Trusted^{TM} TMR 24Vdc Digital Output Module-T8451

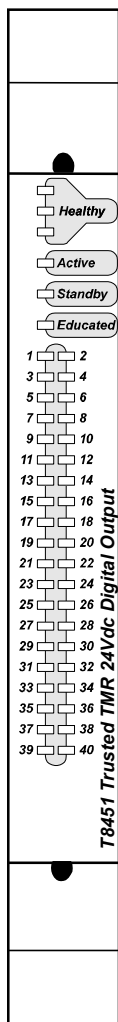### FRONT PANEL

Healthy

Active

Standby

Educated

T8451 Trusted TMR 24Vdc Digital Output

DESCRIPTION

The Trusted^{TM} TMR 24V dc Digital Output Module interfaces to 40 field output devices. Outputs are arranged in five groups of eight outputs. All outputs in a group share a common power source and return. Fault tolerance is achieved through Triple Modular Redundancy (TMR) within the same module for each of the 40 output channels.

The module provides on-board Sequence of Events (SOE) reporting with a resolution of 1ms. The "event" is the actual sensing of the field device loop current.

Each triplicated section (slice) of the module, receives output data from the Trusted^{TM} TMR Processor and sends its data to an internal safety layer hardware voter. Each slice uses the voted data to control the outputs. Every output channel consists of a six-element voted array. The output switch array provides fault tolerant, uninterrupted control under an output switch failure condition. Output switching and fault diagnostics comply with the demanding requirements of IEC-61508 SIL-3 for First Fault - Fault Tolerant, and Second Fault - Fail Safe outputs.

When a module fault is detected, the Trusted^{TM} TMR Processor will flag the unhealthy condition, indicating the need to replace the module. Control continues until a replacement (healthy) module is available. Replacement modules can be located in a standby slot next to the module or in a designated SmartSlot with a temporary connection to the same Trusted^{TM} Termination Assembly.

Each output is user configurable to perform line monitoring of the connected field devices to detect field wiring and load failures. Automatic over-current protection is inherent in every output circuit which eliminates the need for fuses.

Modules may be placed in any I/O module slot in a Trusted^{TM} Processor Chassis or Expander chassis. Once the I/O module configuration is set, mechanical keying is available on all I/O modules to prevent inserting a module into an incorrect slot.

Configuration of the module is carried out using the Trusted^{TM} Toolset running on an Engineering Workstation. Once configured and loaded into the Trusted^{TM} Controller, replacement modules are on-line educated by the TMR Processor.

FEATURES

- **40 TMR output channels per module**

- **Five isolated groups of eight outputs each**

- **Six-element voted output array**

- **Comprehensive diagnostics and self-test**

- **Guaranteed, First fault – Fault Tolerant, Second fault – Fail Safe**

- **Line monitoring on a per channel basis**

- **Automatic over-current protection – no fuses required**

- **2500V dc Opto-Isolation**

- **Hot replaceable**

- **Front panel status LEDs for each channel**

- **Module fault and status indicators**

- **IEC 61508, SIL 3 safety applications**

- **On-board 1 ms resolution Sequence of Events reporting**

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BLOCK DIAGRAM
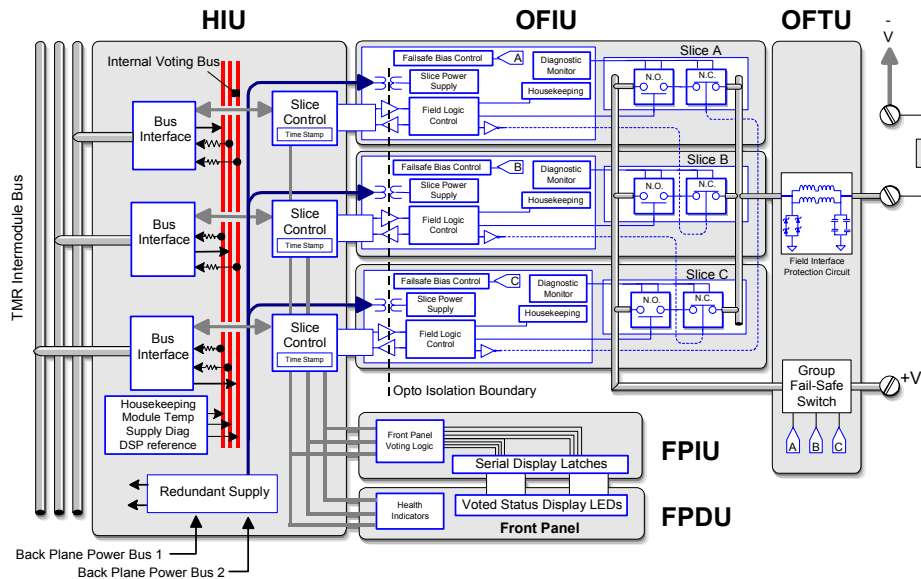
MECHANICAL SPECIFICATION

Dimensions (HxWxD):
241mm x 30mm x 300mm
(9.5ins x 1.2ins x 11.8ins)

Weight:
1.13kg
(2.5lbs)

ENVIRONMENTAL

Operating Temperature:

-5°C to 60°C
(23°F to 140°F)

Operating Humidity:
5 to 95%, non-condensing

Vibration:
10 to 57Hz	±0.075mm
57 to 150Hz	1.0g

Shock:
15g, ½ sine wave, 11ms

EMI (IEC 801):
ESD
Air discharge to 15kV
Contact discharge to 8kV

Radiated Fields
10V/m, 27MHz to 500MHz

Transients and Bursts
2kV, 2.5kHz for
t=60 seconds

ELECTRICAL SPECIFICATION

Number of Outputs	40 Channels
No. of Independent Power Groups	5, each of 8 outputs
Field Common Isolation	
Sustained Working	±250V dc
Maximum Withstanding	±2.5kV dc
Output Voltage Field Supply	
Measurement Range	0 to 36V dc
Maximum Withstanding	-1 to 60V dc
Output Current Rating	
Continuous	2A
Output Off Resistance (effective leakage)	33kΩ
Power Consumption (1A per channel)	24W
Output Turn On/Off Delay	0.5ms
Self-Test Internal	2 minutes
Output Short Circuit Protection	Automatic
Fusing	Not required
Intrinsic Safety	External barrier
Circuit Type	Fault tolerant, fully triplicated with optional line monitoring

ICS Triplex