

Configurable Point-level Output States

Individual outputs can be configured to unique output states if the module goes into Program mode or Fault mode.

IMPORTANT

Whenever you inhibit an output module, it enters Program mode, and all outputs change to the state configured for Program mode. For example, if an output module is configured so that the states of outputs turn Off during Program mode, whenever that module is inhibited, outputs turn Off.

For more information on configuring this feature, see [page 70](#).

Electronic Fusing

Some digital outputs have internal electronic or mechanical fusing to help prevent too much current from flowing through the module. This feature protects the module from electrical damage. Other modules require external fusing.

Modules that use electronic fusing are fused on either a per point basis or per group basis to protect output points from the surge of too much current. If too much current begins to flow through a point, the fuse is tripped and a point-level fault is sent to the controller. A corresponding tag can be examined in the event of a fault. For more information about fault tags, see [Appendix A](#).

These modules use electronic fusing:

- 1756-0A8E
- 1756-0B8EI
- 1756-0A8D
- 1756-0B16D
- 1756-0B16E
- 1756-0V16E
- 1756-0V32E
- 1756-0B16IEF
- 1756-0B16IEFS

Table 13 - 1756-0A8D Point-level Fault Scenarios

Ladder commands output to be On	Ladder commands output to be Off	Possible cause of fault
1. Output Data Echo returns the state of the output as Off. 2. Fuse Blown bit is set.	1. Output Data Echo returns the state of the output as Off. ⁽¹⁾ 2. Pulse Test fails.	Output is shorted to L2.
1. Output Data Echo returns the state of the output as On. 2. Pulse Test fails. ⁽²⁾	1. Output Data Echo returns the state of the output as Off. 2. No Load bit is off.	No Load or output is shorted to L1.
1. Output Data Echo returns the state of the output as Off. 2. No Load shows a fault. 3. Field Power Loss shows a fault. 4. Pulse Test fails.	1. Output Data Echo returns the state of the output as Off. 2. No Load bit is set. 3. Field Power Loss is set. 4. Pulse Test fails.	L1 or L2 are disconnected or outside the 47...63 Hz frequency range.
1. Output Data Echo returns the state of the output as On. ⁽³⁾ 2. Output Verify bit is set. ⁽⁴⁾	1. Data Echo returns the state of the output as Off. 2. Pulse Test fails.	Hardware point damage. ⁽⁵⁾

(1) It is not possible to create a Fuse Blown fault in the Off state. If a short-circuit occurs, the output point is turned Off and the fault appears in the Off state until the point is reset.

(2) When pulse test is executed, it is normal operation to see a momentary pulsation on the module display.

(3) The output cannot turn On due to hardware point damage.

(4) Depending on the characteristics of an applied short-circuit, an output verify fault could be set until the short-circuit is detected by the module and the output is turned Off.

(5) During normal operating conditions, hardware damage is not possible. An output shorted to L2 may temporarily cause a hardware point fault. See output shorted to L2 as a possible cause.

This table lists possible diagnostic faults on the 1756-0B16D module.

Table 14 - 1756-0B16D Point-level Fault Scenarios

Ladder commands output to be On	Ladder commands output to be Off	Possible cause of fault
1. Output Data Echo returns the state of the output as Off. 2. Fuse Blown bit is set. ⁽¹⁾	1. Output Data Echo returns the state of the output as Off. ⁽²⁾ 2. Pulse Test fails. ⁽³⁾	Output is shorted to GND.
1. Output Data Echo returns the state of the output as On. 2. Pulse Test fails	1. Output Data Echo returns the state of the output as Off. 2. No Load bit is set. 3. Pulse Test passes.	One of the following could be the cause. 1. No Load. 2. Output shorted to DC+. 3. No power at module.
1. Output Data Echo returns the state of the output as On. ⁽⁴⁾ 2. Output Verify sets a bit. ⁽⁵⁾	1. Output Data Echo returns the state of the output as Off. 2. Pulse Test fails.	Hardware point damage. ⁽⁶⁾

(1) The electronic protection of this module has been designed to provide protection for the module from short-circuit conditions. The protection is based on a thermal cutout principal. In the event of a short-circuit condition on an output channel, that channel limits the current within milliseconds after its thermal cutout temperature has been reached. Other channels could produce a false error on the output verify fault signal due to the supply dropping below the minimum detect level of 19.2V DC. The output channels that are affected by this phenomenon continues to operate as directed by the module master (CPU, bridge, and so forth). What this means is that the output verify fault signals of the other channels must be checked and reset if a short-circuit on one channel occurs.

(2) It is not possible to create a Fuse Blown fault in the Off state. If a short-circuit occurs, the point is turned Off and the fault appears in the Off state until that point is reset.

(3) When the pulse test is executed, it is normal operation to see a momentary pulsation on the module display.

(4) The output cannot turn On due to hardware point damage.

(5) Depending on the characteristics of an applied short-circuit, an output verify fault could be set until the short-circuit is detected by the module and the output is turned Off.

(6) During normal operating conditions, hardware damage is not possible. An output shorted to GND may temporarily cause a hardware point fault. See output shorted to GND as a possible cause.

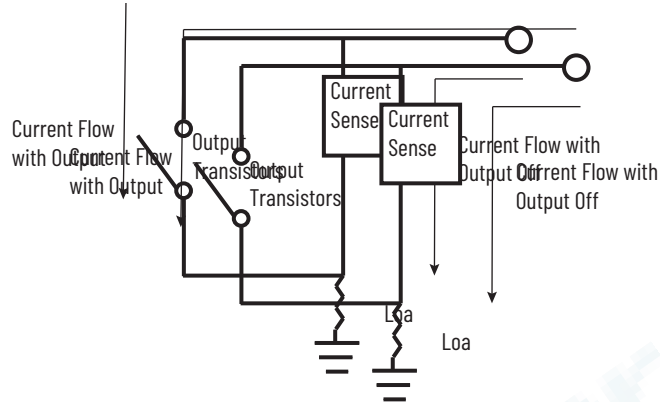
Diagnostic Latch of Information

Diagnostic latching lets diagnostic I/O modules latch a fault in the set position once it has been triggered, even if the error condition causing the fault to occur disappears.

No Load Detection

For each output point, no load detection senses the absence of field wiring or a missing load from each output point in the Off state only.

The output circuit on a diagnostic output module has a current sensing opto-isolator used in parallel with the output transistor. Current flows through this sensing circuit only when the output is Off, as shown in the simplified diagram.



Diagnostic output modules list a minimum load current specification (1756-OA8D = 10 mA & 1756-OB16D = 3 mA). In the On state, the module must be connected to a load that draws a minimum current equal to these values.

If a connected load is sized in accordance with the minimum load current specification, diagnostic output modules are capable of sensing current through the opto-isolator and the load when the output point is Off.

For more information on configuring this feature, see [Chapter 4](#).

Field-side Output Verification

Field-side output verification informs you that logic-side instructions consumed by the module are accurately represented on the power side of a switching device. For each output point, this feature confirms that the output is On when it is commanded to be On.

The diagnostic output module can tell a controller that it received a command and whether the field-side device that is connected to the module has executed the command. For example, in applications that must verify that the module has accurately followed the processor's instructions, the module samples the field-side state and compares it to the system-side state.

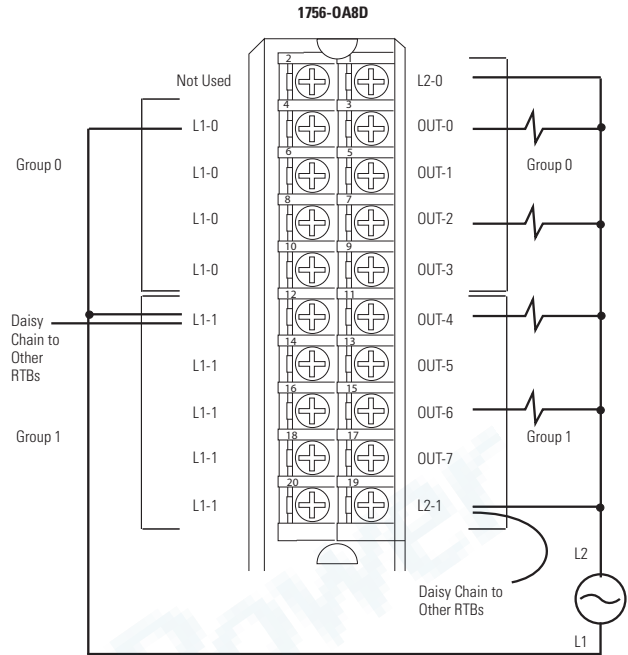
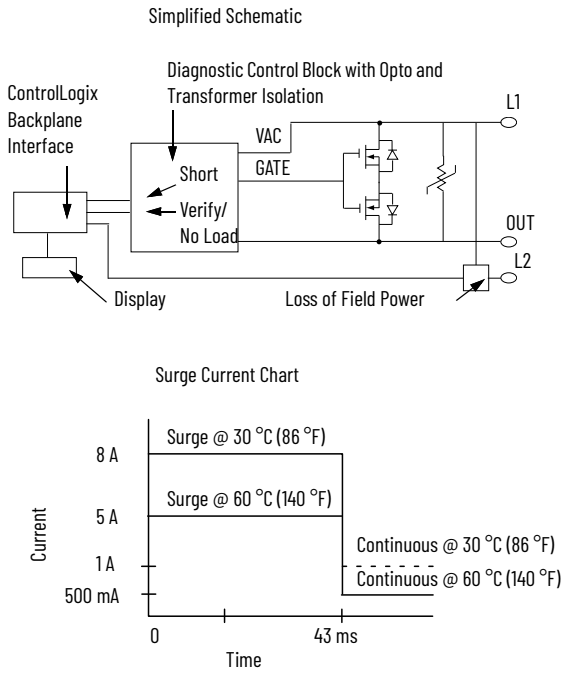
This feature has a corresponding tag that can be examined in the user program in the event of a fault. For more information on these tags, see [Appendix A](#).

If an output cannot be verified, a point-level fault is sent to the controller.

For more information on configuring this feature, see [Chapter 4](#).

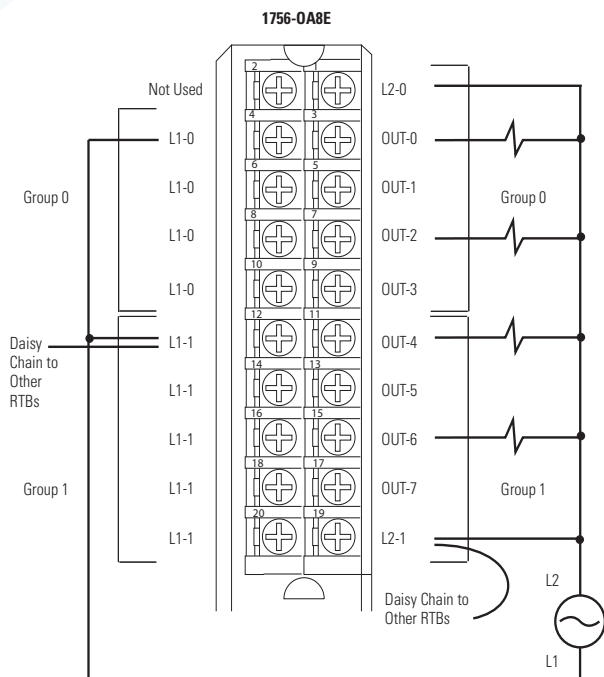
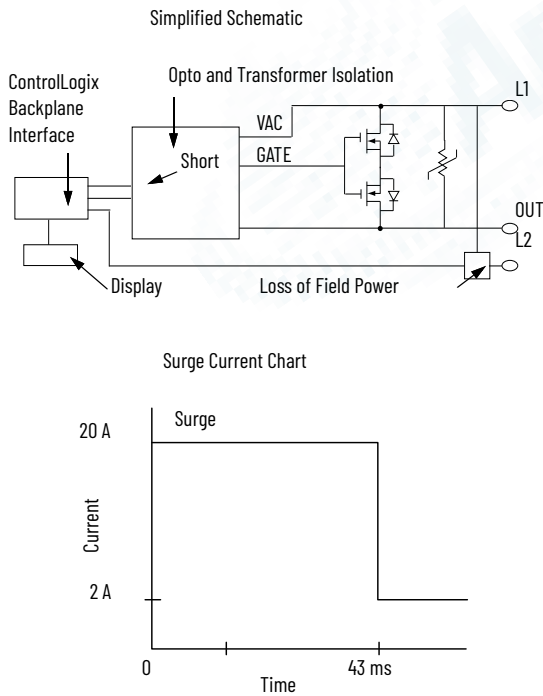
1756-0A8D

ControlLogix AC (74...132V) diagnostic output module



1756-0A8E

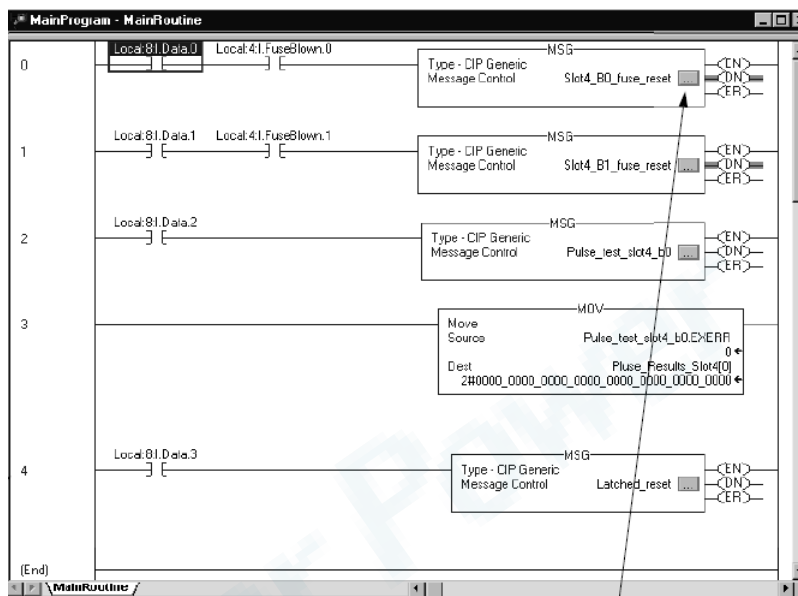
ControlLogix AC (74...132V) electronically fused output module



If an electronic fuse in a digital I/O module is shorted, a red LED appears on the front of the module and the FuseBlown bits for the output group, in the local input tag, will become true.

Once the short has been fixed, you can cycle power to the module with an electronic fuse via turning off the chassis power or re-seating the module itself, or you can use ladder logic to reset the electronic fuse.

This ladder logic program shows how to use ladder logic to reset an electronic fuse for a faulted point, perform a pulse test, and to reset latched diagnostics.



Click the box in each rung to see the associated configuration and communication.

The rungs perform these functions:

- Rungs 0 and 1 are used to perform a reset fuse service on Bits 0 and 1, respectively. The example is of a 1756-0A8D module in slot 4.
- Rung 2 performs a pulse test service to slot 4.
- Rung 3 moves the results of the pulse test to a data storage location. (The actual results appear in the message instruction tags under the tag name EXERR).
- Rung 4 performs a reset latched diagnostics service to slot 4. This example shows an output module.

The Controller Tags dialog box shows examples of the tags created in the ladder logic, as displayed in the tag editor.

Controller Tags - Pulse_Fuse_example(controller)

Scope: Pulse_Fuse_example Show: Show All Sort: Tag Name

	P	Tag Name	Alias For	Base Tag	Type	Style	Description
		Slot4_B1_fuse_reset			MESSAGE		
		Slot4_B0_fuse_reset			MESSAGE		
	☐	reset_slk4_b1			DINT	Binary	
	☐	reset_slk4_b0			DINT	Decimal	
		Pulse_test_slot4_b0			MESSAGE		
	☐	pulse_slk4_b0			DINT[5]	Binary	
	☐	pulse_results_slk4			DINT[1]	Decimal	
	☐	Pluse_Results_Slot4			DINT[1]	Binary	
		Local:9:I			AB:1756_D1_DC_...		
		Local:9:C			AB:1756_D1_DC_...		
		Local:8:I			AB:1756_D1_Time...		
		Local:8:C			AB:1756_D1:C:0		
		Local:7:0			AB:1756_D0:0:0		

Monitor Tags Edit Tags