Analog Output Modules

This section describes the Analog Output Modules available for use with Tricon v9–v10 systems. For installation instructions, see Replacing I/O Modules on page 223.

Table 18 Analog Output Modules

Model	Module Description	Output Current	Type
3805E/H	Analog Output	8 outputs @ 4–20 mA	TMR
3806E	Analog Output	2 outputs @ 20–320 mA 6 outputs @ 4–20 mA	TMR
3807	BiPolar Analog Output	4 outputs @ –60 to +60 mA	TMR

Analog Output Modules receive output signals from the Main Processors on each of three channels. Each set of data is voted, and a healthy channel is selected to drive the outputs. The module monitors its own current outputs (as input voltages) and maintains an internal voltage reference that provides self-calibration and module health information.

Each channel on the analog output module has two independent current loopback circuits per point that are readable by the other channels. The information from these circuits is used as part of the hardware voting process. The first circuit verifies the accuracy and presence of the analog signal for each point, independent of the load presence or channel selection. The second circuit verifies the actual current flow for each point from the selected channel. If a current flow is detected from any point on a non-selected channel, that channel is immediately shutdown. The Load alarm status indicator is annunciated if the module cannot drive current from any point—for example, open load.

Analog Output Modules provide for the connection of redundant field loop power sources with individual indicators on the module called Pwr1 and Pwr2. Field loop power supplies for analog outputs must be provided externally. Connection of the field loop power supplies is made on the termination panel. A Status indicator activates if an open loop is detected on one or more output points. The Pwr1 and Pwr2 indicators are On if loop power is present.

Each module sustains complete and ongoing diagnostics for each channel. Failure of any diagnostic test on any channel activates the module Fault status indicator and the chassis alarm signal. The Fault status indicator points to a channel fault, *not* a module failure. The module is guaranteed to operate properly in the presence of a single fault and may continue to operate properly with multiple faults.

Analog Output Modules include the hot-spare feature which allows online replacement of a faulty module. Like all I/O modules, Analog Output Modules require a separate field termination assembly with a cable interface to the Tricon controller backplane. Each module is mechanically keyed to prevent improper installation in a configured chassis.

Analog Output Schematic

This figure is a simplified schematic for models 3805E, 3805H, and 3806E TMR Analog Output Modules.

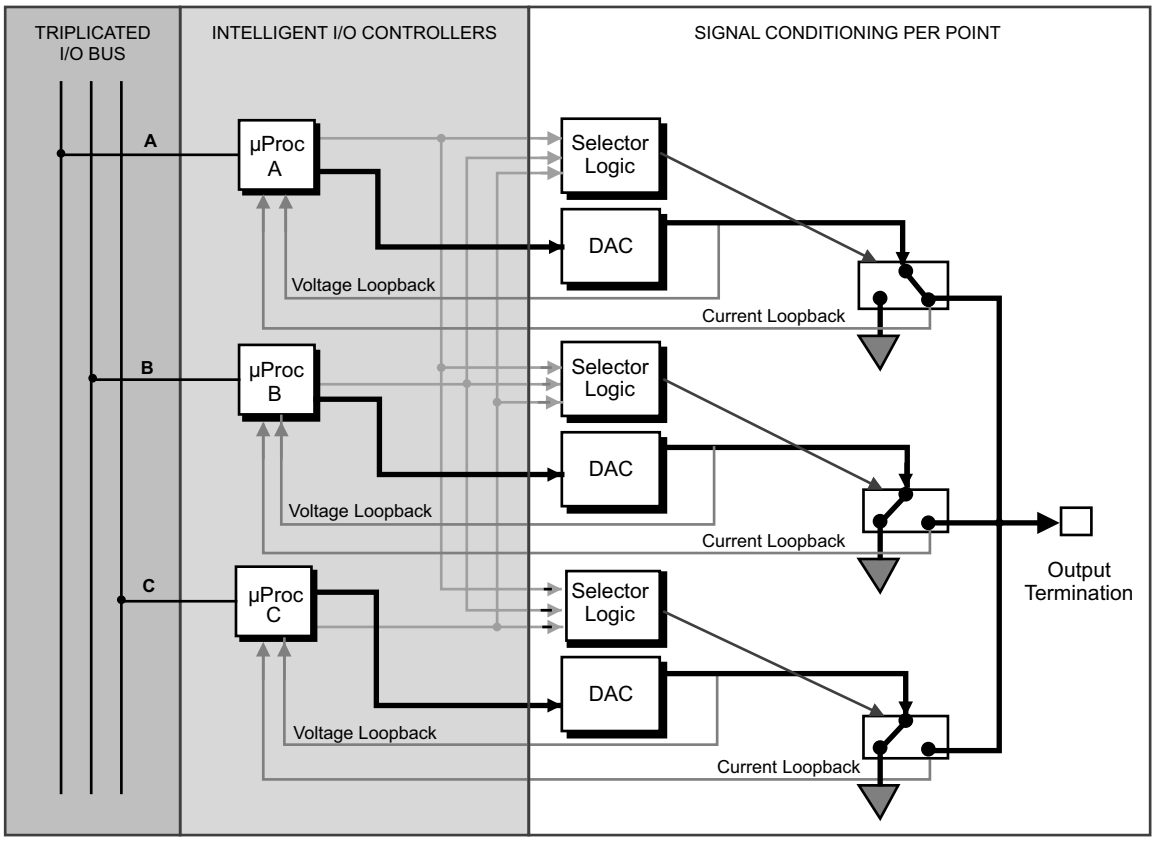


Figure 25 3805E, 3805H, and 3806E Simplified Schematic

Analog Output Front Panels

This figure shows the front panels of models 3805E, 3805H, 3806E, and 3807.

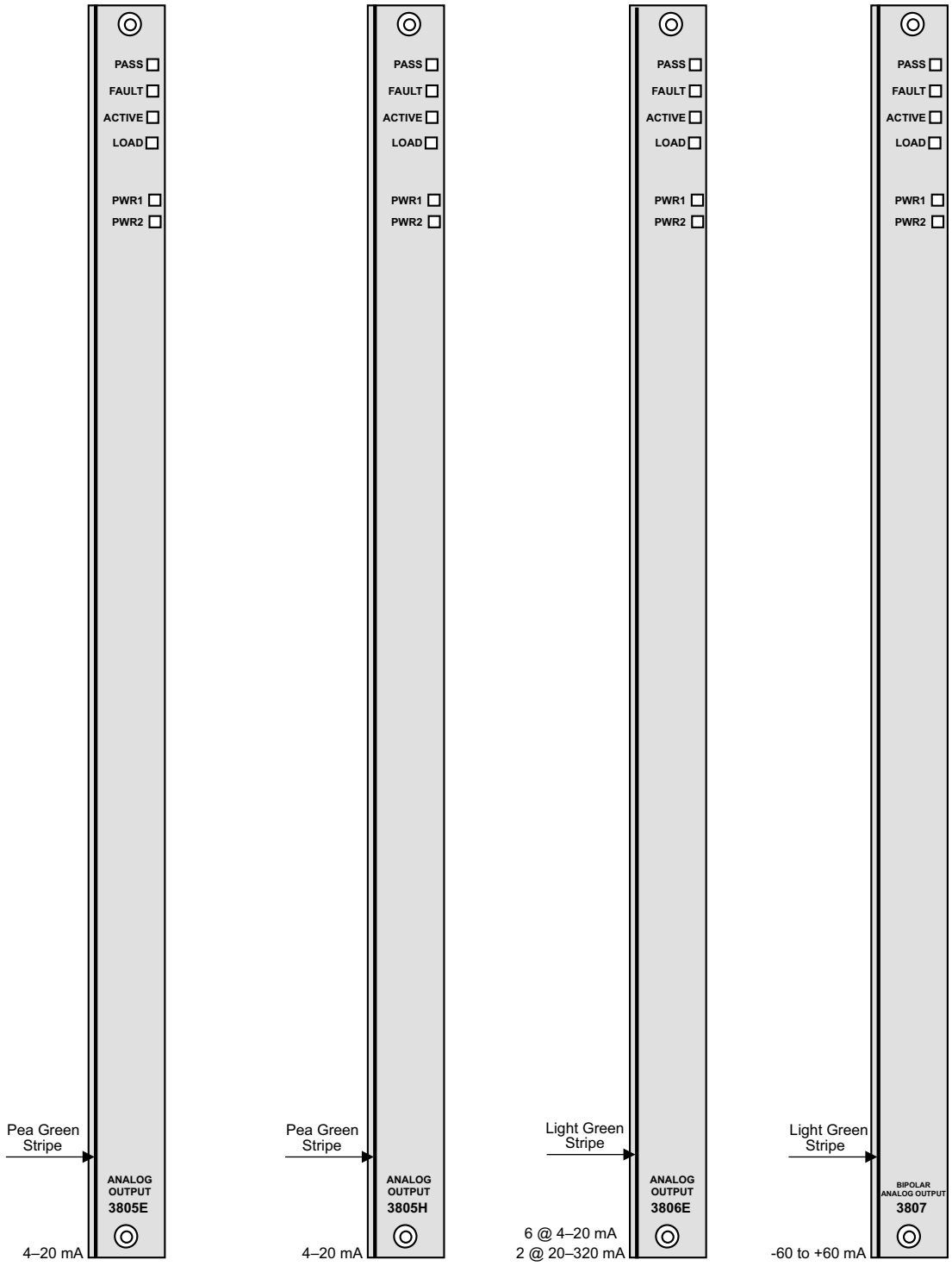


Figure 27 3805E, 3805H, 3806E, and 3807 Front Panels

3805E and 3805H Specifications

This table lists the specifications for the model 3805E and 3805H TMR Analog Output Modules.

Table 19 3805E and 3805H Analog Output Specifications

Feature	Specification
Color code	Pea green
Number of output points	8, output, commoned return, DC-coupled
Resolution	12 bits
Output current range	4–20 mA (+6% over-range)
Output over-range capability	2–21.2 mA
Output accuracy	< 0.25% (in range of 4–20 mA) of FSR (0–21.2 mA), from 0° to 60° C
External loop power (reverse voltage protected)	+42.5 VDC maximum +24 VDC nominal
Output loop power requirement: load	Required
Output loop power requirement: 250 Ω load	> 20V (1 A minimum)
Output loop power requirement: 500 Ω load	> 25V (1 A minimum)
Output loop power requirement: 750 Ω load	> 30V (1 A minimum)
Output loop power requirement: 1000 Ωload	> 35V (1 A minimum)
Output over-range protection	+42.5 VDC continuous, 0 VDC continuous
Switch time on channel failure	10 ms (typical), 20 ms (maximum)
Status indicator: Module status	Pass, Fault, Active, Load
Status indicator: Loop power status[1]	Pwr1, Pwr2
Output diagnostic fault coverage:	
Minimum input change	Not applicable
Output change sample period	Not applicable
Minimum period of mis-compares	Not applicable
Logic power	< 15 watts

1. The loop-power detectors which drive the Pwr1 and Pwr2 indicators identify the presence of loop power (greater than 20 VDC), and do not verify adequate loop power for the attached load.

Note The 3805H module has been modified to support increased inductive loads. It is fully compatible for use in all applications of the 3805E module.

3806E Specifications

This table lists the specifications for the model 3806E TMR Analog Output Module.

Table 20 3806E Analog Output Specifications

Feature	Specification
Color code	Light green
Number of output points	6 outputs @ 4–20 mA 2 outputs @ 20–320 mA, commoned return, DC-coupled
Resolution	12 bits
Recommended operating voltage range	24–32 VDC, 3 amp minimum
Extended operating voltage range	20–36 VDC, 3 amp minimum
Over-voltage protection	< 42.5 VDC continuous
Points 2-4 and 6–8, 4–20 mA output:	
Output current range	4–20 mA
Output over-range capability	2–21.2 mA (+6% over-range)
Output accuracy	< 0.25% (in normal range of 4–20 mA) of FSR (2–21.2 mA), from 0° to 60° C
Maximum load vs. external loop voltage	≤ 275 Ω @ 20 VDC ≤ 475 Ω @ 24 VDC ≤ 650 Ω @ 28 VDC ≤ 825 Ω @ 32 VDC
Points 1 and 5, 20–320 mA output:	
Output current range	20–320 mA
Output over-range capability	20–339.2 mA (+6% over-range)
Output accuracy	< 0.25% (in normal range of 20–320 mA) of FSR (20–339.2 mA), from 0° to 60° C
Maximum load vs. external loop voltage	≤ 15 Ω @ 20 VDC ≤ 25 Ω @ 24 VDC ≤ 40 Ω @ 28 VDC ≤ 50 Ω @ 32 VDC
External loop power (reverse voltage protected)	+42.5 VDC maximum; +24 VDC nominal
Temperature de-rating vs. total output current vs. loop voltage	
836 mA (all points @ maximum over-range output), 32 VDC loop voltage	≤ 104° F (≤ 40° C), ambient (measured at bottom of chassis)
836 mA (all points @ maximum over-range output), 28 VDC loop voltage	≤ 126.5° F (≤ 52.5° C), ambient (measured at bottom of chassis)

Table 20 3806E Analog Output Specifications *(continued)*

Feature	Specification
836 mA (all points @ maximum over-range output), 24 VDC loop voltage	≤ 140° F (≤ 60° C), ambient (measured at bottom of chassis)
774 mA (sum of all points), 28 VDC loop voltage	≤ 140° F (≤ 60° C), ambient (measured at bottom of chassis)
760 mA (all points @ maximum output), 28.5 VDC loop voltage	≤ 140° F (≤ 60° C), ambient (measured at bottom of chassis)
677 mA (sum of all points), 32 VDC loop voltage	≤ 140° F (≤ 60° C) C, ambient (measured at bottom of chassis)
602 mA (sum of all points), 36 VDC loop voltage	≤ 140° F (≤ 60° C), ambient (measured at bottom of chassis)
Status indicator: Module status	Pass, Fault, Active, Load
Status indicator: Loop power status[1]	Pwr1, Pwr2
Output diagnostic fault coverage: Minimum input change Output change sample period Minimum period of mis-compares	 Not applicable Not applicable Not applicable
Switch time upon channel fault	10 ms (typical), 20 ms maximum
Logic power	< 15 watts

1. The loop-power detectors which drive the Pwr1 and Pwr2 indicators identify the presence of loop power (greater than 20 VDC), and do not verify adequate loop power for the attached load.

3807 Specifications and Description

This table lists the specifications for the model 3807 TMR BiPolar Analog Output Module (BPAO).

Table 21 3807 BiPolar Analog Output Specifications

Feature	Specification
Color code	Light green
Output points	4, bipolar outputs
Resolution	13 bits
Output current range	-60 to +60 mA
Output over-range capability	none
Output accuracy	< 0.25% (in range of -60 to 60 mA) of Full Scale Range (FSR), from 0° to 60° C. FSR = 120 mA.
Coil diagnostic input signals[1]	4 differential, DC-coupled
Coil diagnostic input resolution	12 bits
Coil diagnostic input normal-range measurement	± 10 V
External loop power range	24 VDC –15%/+20%, +5% ripple
Absolute external loop power range	19.2–30.0 VDC
Over-voltage protection	36 VDC continuous
External loop power current[2]	3.5 amp minimum
Reverse voltage protected	–36 VDC continuous
Redundant loop power support	Yes
Compliance Voltage[3]	–9 V minimum +9 V maximum
Resistive load operating range	150 ohm @ ± 60 mA 1 kohm @ ± 9 mA 9 kohm @ ± 1 mA
Inductive Load Operating Range—using standard termination with 300 Ω 680 nF snubber	0.0 H minimum 1.0 H maximum
Inductive Load Operating Range—using external 300 Ω 4.7 uF snubber[4]	0.0 H minimum 2.6 H maximum
Capacitive load operating range	0 uF minimum 133 uF maximum, non-polar, with parallel resistor
Maximum glitch time, hourly switch to hot spare module	Less than 20 msec