Technical Data

Original Instructions

ControlLogix I/O Modules Specifications

Bulletin 1756

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The ControlLogix® Architecture provides a wide range of input and output modules to span many applications, from high-speed digital to process control. The ControlLogix architecture uses Producer/Consumer technology, which allows input information and output status to be shared among multiple ControlLogix controllers.

Summary of Changes

This publication contains new and updated information as indicated in the following table.

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Rockwell Automation recognizes that some of the terms that are currently used in our industry and in this publication are not in alignment with the movement toward inclusive language in technology. We are proactively collaborating with industry peers to find alternatives to such terms and making changes to our products and content. Please excuse the use of such terms in our content while we implement these changes.

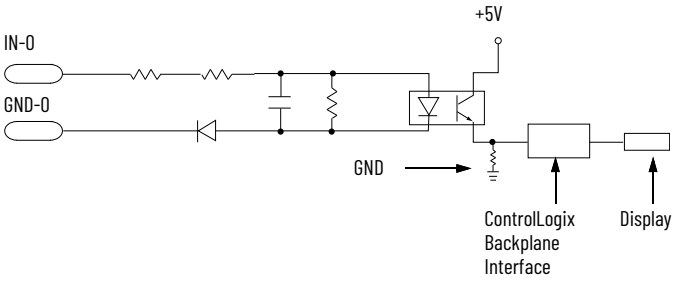
Available 1756 I/O Modules

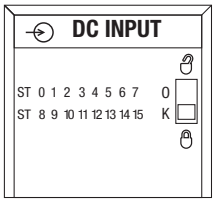
Module Type	Input Module Catalog Number	Page	Output Module Catalog Number	Page
AC Digital I/O Modules	1756-IA8D, 1756-IA8DK	7	1756-OA8, 1756-OA8K	26
	1756-IA16, 1756-IA16K	10	1756-OA8D	29
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DC Digital I/O Modules	1756-IB16, 1756-IB16K, 1756-IB16XT	45	1756-OB8, 1756-OB8K	90
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	1756-IB16IF, 1756-IB16IFK	57	1756-OB16E, 1756-OB16EK	102
	1756-IB16ISOE, 1756-IB16ISOEK	61	1756-OB16I, 1756-OB16IK	107
	1756-IB32, 1756-IB32K	65	1756-OB16IEF, 1756-OB16IEFK	111
	1756-IC16	68	1756-OB16IEFS, 1756-OB16IEFSK	115
	1756-IG16, 1756-IG16K	72	1756-OB16IS	119
	1756-IH16I, 1756-IH16IK	76	1756-OB32, 1756-OB32K, 1756-OB32XT	123
	1756-IH16ISOE, 1756-IH16ISOEK	79	1756-OC8, 1756-OC8K	127
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	1756-IV32, 1756-IV32K	86	1756-OH8I	135
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			1756-OV32E, 1756-OV32EK	142
Safety I/O Modules	1756-IB16S	147	1756-OBV8S	154
Contact I/O Modules			1756-OX8I, 1756-OX8IK	163
			1756-OW16I, 1756-OW16IK	166
Analog I/O Modules	1756-IF4FXOF2F, 1756-IF4FXOF2FK	169	1756-OF4, 1756-OF4K	204
	1756-IF8, 1756-IF8K	174	1756-OF8, 1756-OF8K	208
	1756-IF8I, 1756-IF8IK	179	1756-OF8I, 1756-OF8IK	212
	1756-IF16, 1756-IF16K	184		
	1756-IRT8I, 1756-IRT8IK	189		
	1756-IR12, 1756-IR12K	195		
	1756-IT16, 1756-IT16K	199		
HART I/O Modules	1756-IF8H, 1756-IF8HK	217	1756-OF8H, 1756-OF8HK	233
	1756-IF8IH, 1756-IF8IHK	221	1756-OF8IH, 1756-OF8IHK	237
	1756-IF16H, 1756-IF16HK	225		
	1756-IF16IH, 1756-IF16IHK	229		
Compute Modules	1756-CMEE1Y1	241		
	1756-CMS1B1, 1756-CMS1C1, 1756-CMS1D1, 1756-CMS1H1	243		
Specialty I/O Modules	1756-CFM, 1756-CFMK	245	1756-LSC8XIB8I, 1756-LSC8XIB8IK	258
	1756-HSC, 1756-HSCK	252	1756-PLS	263

1756-IB16, 1756-IB16K, 1756-IB16XT

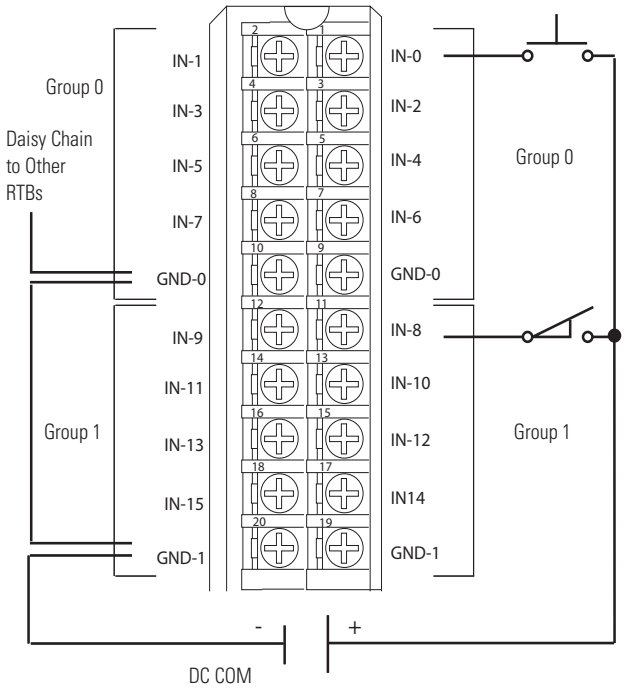
ControlLogix DC (10...31.2V) input module

Simplified Schematic





1756-IB16



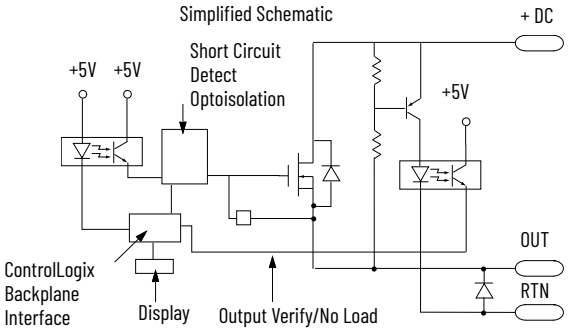
Technical Specifications

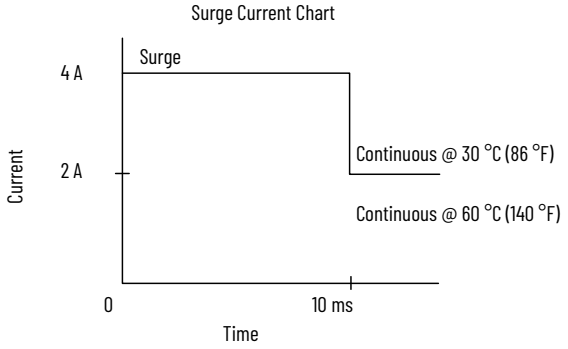
Attribute	1756-IB16, 1756-IB16K,	1756-IB16XT
Inputs	16 (8 points/group)	
Voltage category	12/24V DC sink	
Operating voltage range	10...31.2V DC	
Input voltage, nom	24V DC	
Input delay time (screw to backplane) Off to On On to Off	Hardware delay: 290 µs nom/1 ms max + filter time User-selectable filter time: 0 ms, 1 ms, or 2 ms Hardware delay: 700 µs nom/2 ms max + filter time User-selectable filter time: 0, 1, 2, 9, or 18 ms	
Current draw @ 5.1V	100 mA	
Current draw @ 24V	2 mA	
Total backplane power	0.56 W	
Power dissipation, max	5.1 W @ 60 °C (140 °F)	
Thermal dissipation	17.39 BTU/hr	
Off-state voltage, max	5V	
Off-state current, max	1.5 mA	
On-state current, min	2 mA @ 10V DC	
On-state current, max	10 mA @ 31.2V DC	
Inrush current, max	250 mA peak (decaying to < 37% in 22 ms, without activation)	
Input impedance, max	3.12 kΩ @ 31.2V DC	
Cyclic update time	200 µs...750 ms	
Change of state	Software configurable	
Time stamp of inputs	±200 µs	
Isolation voltage	250V (continuous), reinforced insulation type, inputs-to-backplane 250V (continuous), basic insulation type, input group-to group No isolation between individual inputs	
Module keying	Electronic, software configurable	
Removable terminal block housing	1756-TBNH 1756-TBSH	1756-TBNHXT 1756-TBSHXT
RTB keying	User-defined mechanical	
Slot width	1	
Wire category	1[(1)]	
Wire size	1756-TBNH	1756-TBNHXT
	Single wire connection: 0.33...2.1 mm^2 (22...14 AWG) solid or stranded copper wire rated at 105 °C (221 °F), or greater, 1.2 mm (3/64 in.) insulation max. Do not wire more than one conductors on any terminal. Double wire connection: 0.33...1.3 mm^2 (22...16 AWG) solid or stranded copper wire rated at 105 °C (221 °F), or greater, 1.2 mm (3/64 in.) insulation max. Do not wire more than two conductors on any terminal.	
	1756-TBSH	1756-TBSHXT
	Single wire connection: 0.33...2.1 mm^2 (22...14 AWG) solid or stranded shielded copper wire rated at 105 °C (221 °F), or greater, 1.2 mm (3/64 in.) insulation max.	
Terminal block torque specs	1756-TBNH, 1756-TBNHXT 1.36 N•m (12 lb•in)	
Enclosure type	None (open-style)	
Temperature code	T3	
Reverse polarity protection	Yes	

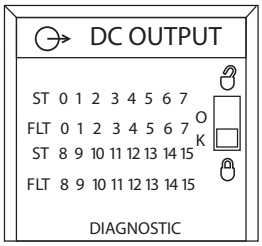
(1) Use this conductor category information for planning conductor routing as described in the system-level installation manual. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

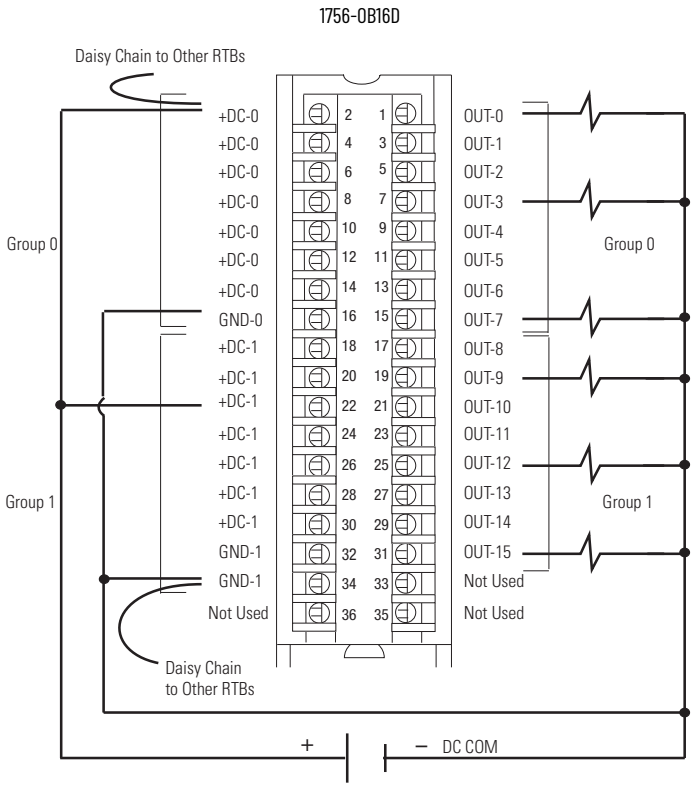
1756-OB16D, 1756-OB16DK

ControlLogix DC (19.2...30V) diagnostic output module









Diagnostic Specifications

Attribute	1756-OB16D, 1756-OB16DK
Short trip	8 A for 180 ms, min 10 A for 120 ms, min
No load	Off-state detection only
Output verification	On-state detection only
Pulse test	Configurable maximum pulse width
Time stamp of diagnostics	±1 ms

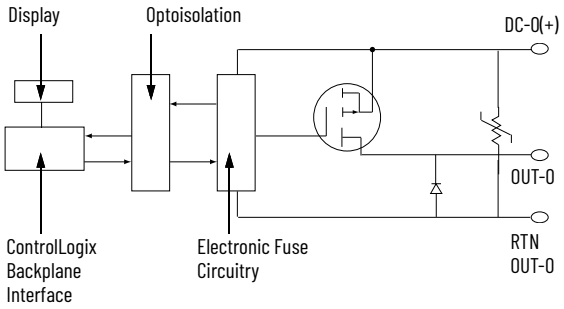
Environmental Specifications

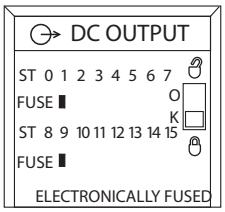
Attribute	1756-OB16D, 1756-OB16DK
Temperature, operating IEC 60068-2-1 (Test Ae, Operating Cold), IEC 60068-2-2 (Test Be, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock)	0 °C < Ta < 60 °C (32 °F < Ta < 140 °F)
Temperature, nonoperating IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock	-40...+85 °C (-40...+185 °F)
Relative humidity IEC 60068-2-30 (Test dB, Unpackaged Damp Heat)	5...95% noncondensing
Vibration IEC 60068-2-6 (Test Fc, Operating)	2 g @ 10...500 Hz
Shock, operating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	50 g
Emissions	IEC 61000-6-4
ESD immunity IEC 61000-4-2	6 kV contact discharges 8 kV air discharges
Radiated RF immunity IEC 61000-4-3	10V/m with 1 kHz sine wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz 3V/m with 1k Hz sine wave 80% AM from 2000...2700 MHz
EFT/B immunity IEC 61000-4-4	±4 kV at 5 kHz on signal ports
Surge transient immunity IEC 61000-4-5	±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports
Conducted RF immunity IEC 61000-4-6	10V rms with 1 kHz sine wave 80% AM from 150 kHz...80 MHz

1756-OB16E, 1756-OB16EK

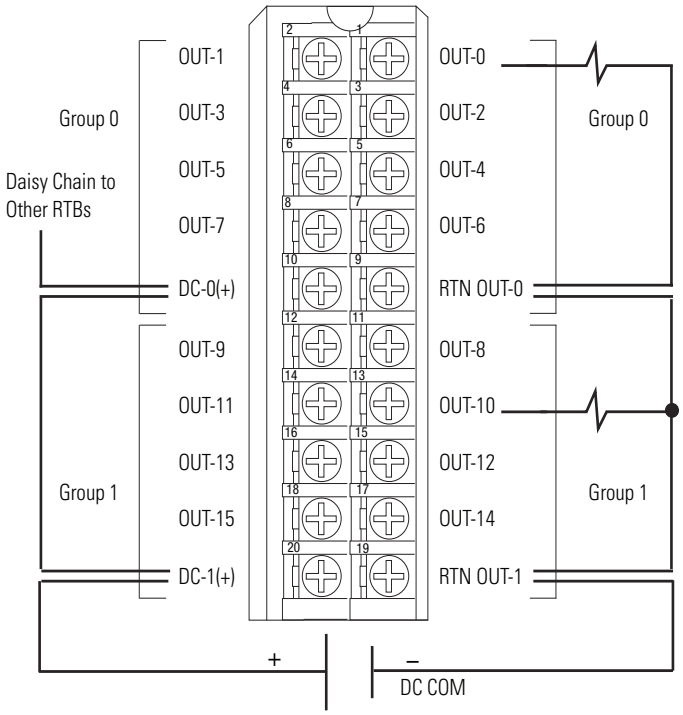
ControlLogix DC (10...31.2V) electronically fused output module

Simplified Schematic





1756-OB16E



Technical Specifications

Attribute	1756-OB16E, 1756-OB16EK
Outputs	16 electronically fused (8 points/group)
Voltage category	12/24V DC source
Operating voltage range	10...31.2V DC
Output delay time Off to On On to Off	 70 µs nom/1 ms max 360 µs nom/1 ms max
Current draw @ 5.1V	250 mA
Current draw @ 24V	2 mA
Total backplane power	1.32 W
Power dissipation, max	4.1 W @ 60 °C (140 °F)
Thermal dissipation	13.98 BTU/hr
Off-state leakage current per point, max	1 mA per point
On-state voltage drop, max	400 mV DC @ 1 A
Current per point, max	1 A @ 60 °C (140 °F)
Current per module, max	8 A @ 60 °C (140 °F)
Surge current per point, typical	2 A for 10 ms per point, repeatable every 2 s @ 0 °C (32 °F) @ 24V DC
Load current, min	3 mA per point
Scheduled outputs	Synchronization within 16.7 s max, reference to the Coordinated System Time
States in Fault mode per point	Hold last state, On or Off (Off is default)
States in Program mode per point	Hold last state, On or Off (Off is default)
Isolation voltage	250V (continuous), basic insulation type, outputs-to-backplane, and output group-to-group No isolation between individual group outputs
Module keying	Electronic, software configurable
Fusing	Electronically fused per group
Removable terminal block	1756-TBNH 1756-TBSH
RTB keying	User-defined mechanical
Slot width	1
Wire category	1(1)
Enclosure type	None (open-style)
Temperature code	T4

(1) Use this conductor category information for planning conductor routing as described in the system-level installation manual. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

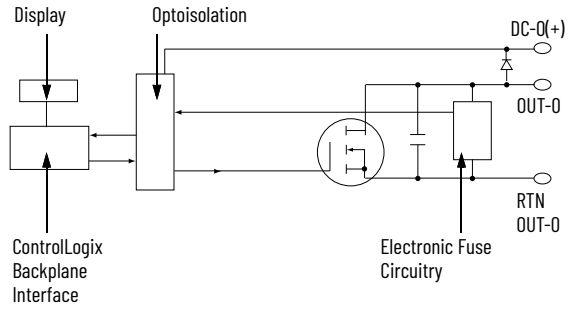
Environmental Specifications

Attribute	1756-OB16E, 1756-OB16EK
Temperature, operating IEC 60068-2-1 (Test Ae, Operating Cold), IEC 60068-2-2 (Test Be, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock)	0...60 °C (32...140 °F)
Temperature, nonoperating IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock)	-40...+85 °C (-40...+185 °F)
Relative humidity IEC 60068-2-30 (Test dB, Unpackaged Damp Heat)	5...95% noncondensing
Vibration IEC 60068-2-6 (Test Fc, Operating)	2 g @ 10...500 Hz
Shock, operating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	50 g
Emissions	IEC 61000-6-4
ESD immunity IEC 61000-4-2	6 kV contact discharges 8 kV air discharges
Radiated RF immunity IEC 61000-4-3	10V/m with 1 kHz sine wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz 3V/m with 1 kHz sine wave 80% AM from 2000...2700 MHz
EFT/B immunity IEC 61000-4-4	±4 kV at 5 kHz on signal ports
Surge transient immunity IEC 61000-4-5	±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports
Conducted RF immunity IEC 61000-4-6	10V rms with 1 kHz sine wave 80% AM from 150 kHz...80 MHz

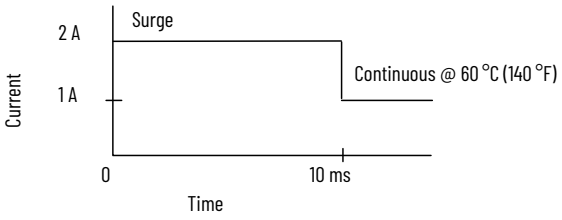
1756-OV16E

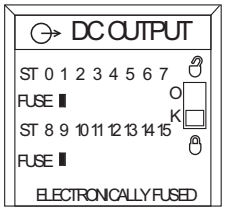
ControlLogix DC (10...30V) electronically fused, sinking output module

Simplified Schematic

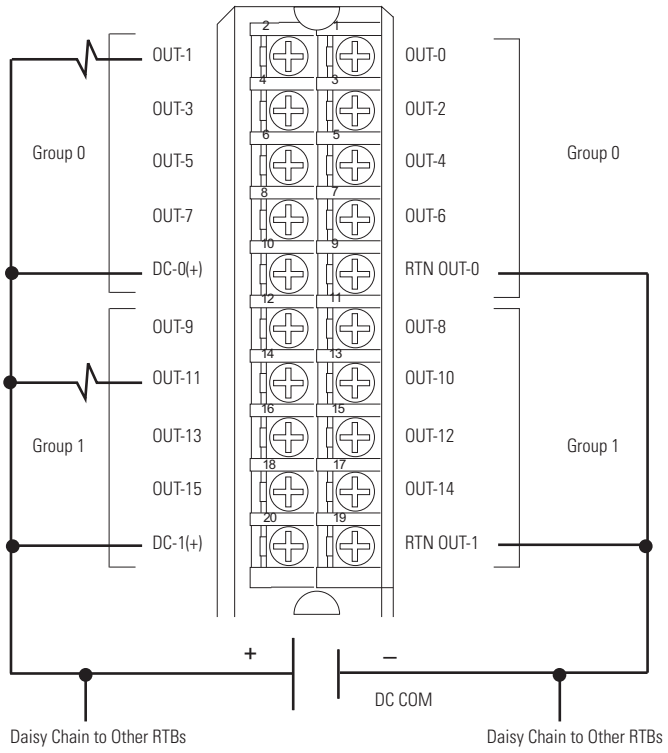


Surge Current Chart





1756-OV16E



Diagnostic Specifications

Attribute	1756-OV16E
Short trip	5 A for 20 ms @ 24V DC (output on, then short) 5 A for 20 ms @ 24V DC (output on into short)
Time stamp of diagnostics	±1 ms

Technical Specifications

Attribute	1756-OV16E
Outputs	16 electronically fused (8 points/group)
Pilot duty	1 A (DC-13/SR)
Voltage category	12/24V DC sink
Output delay time Off to On On to Off	 75 µs nom/1 ms max 360 µs nom/1 ms max
Operating voltage range	10...30V DC
Current draw @ 5.1V	210 mA
Current draw @ 24V	2 mA
Total backplane power	1.12 W
Power dissipation, max	6.72 W @ 60 °C (140 °F)
Thermal dissipation	22.94 BTU/hr
Off-state leakage current per point, max	1 mA per point
On-state voltage drop, max	700 mV DC @ 1 A
Current per point, max	1 A @ 60 °C (140 °F)
Current per module, max	8 A @ 60 °C (140 °F)
Surge current per point	2 A for 10 ms per Point, repeatable every 2 s @ 60 °C (140 °F)
Load current, min	2 mA per point
Scheduled outputs	Synchronization within 16.7 s max, reference to the Coordinated System Time
States in Fault mode per point	Hold last state, On or Off (Off is default)
States in Program mode per point	Hold last state, On or Off (Off is default)
Isolation voltage	250V (continuous), basic insulation type, outputs-to-backplane, and output group-to-group No isolation between individual group outputs
Module keying	Electronic, software configurable
Fusing	Electronically fused per group
Removable terminal block	1756-TBNH 1756-TBSH
RTB keying	User-defined mechanical
Slot width	1
Wire category	1(1)
Enclosure type	None (open-style)
Temperature code	T4

(1) Use this conductor category information for planning conductor routing as described in the system-level installation manual. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

1756 Removable Terminal Blocks



Removable terminal blocks (RTBs) provide a flexible interconnection between your plant wiring and 1756 ControlLogix I/O modules. The RTB plugs into the front of the I/O module. The type of module determines which RTB you need. You can choose screw-clamp or spring-clamp RTBs.

RTBs are not shipped with I/O modules. You must order them separately. The standard housing on the front of the wiring arm is not deep enough for 2.5 mm^2 (14 AWG) wiring. So, if you plan to use 2.5 mm^2 (14 AWG) wiring, order the extended housing.

ATTENTION: If separate power sources are used, do not exceed the specified isolation voltage. See the specifications for each individual module on the preceding pages.

WARNING: Do not use 1756-TBNHS, 1756-TBSHS, 1756-TBCHS, or 1756-TBS6HS safety RTBs and 1756-TBES extended-depth terminal block housings with non-safety I/O modules.

RTB Specifications

Attribute	1756-TBCH 1756-TBCHS 1756-TBCHXT	1756-TBNH 1756-TBNHS 1756-TBNHXT	1756-TBSH 1756-TBSHS 1756-TBSHXT	1756-TBS6H 1756-TBS6HS 1756-TBS6HXT	1756-TBE 1756-TBES 1756-TBEXT
Description	36-pin cage-clamp removable terminal block with standard housing	20-position NEMA screw-clamp removable block	20-pin spring-clamp removable terminal block with standard housing	36-pin spring-clamp removable terminal block with standard housing	Extended depth terminal block housing
Screw torque	0.5 N•m (4.4 lb•in)	1.36 N•m (12 lb•in)	–	–	–
Wire size(1)	Single wire connection: 0.33…2.1 mm^2 (22…14 AWG) solid or stranded shielded copper wire rated at 105 °C (221 °F), or greater, 1.2 mm (3/64 in.) insulation max. Do not wire more than one conductor on any single terminal. Double wire connection: 0.33…1.3 mm^2 (22…16 AWG) solid or stranded copper wire rated at 105 °C (221 °F), or greater, 1.2 mm (3/64 in.) insulation max. Do not wire more than two conductors on any single terminal.		Single wire connection: 0.33…2.1 mm^2 (22…14 AWG) solid or stranded copper wire, rated at 105 °C (221 °F) or greater, 1.2 mm (3/64 in.) insulation max. Do not wire more than one conductor on any single terminal.		–
Screwdriver width	3.2 mm (1/8 in.)	8 mm (5/16 in.) Max	–	–	–

(1) Maximum wire size requires extended housing, catalog number 1756-TBE.