**Table 30 - T9831/2/3 Analogue Input TA Specification**

| Attribute | Value |
|---|---|
| T9831 | None |
| T9832/T9833 | ± 1.5 kVdc Maximum withstanding for 1 minute |
| Maximum field loop power dissipation | 0.08 W for each field loop (0.27 BTU/hr) |

## T9451 Digital Output Module, 24Vdc, 8 channel

The T9451 digital output module has 8 channels for a maximum of 8 field elements and can switch 1 A at 32 Vdc for each device. It features voltage and load current monitoring on each channel, reverse current protection and short and open circuit line monitoring. It is designed to always be able to switch off an output when demanded. No single failure in the module can cause a stuck-on failure. The module supports dual redundant power feeds for field devices without the need for external diodes.

The output module isolates the processor module from the output channel control and data management circuits, thus protecting the processor module from possible faults in the output control circuits and field connections. An output channel protection activates when the channel load exceeds a safe limit. And, a reverse voltage protection circuit in each output channel verifies that externally applied voltages do not supply current flow into the module outputs.

The module has self-checking functionality. Short circuit and open circuit line monitoring is supplied on all outputs (see article 605753 on the Rockwell Automation Knowledgebase website). Internal diagnostics do ongoing functionality checks ensuring that the output channel command data is correctly transferred to the output. The processor module initiates a test sequence on each output channel, checking for 'stuck-on' and 'stuck-off' conditions on the output switch pairs. Front panel LEDs give module, channel and field connection status indications. These status indications can also be connected to application variables and viewed at the Workbench.

When a controller uses a pair of digital output modules in a dual configuration, the two fail-safe output switches on each channel are combined in a parallel arrangement so that they automatically form a fault-tolerant output configuration.

The AADvance Workbench has settings for individual digital output channels:

- You can specify a shutdown state for an output channel that defines how the output will behave when the module is in a shutdown mode.
- You can disable the line test feature for an output that disables detection of a no-load condition (e.g. for used output channels).

## T9451 Digital Output Module Specification

**Table 31 - Digital Output Module Specification**

| Attribute | Value |
|---|---|
| **Functional Characteristics** | |
| Output channels | 8 |
| **Performance Characteristics** | |

**Table 31 - Digital Output Module Specification**

| Attribute | Value |
|---|---|
| Safety integrity level | IEC 61508 SIL 3 (1) |
| Safety level degradation | 1oo1D, 1oo2D |
| Self-test interval | <30 minutes (30s for each module) |
| **Electrical Characteristics** | |
| Module supply voltage: | |
| Voltage | Redundant +24 Vdc nominal;<br>18 Vdc to 32 Vdc |
| Module supply power dissipation | 3.0 W (10.2 BTU/hr.) |
| Output Voltage: | |
| Maximum voltage without damage | –1 V to +60 Vdc |
| Operating field supply voltage | 18 Vdc to 32 Vdc |
| Maximum Field Voltage Slew Rate | 150 V/s [(2), (3)] |
| Output current: | 1 A continuous for each channel |
| Minimum current required for line monitoring | 10 mA for each module (20 mA for dual pair) |
| Maximum voltage drop | 1 Vdc |
| Maximum current at de-rated temperature<br>De-rated current at maximum temperature | 8 A all channels @ 60 °C<br>6 A all channels @ 70 °C |
| Maximum De-energised Output Voltage Slew Rate | 12 V/ms (4) |
| Maximum Energised Output Current Slew Rate | 0.9 A/ms (4) |
| Output off resistance (effective leakage) | 50 KΩ |
| Voltage monitoring accuracy | ± 0.5 V |
| Current monitoring accuracy | ± 10 mA |
| Output overload protection | |
| Surge | 2 A for up to 50 ms |
| Continuous | 1.5 A |
| Maximum field loop power dissipation | 0.57 W for each field loop (1.94 BTU/hr.) |
| **Mechanical Specification** | |
| Dimensions (height × width × depth) | 166 mm × 42 mm × 118 mm<br>(6-½ in. × 1-21/32 in. × 4-21/32 in.) |
| Weight | 340 g (12 oz.) |
| Casing | Plastic, non flammable |

(1) SIL 3 is the maximum achievable for a single channel. Selected CPU, input and output voting configurations could increase or decrease the correct SIL achieved. Refer to the Safety Manual for more details.

(2) Limit not applicable if all outputs are energised.

(3) Limit not applicable if perturbations are less than 2.0 Vpp or last less than 3 minutes in any 60 minute period.

(4) Limit not applicable to transgressions lasting less than the process safety time configured for the module.

Transgression of the slew rate limits identified above may lead to channel failure resulting from diagnostics otherwise designed to verify that channels are operating within their defined safety accuracy.

## T9851/2 Termination Assemblies for Digital Outputs

A T9851 is a simplex termination assembly for 8 digital output channels. The T9852 is a dual 8 channel output termination assembly. The terminal blocks also accept two 24 Vdc power sources for field power. The termination assembly incorporates two replaceable 10 A fuses, one for each field power source.