
		1000 ms							1	1	1	1	1	0	1	0	0	0

(1) No pre-determined output pulse duration. Output directed off when BOOLEAN expression goes to FALSE.

Shaded bit positions must be set to 0. Entering a binary value greater than 1111101000 (greater than 1000 decimal) results in a configuration error.

Specifications

Compact I/O - 1769-BOOLEAN General Specifications

Specification	Value
Closed Loop Time (Digital Filter = 0)	Output on-state current ≥ 5 mA: 100 µs max Output on-state current < 5 mA: 150 µs max
Bus Current Draw, Max	220 mA at 5V dc
Heat Dissipation	3.55 Total Watts (The Watts per point, plus the minimum Watts, with all points energized.)
Power Supply Distance Rating	8 (The module may not be more than 8 modules away from the power supply or controller.)
Isolated Groups	Group 1: inputs 0…7 Group 2: outputs 0…3
Input Point to Output Point Isolation	Verified by one of the following dielectric tests: 1200V ac for 1 s or 1697V dc for 1 s 75V dc working voltage (IEC Class 2 reinforced insulation)
Vendor I.D. Code	1
Product Type Code	109
Product Code	37
Dimensions, HxDxW	118 mm x 87 mm x 35mm (4.65 in. x 3.43 in. x 1.38 in.) Height including mounting tabs is 138 mm (5.43 in.)
Approximate Shipping Weight (With Carton)	282 g (0.625 lbs)

Input Specifications

Voltage Category	24V dc (sink[1])
Operating Voltage Range	10…30V dc @ 30 °C (86 °F) 10…26.4V dc @ 60 °C (140 °F)
Number of Inputs	8 real 8 virtual
Digital Filter	OFF to ON: 0 s, 100 µs, 200 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms ON to OFF: 0 s, 100 µs, 200 µs, 500 µs, 1 ms, 2 ms, 4 ms, 8 ms
Hardware Delay, Max	OFF to ON: 10 µs ON to OFF: 10 µs
Off-state Voltage, Max	5V dc

Input Specifications

Off-state Current, Max	1.5 mA
On-state Voltage, Min	10V dc
On-state Current, Min	2.0 mA
Inrush Current, Max	250 mA
Nominal Impedance	2.0 kohm @ 24V dc 2.3 kohm @ 30V dc
IEC Input Compatibility	Type 1+
Input Point to Bus (CompactBus) Isolation	Verified by one of the following dielectric tests: 1200V ac for 1 s or 1697V dc for 1 s 75V dc working voltage (IEC Class 2 reinforced insulation)

(1) Sinking Input - Sink describes the current flow between the I/O module and the field device. Sinking I/O circuits are driven by a current sourcing field device. Field devices connected to the positive side (+V) of the field supply are sourcing field devices. **Europe:** DC sinking input and sourcing output module circuits are the commonly used options.

Output Specifications

Voltage Category	24V dc
Operating Voltage Range	20.4…26.4V dc (source(3))
Number of Outputs	4
Signal Delay, Max (Resistive Load)	Turn-on: 10 µs, output on-state current ≥ 5 mA Turn-off: 10 µs, output on-state current ≥ 5 mA
Off-state Leakage, Max(1)	1.0 mA @ 26.4V dc
On-state Current, Min	1.0 mA
On-state Voltage Drop, Max	1.0V dc @ 1.0 A
Continuous Current per Point, Max	0.5 A @ 60 °C (140 °F) 1.0 A @ 30 °C (86 °F) Refer to Temperature Derating on page 25.
Surge Current, Max(2)	2.0 A (Repeatability is once every 2 s for a duration of 10 ms.)
Output Point to Bus (CompactBus) Isolation	Verified by one of the following dielectric tests: 1200V ac for 1 s or 1697V dc for 1 s 75V dc working voltage (IEC Class 2 reinforced insulation)

(1) Typical Loading Resistor - To limit the effects of leakage current through solid state outputs, a loading resistor can be connected in parallel with your load. Use a 5.6 kohm, 1/2 W resistor for transistor outputs, 24V dc operation.

(2) Recommended Surge Suppression - Use a 1N4004 diode reverse-wired across the load for transistor outputs switching 24V dc inductive loads. For additional details, refer to Industrial Automation Wiring and Grounding Guidelines, Allen-Bradley publication 1770-4.1.

(3) Sourcing Output - Source describes the current flow between the I/O module and the field device. Sourcing output circuits supply source current to sinking field devices. Field devices connected to the negative side (dc common) of the field power supply are sinking field devices. **Europe:** DC sinking input and sourcing output module circuits are the commonly used options.

Environmental Specifications

Specification	Value
Storage Temperature	-40…+85 °C (-40…+185°F)
Operating Temperature	0…60 °C (32…140 °F)
Operating Humidity	5…95% non-condensing
Operating Altitude	2000 m (6561 ft)
Vibration	Operating: 10…500 Hz, 5 g, 0.030 in. max peak-to-peak
Shock	Operating: 30 g panel mounted (20 g DIN-rail mounted) Non-operating: 40 g panel mounted (30 g DIN-rail mounted)
Radiated and Conducted Emissions	EN50081-2 Class A
Electrical /EMC	The module has passed testing at the following levels
ESD Immunity (IEC1000-4-2)	4 kV contact, 8 kV air, 4 kV indirect
Radiated Immunity (IEC1000-4-3)	10V/m, 80…1000 MHz, 80% amplitude
Fast Transient Burst (IEC1000-4-4)	2 kV, 5 kHz
Surge Immunity (IEC1000-4-5)	2 kV common mode, 1 kV differential mode
Conducted Immunity (IEC1000-4-6)	10V, 0.15…80 MHz(1)

(1) Conducted Immunity frequency range may be 150 kHz…30 MHz if the radiated immunity frequency range is 30…1000 MHz.

Certifications

Certification	Value
Agency Certification	• C-UL certified (under CSA C22.2 No. 142) • UL 508 listed • CE compliant for all applicable directives
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)

Temperature Derating

The area within the curve represents the safe operating range for the module under various conditions of user-supplied voltages and ambient temperatures.

Figure 1 1769-BOOLEAN Maximum Output Amperes per Module vs. Temperature

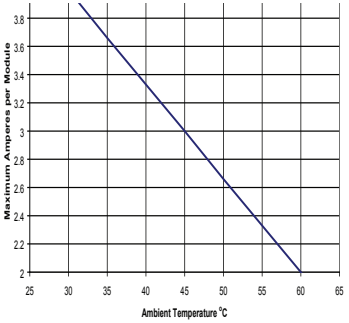
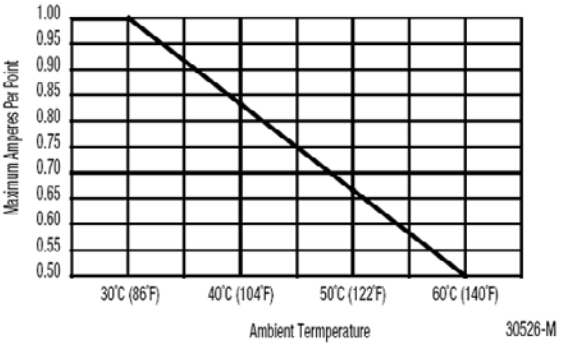


Figure 2 1769-BOOLEAN Maximum Output Amperes per Point vs. Temperature



Transistor Output Transient Pulses

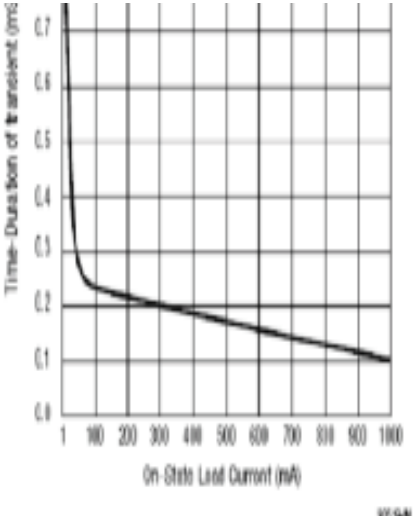
The maximum duration of the transient pulse occurs when minimum load is connected to the output. However, for most applications, the energy of the transient pulse is not sufficient to energize the load.

ATTENTION

A transient pulse occurs in transistor outputs when the external dc supply voltage is applied to the output common terminals, for example, via the master control relay. The sudden application of voltage creates this transient pulse. This condition is inherent in transistor outputs and is common to solid-state devices. A transient pulse can occur regardless of the controller having power. Refer to your controller's user manual to reduce inadvertent operation.

Figure 3 illustrates that the duration of the transient is proportional to the load current. Therefore, as the on-state load current increases, the transient pulse decreases. Transients when you cycle power do not exceed the time duration shown for the amount of loading indicated at 60 °C (140 °F).

Figure 3 Transient Pulse Duration as a Function of Load Current



Additional Resources

If you would like a manual, you can:

- Download a free electronic version from www.ab.com/literature
- Purchase a printed manual by contacting your local distributor or Rockwell Automation representative

For	Refer To This Document	Pub. No.
A more detailed description of how to install and use your Compact I/O with MicroLogix 1200/1500 programmable controllers	MicroLogix 1200 and MicroLogix 1500 Programmable Controllers User Manual	1764-RM001
A more detailed description of how to install and use your Compact I/O system with the 1769-ADN DeviceNet adapter	1769-ADN DeviceNet Adapter User Manual	1769-UM001
A more detailed description of how to install and use your Compact I/O system with the CompactLogix system	CompactLogix System User Manual	1769-UM007
More information on proper wiring and grounding techniques	Industrial Automation Wiring and Grounding Guidelines	1770-4.1

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For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect Support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://support.rockwellautomation.com.

Installation Assistance

If you experience a problem with a hardware module within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your module up and running:

United States	1.440.646.3223 Monday – Friday, 8am – 5pm EST
Outside United States	Please contact your local Rockwell Automation representative for any technical support issues.

New Product Satisfaction Return

Rockwell tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned:

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Outside United States	Please contact your local Rockwell Automation representative for return procedure.

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Publication 1769-IN077A-EN-P - May 2006 PN 40071-209-01(1)

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