

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

INVENSYS TRICONEX

3604E

TMR DIGITAL OUTPUT MODULE

Used with the applicable Tricon v9-v10 system configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official pages follow this cover with source pagination retained.

Invensys 9700077-012, February 2009

Digital Output Modules

This section describes the Digital Output Modules available for use with Tricon v9–v10 systems, which include TMR and Single (non-triplicated) modules. For field wiring information, see [Digital Output Field Wiring Precautions on page 192](#).

Table 30 Digital Output Modules

Model	Voltage	Type
3601E/T	115 VAC	16-point TMR, Non-Commoned
3603B	120 VDC	16-point TMR, Non-Commoned
3603E/T	120 VDC	16-point TMR, Commoned
3604E	24 VDC	16-point TMR, Non-Commoned
3607E	48 VDC	16-point TMR, Non-Commoned
3611E	115 VAC	8-point TMR Supervised, Commoned
3613E	120 VDC	8-point TMR Supervised, Commoned
3614E	24 VDC	8-point TMR Supervised, Commoned
3615E	24 VDC	8-point TMR Supervised, Low Power, Commoned
3617E	48 VDC	8-point TMR Supervised, Commoned
3623/T	120 VDC	16-point TMR Supervised, Commoned
3624	24 VDC	16-point TMR Supervised, Commoned
3625 ¹	24 VDC	32-point TMR Supervised/Non-Supervised, Commoned
3636R/T	Relay, NO	32-point Non-Triplicated, Non-Commoned
3664	24 VDC	32-point Dual Output, Commoned
3674	24 VDC	32-point Dual Output, Commoned

1. The 3625 module can be installed only in Tricon v10.2 and later systems.

Each Digital Output Module houses the circuitry for three identical, isolated channels. Each channel includes an I/O microprocessor which receives its output table from the I/O communication processor on its corresponding Main Processor. All the Digital Output Modules, except the dual DC modules, use special quadruplicated output circuitry which votes on the individual output signals just before they are applied to the load. This voter circuitry is based on parallel-series paths which pass power if the drivers for Channels A and B, or Channels B and C, or Channels A and C command them to close – in other words, 2-out-of-3 drivers voted On. The dual Digital Output Modules provide a single parallel or series path, with the 2-out-of-3 voting process applied individually to each switch.

The quadruplicated output circuitry provides multiple redundancy for all critical signal paths, guaranteeing safety and maximum availability. The dual output module provides just enough redundancy to ensure safe operation. Dual modules are optimized for those safety-critical applications where low cost is more important than maximum availability.

24 to 120 VDC Digital Output Modules

This figure is a simplified schematic for models 3603B, 3603E, 3603T, 3604E, and 3607E, which are TMR Digital Output Modules.

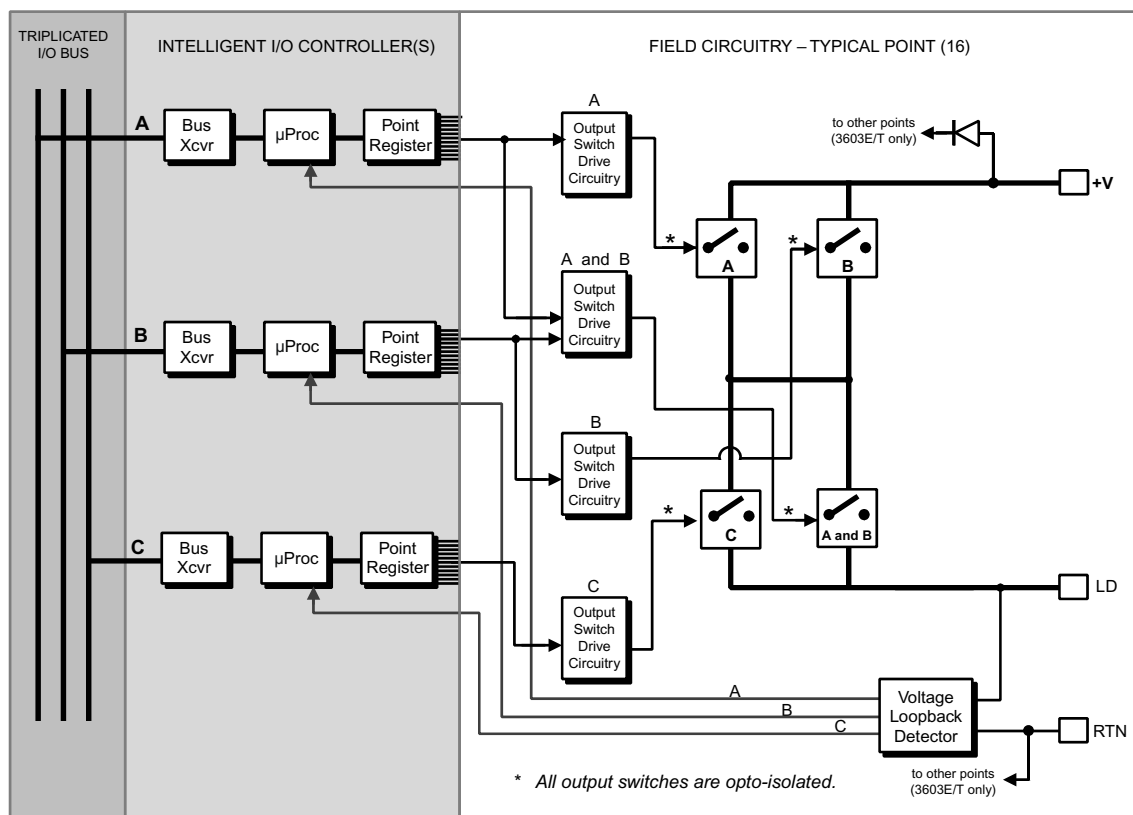


Figure 38 3603B, 3603E, 3603T, 3604E, and 3607E Simplified Schematic

This figure shows the front panels of models 3603B, 3603E, 3603T, 3604E, and 3607E.

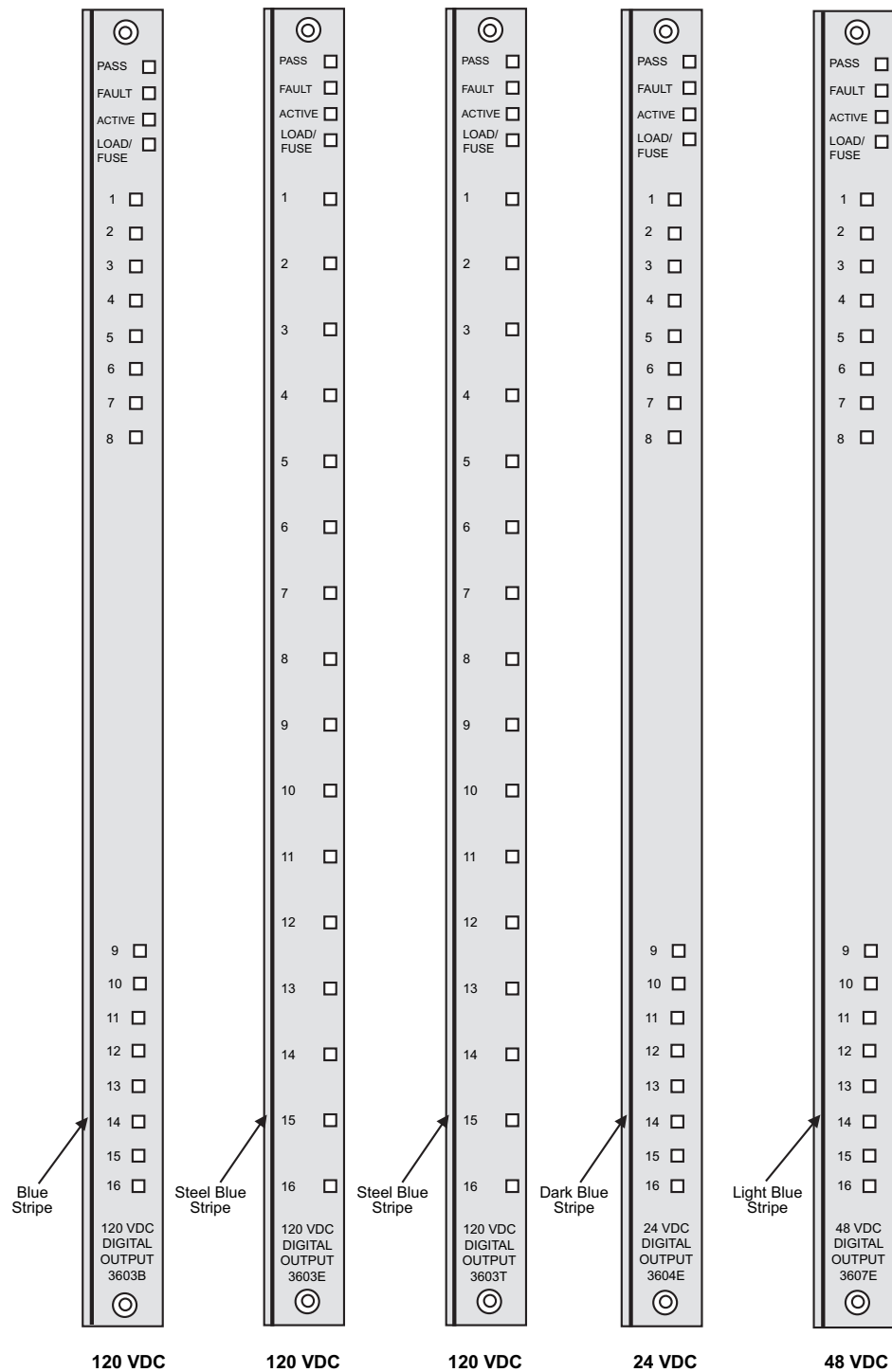


Figure 39 3603B, 3603E, 3603T, 3604E, and 3607E Front Panels

Table 33 3603E and 3603T Digital Output Specifications (*continued*)

Feature	Specification
On-state voltage drop:	< 1.5 VDC typical @ 250mA
With external termination, 10-foot cable	< 2.5 VDC maximum @ 1A
On-state voltage drop:	< 2.5 VDC typical @ 250mA
With external termination, 99-foot cable	< 5.5 VDC maximum @ 1A
Inductive kick-back protection (reverse EMF)	Reverse diode on I/O module

1. Power must be supplied to all points, including unused points on non-commoned panels.
2. The maximum output toggle rate enables proper operation of I/O diagnostics and detection of all normally detectable faults. The minimum toggle rate provides fault coverage of normally undetectable faults within 10% of the calculated mean-time-between-faults (MTBF) for the module.
3. Diagnostic glitching can be disabled by using the OVD disable function.

3604E Specifications

This table lists the specifications for model 3604E, which is a TMR Digital Output Module with a nominal voltage of 24 VDC.

Table 34 3604E Digital Output Specifications

Feature	Specification
Color code	Dark blue
Number of output signals	16, non-commoned
Voltage range	22–45 VDC
Logic power	< 10 watts
Current ratings, maximum	2 amps/point, 10 amps surge/10 ms
Leakage current to load	2 mA, maximum
Fuses (field termination module)	1 per output (2.5 amps fast-acting)
Status indicator: On or Off state	1 per point
Status indicator: Module status	Pass, Fault, Active
Status indicator: Field alarm ¹	Load/Fuse
Point isolation	1500 VDC minimum
Output diagnostic fault coverage ² :	
Maximum output toggle rate	Every 100 ms plus one scan
Minimum output toggle rate	Not applicable
Diagnostic glitch duration ³	2 ms maximum, 500 μ s typical
On-state voltage drop:	< 3 VDC typical @ 500mA
At backplane	< 3 VDC maximum @ 2A

Table 34 3604E Digital Output Specifications (continued)

Feature	Specification
On-state voltage drop:	< 4 VDC typical @ 500mA
With external termination, 10-foot cable	< 5 VDC maximum @ 2A
On-state voltage drop:	< 6 VDC typical @ 500mA
With external termination, 99-foot cable	< 11 VDC maximum @ 2A
Inductive kick-back protection (reverse EMF)	Reverse diode on I/O module

1. Power must be supplied to all points, including unused points on non-commoned panels.
2. The maximum output toggle rate enables proper operation of I/O diagnostics and detection of all normally detectable faults. The minimum toggle rate provides fault coverage of normally undetectable faults within 10% of the calculated mean-time-between-faults (MTBF) for the module.
3. Diagnostic glitching can be disabled by using the OVD disable function.

3607E Specifications

This table lists the specifications for model 3607E, which is TMR Digital Output Module with a nominal voltage of 48 VDC.

Table 35 3607E Digital Output Specifications

Feature	Specification
Color code	Light blue
Number of output signals	16, non-commoned
Voltage range	44–80 VDC
Logic power	< 10 watts
Current ratings, maximum	1 amp/ point, 5 amps surge/10 ms
Leakage current to load	2 mA, maximum
Fuses (field termination module)	1 per output (1.25 amps fast-acting)
Status indicator: On or Off state	1 per point
Status indicator: Module status	Pass, Fault, Active
Status indicator: Field alarm ¹	Load/Fuse
Point isolation	1500 VDC minimum
Output diagnostic fault coverage ² :	
Maximum output toggle rate	Every 100 ms
Minimum output toggle rate	Not applicable
Diagnostic glitch duration ³	2 ms maximum, 500 μ s typical
On-state voltage drop:	< 2 VDC typical @ 250mA
At backplane	< 3 VDC maximum @ 1A
On-state voltage drop:	< 3 VDC typical @ 250mA
With external termination, 10-foot cable	< 4 VDC maximum @ 1A