Allen-Bradley 1756-HSC

ControlLogix High-Speed Counter Module

Allen-Bradley 1756-HSC connects pulse-output devices and encoders to a ControlLogix system. Its two counter channels support position and event counting, while four onboard outputs can respond to configured count conditions. Match the operating mode to the signal source and the required measurement.



Technical Specifications

Product Identity	
Manufacturer	Allen-Bradley
Catalog number	1756-HSC
Product type	ControlLogix high-speed counter module
Chassis width	1 slot
Hardware series in photographs	Series A; verify the supplied unit and applicable firmware
Functional Configuration	
Counter channels	2; A/B and Z gate/reset inputs per counter
Onboard outputs	4, in 2 groups of 2
Count range	0–16,777,214
Removable terminal block	1756-TBCH or 1756-TBS6H
Performance & Power	
Maximum counter input rate	1MHz
Maximum frequency-mode input rate	500kHz
Maximum encoder input rate	250kHz
Input operating voltage	4.5–5.5V DC or 10–26.4V DC, using the correct input connections
Backplane current	300mA at 5.1V DC; 3mA at 24V DC
Output current limits	20mA per point at 5V; 1A per point for 12/24V operation within the rated voltage range
Environment	
Operating temperature	0–60°C

Selected original manufacturer material follows on pages 3–7.

Celine unity@mvme.cn +86-18020776786

Compatibility & Selection Guide

System and software compatibility. The 1756-HSC belongs to the ControlLogix I/O family. Available functions and configuration profiles depend on both the hardware series and firmware. For a Series A replacement, confirm the firmware major revision and the existing Logix project; later-series digital filters and additional rate modes are not automatic Series A features.

Wiring & Installation Reference

Signal and terminal selection

A/B inputs. Pulse or encoder channels · Use the separate 5V or 12/24V connections for the actual signal level.

Z inputs. Gate/reset function · Match Z wiring and mode to the intended count operation.

Output groups. Four outputs in two groups · Use the external DC supply and commons shown for each output group.

Installation checks

Prepare the chassis. Verify the installed ControlLogix chassis and power supply, and establish the required safe work condition before handling the module or field wiring.

Key and wire the terminal block. Use the correct 1756-TBCH or 1756-TBS6H block. Match its mechanical keying to the module and follow the signal-level-specific terminal diagram.

Check shielding and configuration. Terminate shields according to the grounding instructions, secure the wiring and verify firmware, counter mode and input filter settings before commissioning.

Installation precautions. Remove power or establish a nonhazardous area before insertion, removal or field connections; energized disconnection can cause an arc. Do not connect 12/24V field signals to the 5V input terminals. Observe electrostatic-discharge precautions and keep counter output operation in a safe state during commissioning.

View terminal diagram (PDF) · PDF page 7 | View RTB keying · PDF page 4

Manufacturer sources: ControlLogix System Selection Guide / ControlLogix I/O Modules Technical Data / ControlLogix High-speed Counter Module User Manual.

Technical Specifications

Attribute	1756-HSC/A, 1756-HSCK/A, 1756-HSC/B, 1756-HSCK/B	1756-HSC/C, 1756-HSCK/C, 1756-HSC/D, 1756-HSCK/D
Number of counters	2	
Inputs per counter	3 (A, B, Z for gate/reset)	
Outputs	4 (2 points/group)	
Operating voltage range, inputs[1]	5V operation: 4.5…5.5V DC 12/24V operation: 10…26.4V DC	
Operating voltage range, outputs[1]	5V operation: 4.5…5.5V DC 12/24V operation: 10…26.4V DC	
Current draw at 5.1V	300 mA	
Current draw at 24V	3 mA	
Total backplane power	1.6 W	
Power dissipation, max	5.6 W @ 60 °C (140 °F)	3.5 W @ 60 °C (140 °F)
Thermal dissipation	19.1 BTU/hr	12 BTU/hr
Isolation voltage	125V (continuous), basic insulation type, input group-to backplane 30V (continuous), basic insulation type, input group-to-input group	250V (continuous), basic insulation type, input group to backplane 125V (continuous), basic insulation type, input group to input group Compliant and tested according to IEC/UL 61010-1
Module keying	Electronic, software configurable	
Removable terminal block	1756-TBCH 1756-TBS6H	
Screw torque	0.5 N•m (4.4 lb•in)	
RTB keying	User-defined mechanical	
Slot width	1	
Wire size	1756-TBCH Single wire connection: 0.33…2.1 mm^2 (22…14 AWG) solid or stranded shielded copper wire that is rated at 105 °C (221 °F), or greater, 1.2 mm (3/64 in.) insulation max Double wire connection: 0.33…1.3 mm^2 (22…16 AWG) solid or stranded copper wire that is rated at 105 °C (221 °F), or greater, 1.2 mm (3/64 in.) insulation max 1756-TBS6H Single wire connection: 0.33…2.1 mm^2 (22…14 AWG) solid or stranded shielded copper wire that is rated at 105 °C (221 °F), or greater, 1.2 mm (3/64 in.) insulation max	
Wire category	2 on signal ports 1 on power ports[2]	
Enclosure type	None (open-style)	
Temperature code	T4	

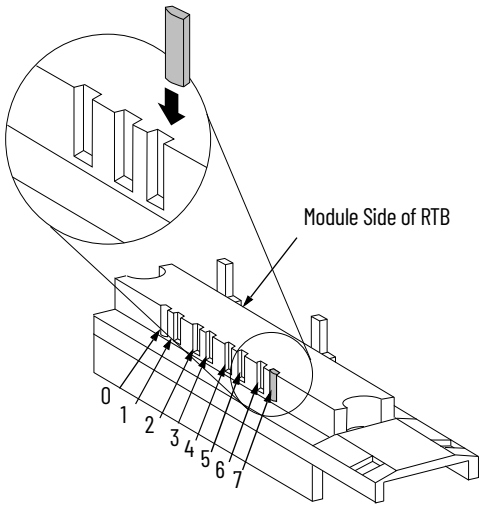
(1) UL rating is 24V DC.
(2) Use this conductor category information for planning conductor routing as described in the system-level installation manual. See the Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.

Input Specifications

Attribute	1756-HSC, 1756-HSCK
Number of counters	2
Inputs per counter	3 (A, B, Z for gate/reset)
Input frequency, max	1 MHz in counter modes (A input) 500 kHz in rate measurement mode (A input) 250 kHz in encoder mode (A/B inputs, X1 or X4) 70 Hz with filter enabled
Count range	0…16, 777, 214
Counting frequency, max	1000 kHz
Input current, min	4 mA
Input current, nom	15 mA

2. Key the RTB in positions that correspond to unkeyed module positions.
3. Insert the wedge-shaped tab on the RTB with the rounded edge first.
4. Push the tab onto the RTB until it stops.

IMPORTANT	When keying your RTB and module, you must begin with a wedge-shaped tab in slot 6 or 7.



Wiring the Module

Before wiring the module, adhere to these wiring guidelines.

WARNING: If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

WARNING: If multiple power sources are used, do not exceed the specified isolation voltage.

WARNING: When using the 1756-TBCH terminal block, do not wire more than two 0.33...1.3 mm^2 (22...16 AWG) conductors on any single terminal. Use only the same size wires with no intermixing of solid and stranded wire types.
When using the 1756-TBS6H terminal block, do not wire more than one conductor on any single terminal.

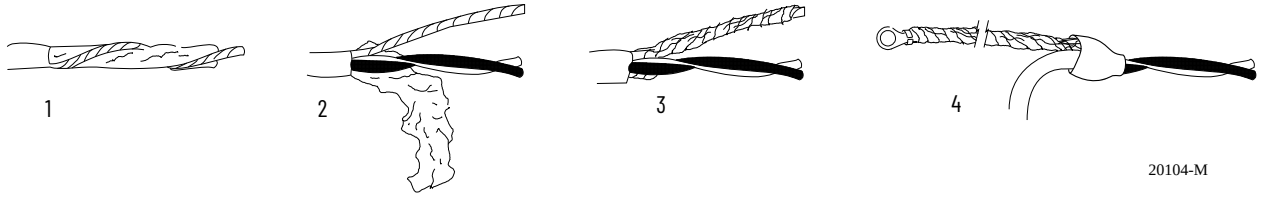
Connect the Wires

You can use an RTB to connect wiring to your module. For most applications, we recommend using Belden 8761 cable. The RTB terminations can accommodate 0.33...1.3 mm² (22...16 AWG) shielded wire. Before wiring the RTB, you must connect ground wiring.

Follow these directions to ground the wiring to the RTB.

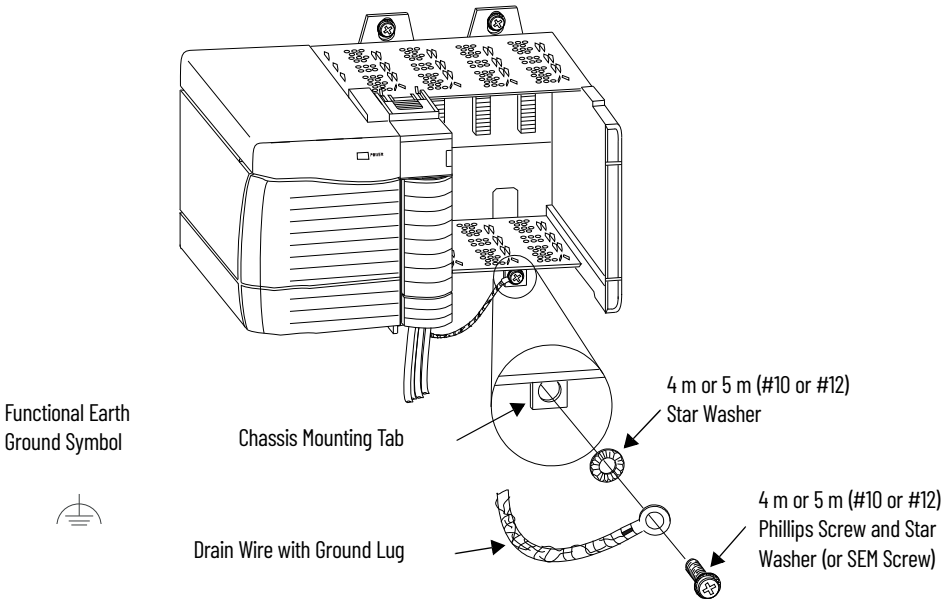
IMPORTANT We recommend you ground the drain wire at the field-side. If you cannot ground at the field-side, ground at an earth ground on the chassis as shown.

1. Remove a length of cable jacket from the connecting cables.
2. Pull the foil shield and bare the drain wire from the insulated wire.



20104-M

3. Twist the foil shield and the drain wire together to form one strand.
4. Attach a ground lug and apply heat shrink tubing to the exit area.



20918-M

5. Connect the drain wire to a chassis mounting tab.

   Use any chassis mounting tab that is designated as a functional signal ground. The functional earth ground symbol appears near the tab.
6. When the drain wire is grounded, connect the insulated wires to the field-side.

Connect Ungrounded End of the Cable

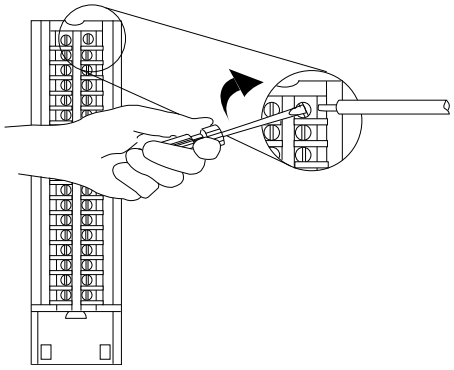
Follow these directions to connect the ungrounded end of the cable.

1. Cut the foil shield and drain wire back to the cable casing and apply shrink wrap.
2. Connect the insulated wires to the RTB.

Two Types of RTBs (each RTB comes with housing)

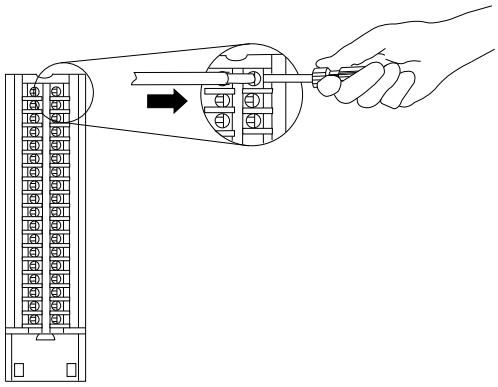
Cage clamp - catalog number 1756-TBCH

1. Insert the wire into the terminal.
2. Turn the screw clockwise to close the terminal on the wire.



Spring clamp - catalog number 1756-TBS6H

1. Insert the screwdriver into the outer hole of the RTB.
2. Insert the wire into the open terminal and remove the screwdriver.



ATTENTION: The ControlLogix system has been agency certified using only the ControlLogix RTBs (catalog numbers 1756-TBCH, 1756-TBNH, 1756-TBSH and 1756-TBS6H). Any application that requires agency certification of the ControlLogix system using other wiring termination methods may require application-specific approval by the certifying agency.

Recommendations for Wiring Your RTB

We recommend that you follow these guidelines when wiring your RTB.

1. Begin wiring the RTB at the bottom terminals and move up.
2. Use a tie to secure the wires in the strain relief (bottom) area of the RTB.
3. Order and use an extended-depth housing (catalog number 1756-TBE) for applications that require heavy gauge wiring.

   See Appendix D for cable considerations.

Wire Terminations

These sections provide details about wiring terminations to specific products.

Wire an Allen-Bradley 845 Incremental Encoder

Use the table and diagram to connect the 1756-HSC module to an Allen-Bradley 845 incremental encoder.

Application	A1 Connections	B1 Connections	Z1 Connections
Differential Line Driver Output (40 mA)	White - A1 5V DC Black of white - A1Return	Blue - B1 5V DC Black of blue - B1 Return	Green - Z1 5V DC Black of green - Z1 Return

