

SPECIFICATIONS - DISCRETE I/O MODULES



In This Chapter:

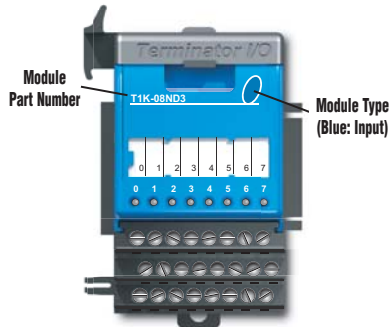
Discrete I/O Module Overview	5-3
Discrete I/O Modules	5-4

Notes:

Discrete I/O Modules Overview

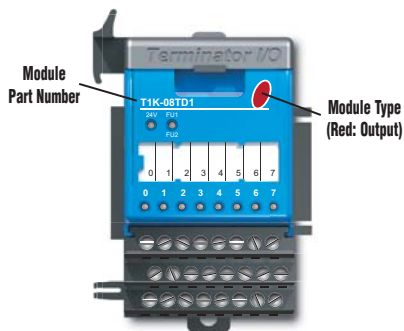
There are 15 discrete I/O modules available. The specifications and wiring diagrams for these modules are found in this chapter. Each discrete I/O module is identified as an “Input” or “Output” module using the color coding scheme shown below. A blue dot on the front panel signifies an Input module and a red dot signifies an Output module.

Discrete Input Modules



Discrete Input Modules			
Part Number	Number of Inputs	Description	See Page
T1K-08ND3	8	Sinking/Sourcing DC Input	5-4
T1K-16ND3	16	Sinking/Sourcing DC Input	5-6
T1K-08NA-1	8	AC Input	5-8
T1K-16NA-1	16	AC Input	5-9

Discrete Output Modules



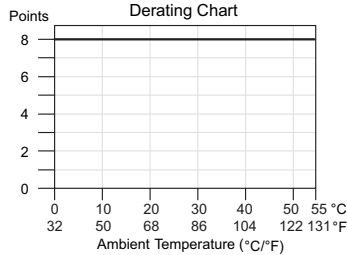
Discrete Output Modules			
Part Number	Number of Outputs	Description	See Page
T1K-08TD1	8	Sinking DC Output	5-10
T1K-16TD1	16	Sinking DC Output	5-11
T1K-08TD2-1	8	Sourcing DC Output	5-12
T1K-16TD2-1	16	Sourcing DC Output	5-13
T1H-08TDS	8	Isolated Sinking/Sourcing DC Output	5-14
T1K-08TA	8	AC Output	5-15
T1K-16TA	16	AC Output	5-16
T1K-08TAS	8	Isolated AC Output	5-17
T1K-08TR	8	Relay Output	5-18
T1K-16TR	16	Relay Output	5-19
T1K-08TRS	8	Isolated Relay Output	5-20



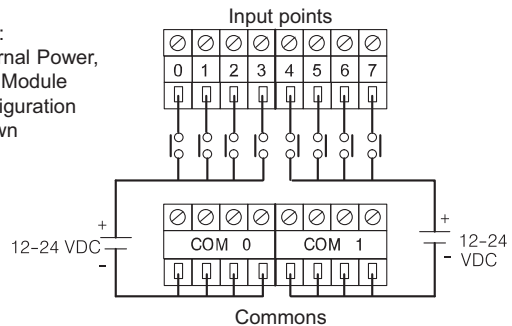
WARNING: The T1H Series PLC does not support any Hot-Swap features.

T1K-08ND3 - DC Input

Specifications	
Inputs Per Module	8 (sink / source)
Commons Per Module	ext. power: 2, isolated (4 pts. / com.) int. power: 2, all 8 pts. internally connected
Operating Voltage	12 - 24 VDC
Input Voltage Range	10.8 - 26.4 VDC min. / max.
Peak Voltage	30 VDC
Input Current (Typical)	4 mA @ 12 VDC, 8.5 mA @ 24 VDC
Input Impedance	2.8 K Ω
ON Voltage Level	> 10.0 VDC
OFF Voltage Level	< 2.0 VDC
Min. ON Current	4 mA
Max. OFF Current	0.5 mA
OFF to ON Response	2 - 8 ms., Typical: 4 ms
ON to OFF Response	2 - 8 ms, Typical: 4 ms
Base Power Requirements	35 mA @ 5 VDC
Status Indicators	Logic Side
Weight	70 g



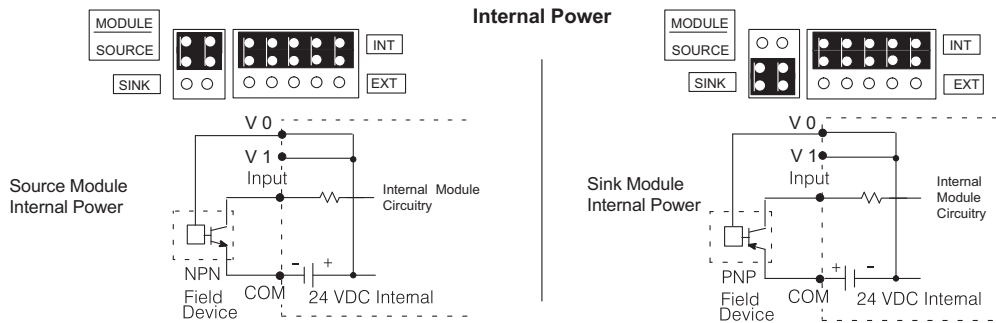
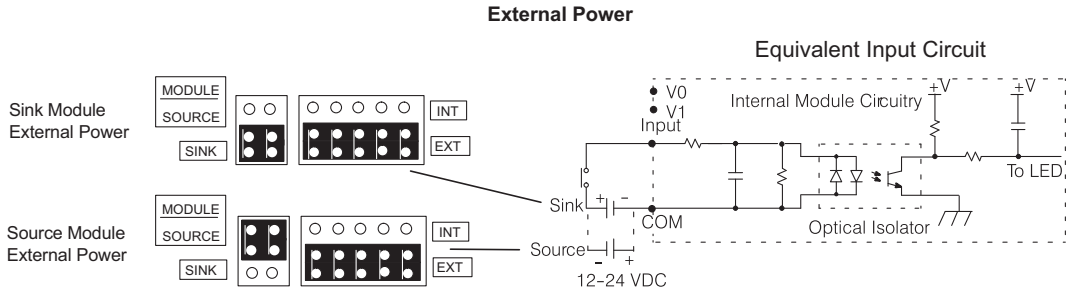
Note:
External Power,
Sink Module
Configuration
Shown



V 0 and V 1 supply 24 VDC
or 0 VDC if Internal Power
Jumper is selected

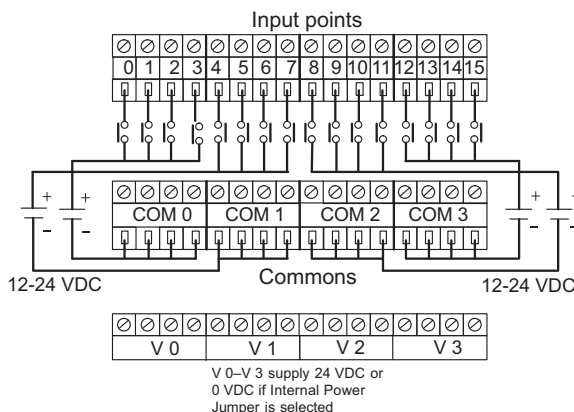
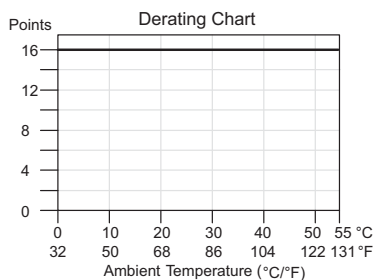
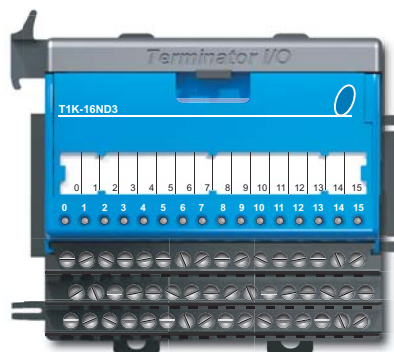


Jumper Selection



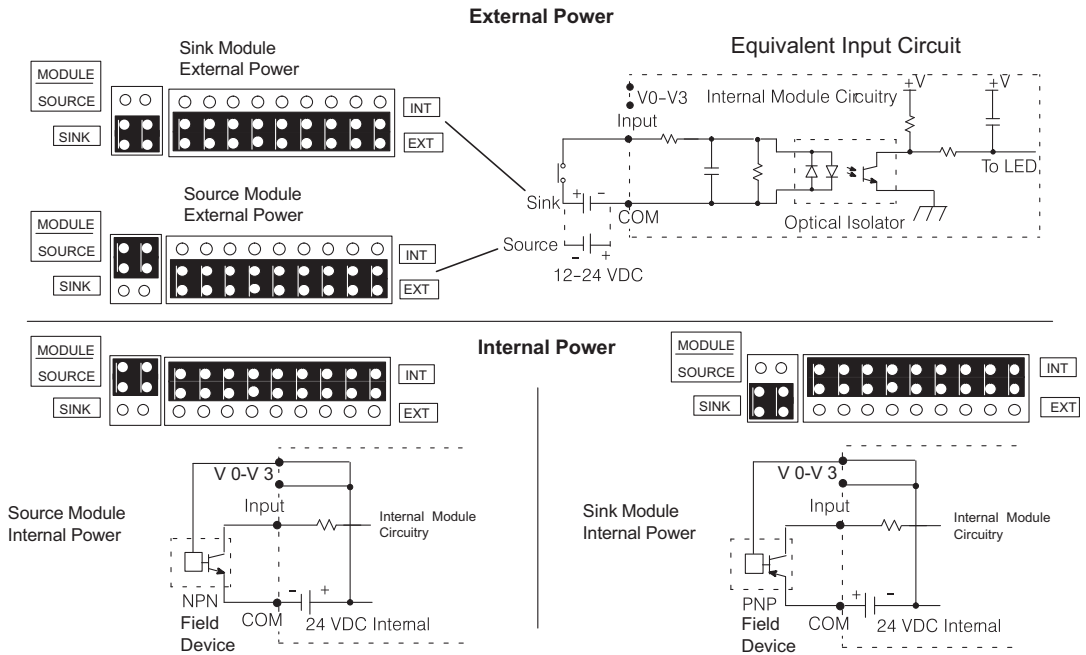
T1K-16ND3 - DC Input

Specifications	
Inputs Per Module	16 (sink / source)
Commons Per Module	ext. power: 4, isolated (4 pts. / com.) int. power: 4, all 16 pts. internally connected
Operating Voltage	12 - 24 VDC
Input Voltage Range	10.8 - 26.4 VDC min. / max.
Peak Voltage	30 VDC
Input Current (Typical)	4 mA @ 12 VDC, 8.5 mA @ 24 VDC
Input Impedance	2.8 K Ω
ON Voltage Level	> 10.0 VDC
OFF Voltage Level	< 2.0 VDC
Min. ON Current	4 mA
Max. OFF Current	0.5 mA
OFF to ON Response	2 - 8 ms, Typical: 4 ms
ON to OFF Response	2 - 8 ms, Typical: 4 ms
Base Power Requirements	70 mA @ 5 VDC
Status Indicators	Logic Side
Weight	160 g



Note:
External Power,
Sink Module
Configuration
Shown

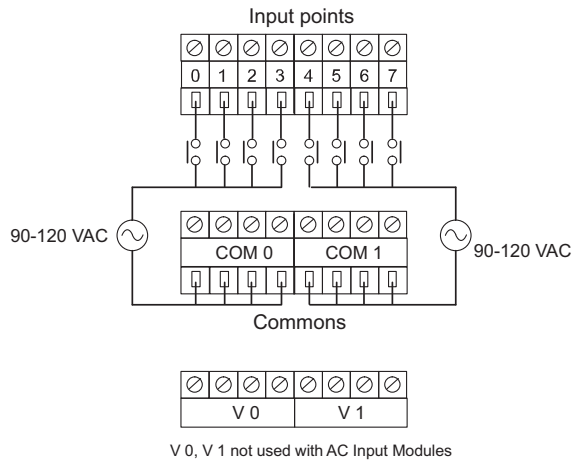
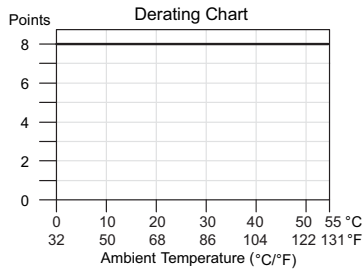
Jumper Selection



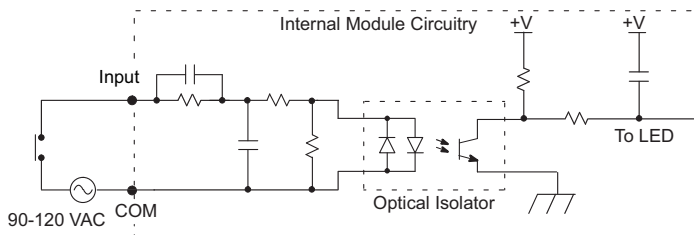
T1K-08NA-1 - AC Input

5

Specifications	
Inputs Per Module	8
Commons Per Module	2, 4 pts. / com. (isolated)
Operating Voltage	90 - 120 VAC, 47 - 63 Hz
Input Voltage Range	80 - 132 VAC, 47 - 63 Hz min. / max.
Input Current	8 mA @ 100 VAC (50 Hz) 10 mA @ 100 VAC (60 Hz) 12 mA @ 132 VAC (50 Hz) 15 mA @ 132 VAC (60 Hz)
Input Impedance	14 K Ω @ 50 Hz, 12 K Ω @ 60 Hz
ON Current / Voltage	> 6 mA @ 75 VAC
OFF Current / Voltage	< 2.0 mA @ 20 VAC
OFF to ON Response	< 40 ms
ON to OFF Response	< 40 ms
Base Power Requirements	35 mA @ 5 VDC
Status Indicators	Logic Side
Weight	70 g



Equivalent Input Circuit

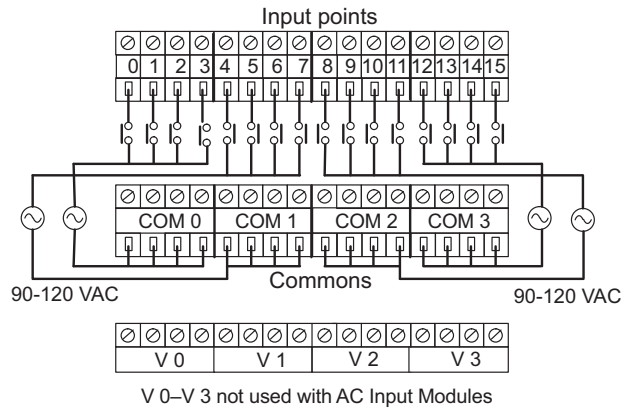
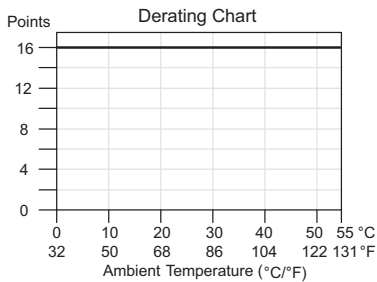


T1K-16NA-1 - AC Input

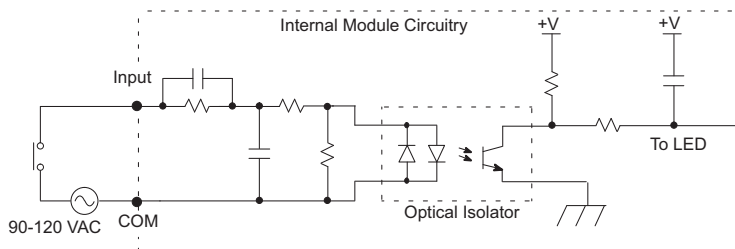
Specifications	
Inputs Per Module	16
Commons Per Module	4, 4 pts. / com. (isolated)
Operating Voltage	90 - 120 VAC, 47 - 63 Hz
Input Voltage Range	80 - 132 VAC, 47 - 63 Hz min. / max.
Input Current	8 mA @ 100 VAC (50 Hz) 10 mA @ 100 VAC (60 Hz) 12 mA @ 132 VAC (50 Hz) 15 mA @ 132 VAC (60 Hz)
Input Impedance	14 K Ω @ 50 Hz, 12 K Ω @ 60 Hz
ON Current / Voltage	> 6 mA @ 75 VAC
OFF Current / Voltage	< 2.0 mA @ 20 VAC
OFF to ON Response	< 40 ms
ON to OFF Response	< 40 ms
Base Power Requirements	70 mA @ 5 VDC
Status Indicators	Logic Side
Weight	120 g



5



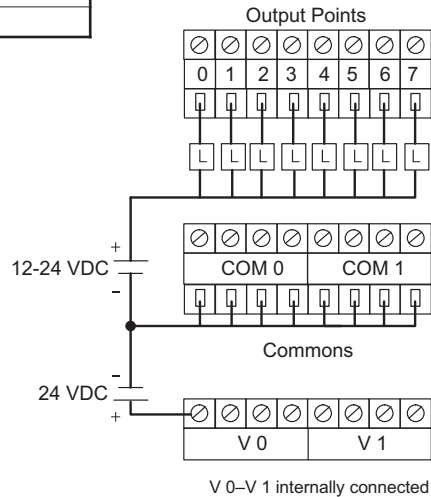
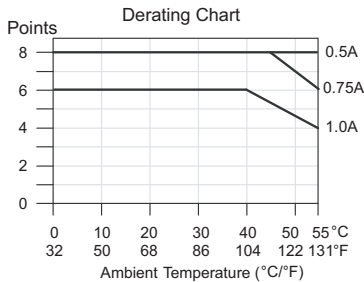
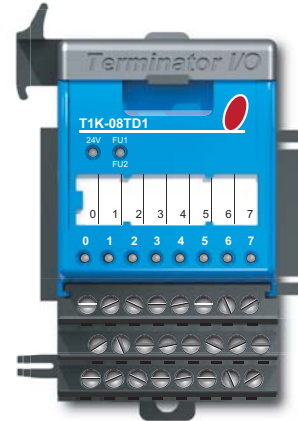
Equivalent Input Circuit



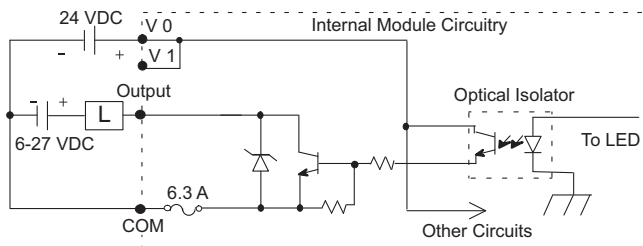
T1K-08TD1 - DC Output

Specifications

Outputs Per Module	8 (sink)
Commons Per Module	2 internally connected
Operating Voltage Range	6 - 27 VDC
Output Voltage Range	5 - 30 VDC min. / max.
Peak Voltage	50 VDC
Max. Load Current	1A / pt., 4A / common
Max. Leakage Current	15 μ A @ 30 VDC
ON Voltage Drop	0.3 VDC @ 1.0 A
Max. Inrush Current	2A for 100 ms
OFF to ON Response	< 10 μ s
ON to OFF Response	< 60 μ s
Base Power Requirements	100 mA @ 5 VDC
External Power Required	200 mA max. @ 20 - 28 VDC
Status Indicators	Logic Side
Error Status Indicators (LEDs)	24 V ON = low external power FU1 / FU2 ON = fuse 1 or fuse 2 blown
Fuses (User Replaceable) T1K-FUSE-1	2, (6.3 A, 250 V / common), (4 pts. / fuse) NQ3 - 6.3 SOC corp.
Weight	85 g



Equivalent Output Circuit

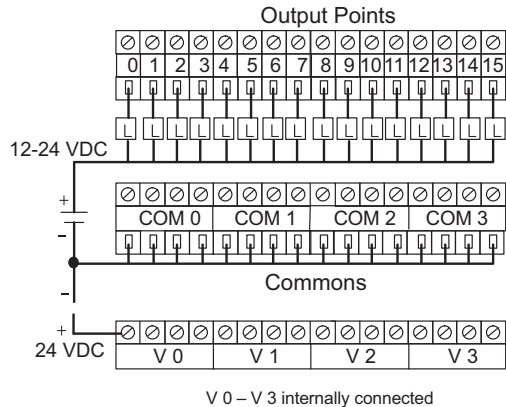
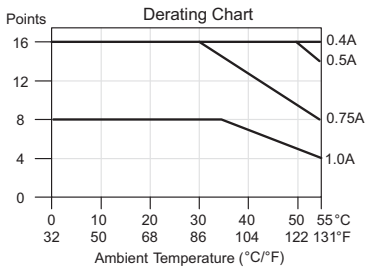


T1K-16TD1 - DC Output

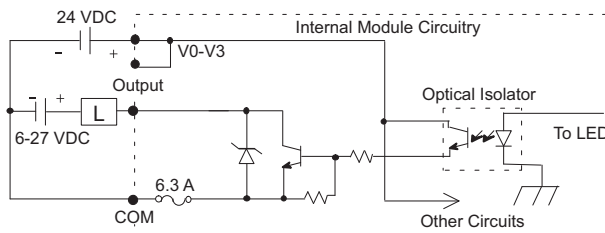
Specifications	
Outputs Per Module	16 (sink)
Commons Per Module	4 internally connected
Operating Voltage Range	6 - 27 VDC
Output Voltage Range	5 - 30 VDC min. / max.
Peak Voltage	50 VDC
Max. Load Current	1A / pt., 4A / common
Max. Leakage Current	15 μ A @ 30 VDC
ON Voltage Drop	0.3 VDC @ 1.0 A
Max. Inrush Current	2A for 100 ms
OFF to ON Response	< 10 μ s
ON to OFF Response	< 60 μ s
Base Power Requirements	200 mA @ 5 VDC
External Power Required	400 mA max. @ 20 - 28 VDC
Status Indicators	Logic Side
Error Status Indicators (LEDs)	24 V ON = low external power FU1 / FU2 ON = fuse 1 or 2 blown FU3 / FU4 ON = fuse 3 or 4 blown
Fuses (User Replaceable) T1K-FUSE-1	4, (6.3 A, 250 V / common), (4 pts. / fuse) NQ3 - 6.3 SOC corp.
Weight	140 g



5

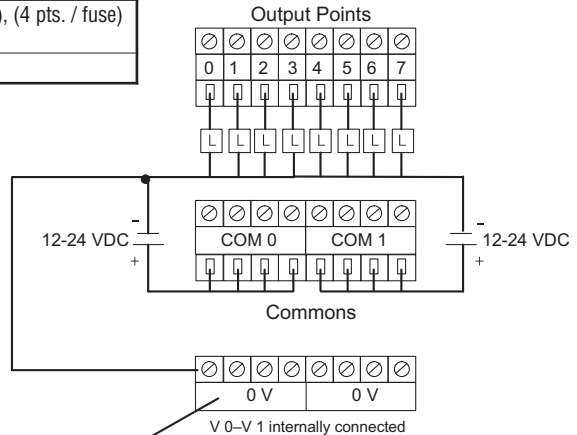
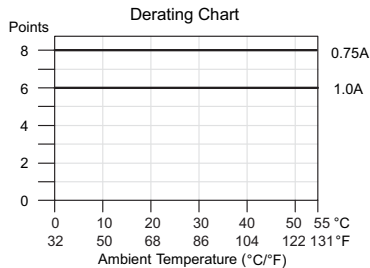


Equivalent Output Circuit



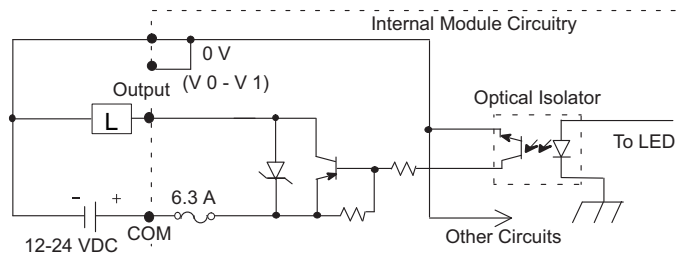
T1K-08TD2-1 - DC Output

Specifications	
Outputs Per Module	8 (source)
Commons Per Module	2 internally connected
Operating Voltage Range	12 - 24 VDC
Output Voltage Range	10.8 - 26.4 VDC min. / max.
Peak Voltage	50 VDC
Max. Load Current	1A / pt., 4A / common
Max. Leakage Current	15 μ A @ 26.4 VDC
ON Voltage Drop	1.2 VDC @ 1.0 A
Max. Inrush Current	2A for 100 ms
OFF to ON Response	< 10 μ s
ON to OFF Response	< 0.5 ms
Base Power Requirements	100 mA @ 5 VDC
Status Indicators	Logic Side
Error Status Indicators (LEDS)	FU1 / FU2 ON = fuse 1 or fuse 2 blown
Fuses (User Replaceable) T1K-FUSE-1	2, (6.3 A, 250 V / common), (4 pts. / fuse) NQ3 - 6.3 SOC corp.
Weight	100 g



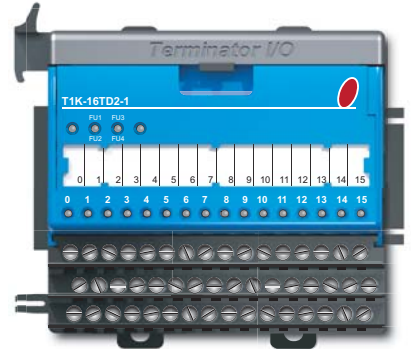
Note: Apply the 0 V label that comes with the I/O module to I/O base terminal points V 0-V 1 to properly identify the 0 VDC terminal points.

Equivalent Output Circuit

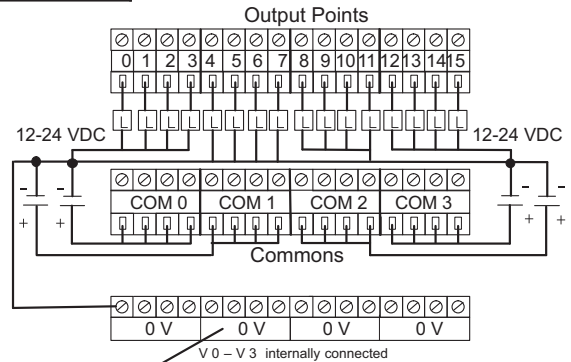
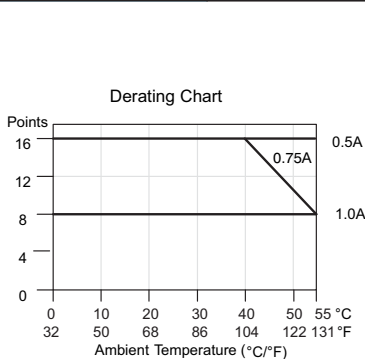


T1K-16TD2-1 - DC Output

Specifications	
Outputs Per Module	16 (source)
Commons Per Module	4 internally connected
Operating Voltage Range	12 - 24 VDC
Output Voltage Range	10.8 - 26.4 VDC min. / max.
Peak Voltage	50 VDC
Max. Load Current	1A / pt., 4A / common (subject to derating)
Max. Leakage Current	15 μ A @ 26.4 VDC
ON Voltage Drop	1.2 VDC @ 1.0 A
Max. Inrush Current	2A for 100 ms
OFF to ON Response	< 10 μ s
ON to OFF Response	< 0.5 ms
Base Power Requirements	200 mA @ 5 VDC
Status Indicators	Logic Side
Error Status Indicators (LEDs)	FU1 / FU2 ON = fuse 1 or 2 blown FU3 / FU4 ON = fuse 3 or 4 blown
Fuses (User Replaceable) T1K-FUSE-1	4, (6.3 A, 250 V / common), (4 pts. / fuse)
Weight	140 g

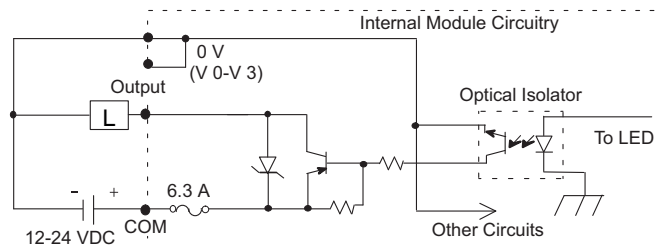


5



Note: Apply the 0 V label that comes with the I / O module to I / O base terminal points V 0-V 3 to properly identify the 0 VDC terminal points.

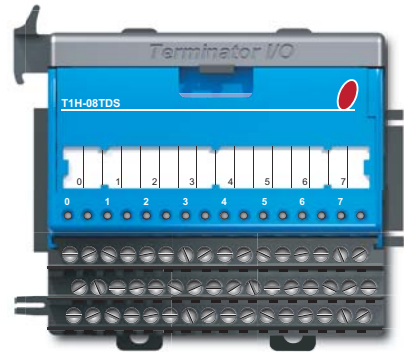
Equivalent Output Circuit



T1H-08TDS - Isolated DC Output

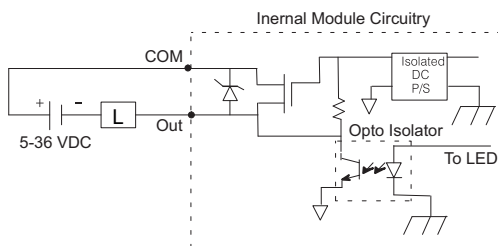
Specifications

Outputs Per Module	8 (sink / source)
Commons Per Module	8 (isolated)
Operating Voltage Range	5 - 36 VDC
Max. Voltage	36 VDC
Output Clamp Voltage	40 VDC
Max. Load Current	2A / pt., 16 A / module, 32° F to 140° F (0° C to 60° C)
Electronic Over Current Protection	Output trips at 6 A min., 12 A max.
Max. Load Voltage	36 VDC
Max. Leakage Current	75 μ A
Max. ON State Voltage Drop	0.3 VDC @ 2.0 A, 0.15 V @ 1 A
Inrush Current	5A for 20 ms
OFF to ON Response	< 3 μ s
ON to OFF Response	< 100 μ s
Base Power Requirements	200 mA max.
Thermal Shutdown	Between Tjunction = 302° F to 374° F (150° C to 190° C)
Over Temperature Reset	Thermal shutdown temp. minus 5° F (15° C)
Status Indicators	Logic Side
Weight	93.6 g

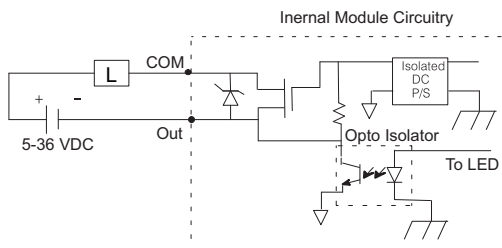


Equivalent Output Circuit

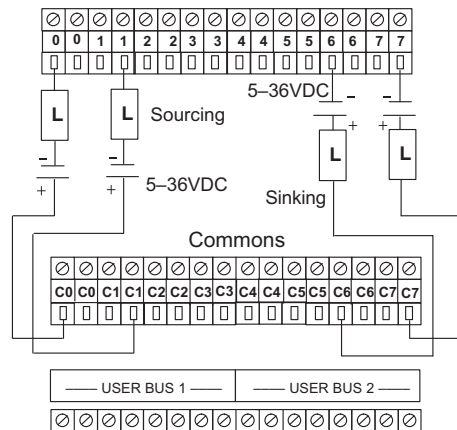
Sourcing (High Side Switching)



Sinking (Low Side Switching)



Output Points



No connection: The 8 User Bus 1 terminals are bussed together. The 8 User Bus 2 terminals are also bussed together.

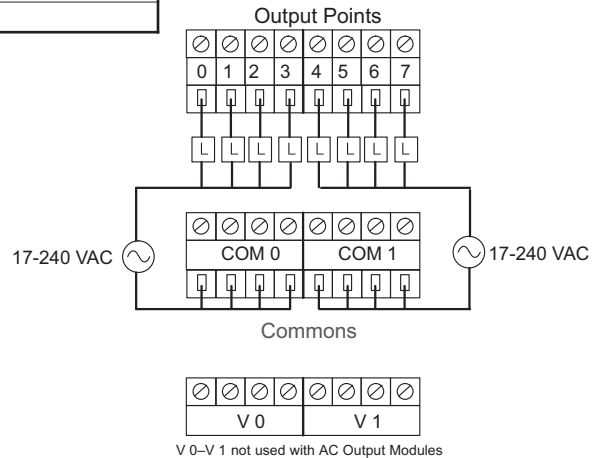
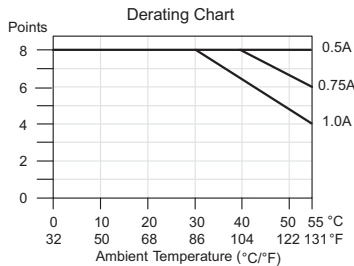
Note: Apply the labels that come with the I/O module to the I/O base to properly identify the terminal points.

T1K-08TA - AC Output

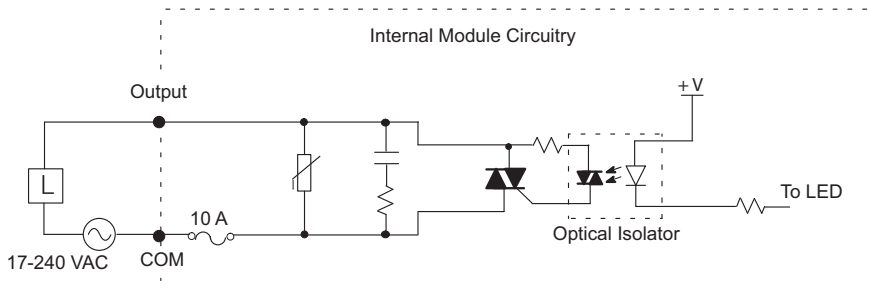
Specifications	
Outputs Per Module	8
Commons Per Module	2, 4 pts. / common (isolated)
Operating Voltage Range	17 - 240 VAC (47 - 63 Hz)
Output Voltage Range	15 - 264 VAC (47 - 63 Hz) min. / max.
Max. Load Current	1A / pt., 4A / common (subject to derating)
ON Voltage Drop	1.5 VAC @ > 50 mA, 4.0 VAC @ < 50 mA
Max. Leakage Current	4 mA @ 264 VAC
Max. Inrush Current	10 A for 10 ms
Min. Load	10 mA
OFF to ON Response	< 1 ms
ON to OFF Response	< 1 ms + 1/2 cycle
Base Power Requirements	250 mA @ 5 VDC
Status Indicators	Logic Side
Error Status Indicators (LEDs)	FU1 ON = fuse 1 blown FU2 ON = fuse 2 blown
Fuses (User Replaceable) T1K-FUSE-2	2, (10 A, 250 V / common), (4 pts. / fuse) 5 x 20 mm type
Weight	140 g



5



Equivalent Output Circuit



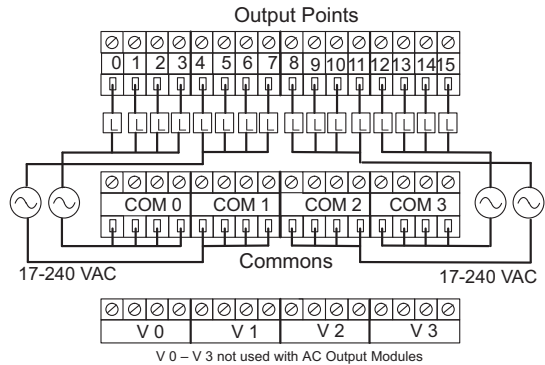
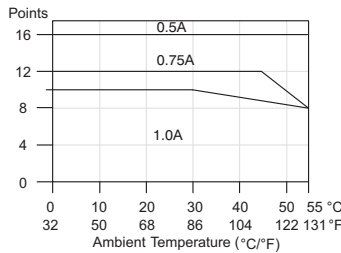
T1K-16TA - AC Output

Specifications

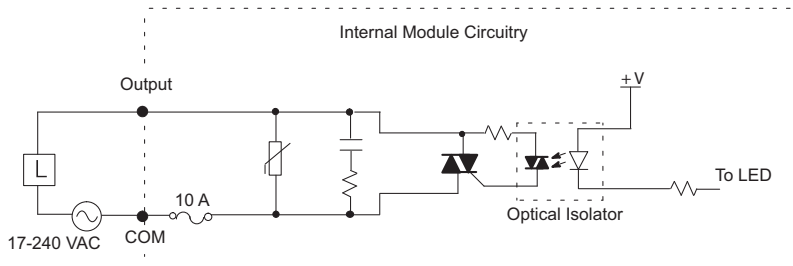
Outputs Per Module	16
Commons Per Module	4, 4 pts. / common (isolated)
Operating Voltage Range	17 - 240 VAC (47 - 63 Hz)
Output Voltage Range	15 - 264 VAC (47 - 63 Hz) min. / max.
Max. Load Current	1A / pt., 4A / common (subject to derating)
ON Voltage Drop	1.5 VAC @ > 50 mA, 4.0 VAC @ < 50 mA
Max. Leakage Current	4 mA @ 264 VAC
Max. Inrush Current	10 A for 10 ms
Min. Load	10 mA
OFF to ON Response	< 1 ms
ON to OFF Response	< 1 ms + 1/2 cycle
Base Power Requirements	450 mA @ 5 VDC
Status Indicators	Logic Side
Error Status Indicators (LEDs)	FU1 / FU2 ON = fuse 1 or 2 blown FU3 / FU4 ON = fuse 3 or 4 blown
Fuses (User Replaceable) T1K-FUSE-2	4, (10 A, 250 V / common), (4 pts. / fuse) 5 x 20 mm type
Weight	190 g



Derating Chart

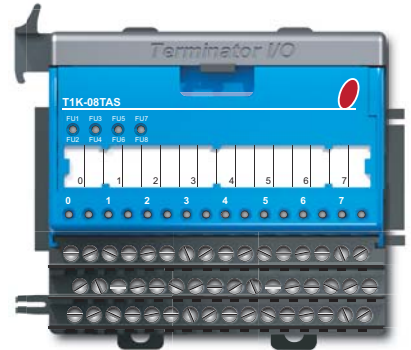


Equivalent Output Circuit

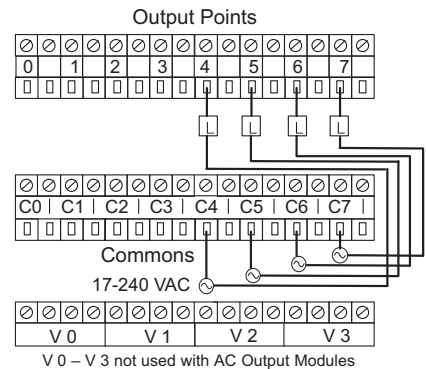
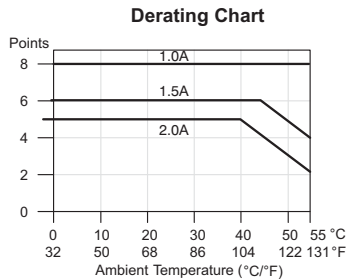


T1K-08TAS - Isolated AC Output

Specifications	
Outputs Per Module	8
Commons Per Module	8, 1 pt. / common (isolated)
Operating Voltage Range	17 - 240 VAC (47 - 63 Hz)
Output Voltage Range	15 - 264 VAC (47 - 63 Hz) min. / max.
Max. Load Current	2A / pt. common (subject to derating)
ON Voltage Drop	1.5 VAC @ > 50 mA, 4.0 VAC @ < 50 mA
Max. Leakage Current	4 mA @ 264 VAC
Max. Inrush Current	10 A for 10 ms
Min. Load	10 mA
OFF to ON Response	< 1 ms
ON to OFF Response	< 1 ms + 1/2 cycle
Base Power Requirements	300 mA @ 5 VDC
Status Indicators	Logic Side
Error Status Indicators (LEDs)	FU1 / FU2 ON = fuse 1 or 2 blown FU3 / FU4 ON = fuse 3 or 4 blown FU5 / FU6 ON = fuse 5 or 6 blown FU7 / FU8 ON = fuse 7 or 8 blown
Fuses (User Replaceable) T1K-FUSE-3	8 (10 A, 250 V / common), (1 pt. / fuse) NQ3-10 SOC Corp.
Weight	190 g

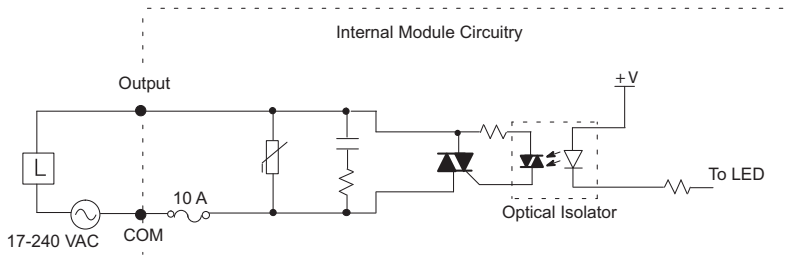


5



Note: Apply the labels that come with the I/O module to the I/O base to properly identify the terminal points.

Equivalent Output Circuit



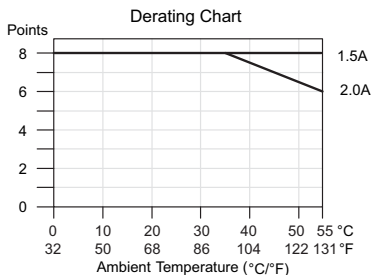
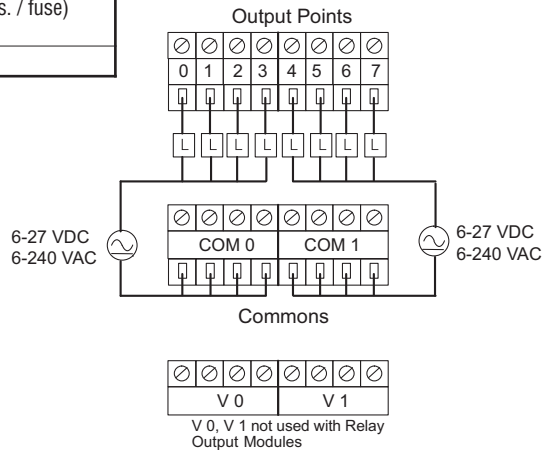
T1K-08TR - Relay Output

5

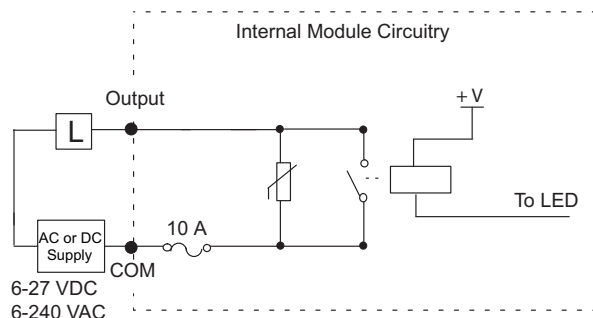
Specifications	
Outputs Per Module	8
Output Type	Relay Form A (SPST) normally open
Commons Per Module	2, 4 pts. / common (isolated)
Operating Voltage Range	6 - 240 VAC (47 - 63 Hz), 6 - 27 VDC
Output Voltage Range	5 - 264 VAC (47 - 63 Hz) min. / max. 5 - 30 VDC min / max
Max. Load Current	2A / pt., 8A / common
Max. Leakage Current	0.1 mA @ 264 VAC
Max. Inrush Current	6A for 10 ms. / pt.; 20 A for 10 ms / common
Min. Load	5 mA @ 5 VDC
OFF to ON Response	< 15 ms
ON to OFF Response	< 10 ms
Base Power Requirements	350 mA @ 5 VDC
Status Indicators	Logic Side
Error Status Indicators (LEDs)	FU1 ON = fuse 1 blown FU2 ON = fuse 2 blown
Fuses (User Replaceable) T1K-FUSE-2	2 (10 A, 250 V / common), (4 pts. / fuse) 5 x 20 mm type
Weight	110 g



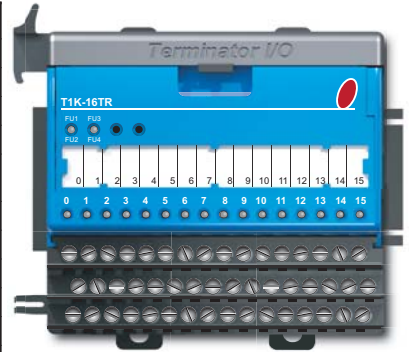
Typical Relay Life (Operations) at Room Temperature		
Voltage & Type of Load	Load Current	
	1 A	2 A
24 VDC Resistive	500 K	250 K
24 VDC Solenoid	100 K	50 K
110 VAC Resistive	500 K	250 K
110 VAC Resistive	200 K	100 K
220 VAC Resistive	350 K	200 K
220 VAC Resistive	100 K	50 K



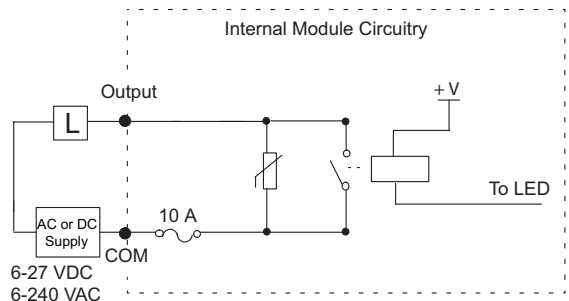
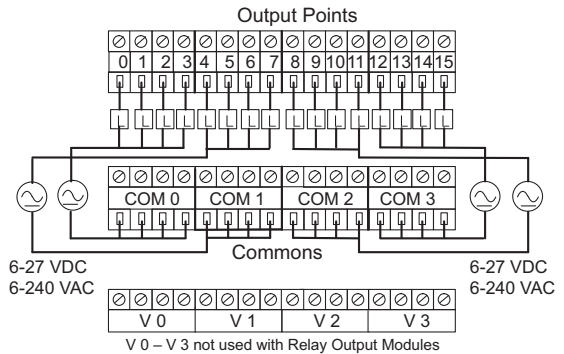
Equivalent Output Circuit



Specifications	
Outputs Per Module	16
Output Type	Relay Form A (SPST) normally open
Commons Per Module	4, 4 pts. / common (isolated)
Operating Voltage Range	6 - 240 VAC (47 - 63 Hz), 6 - 27 VDC
Output Voltage Range	5 - 264 VAC (47 - 63 Hz) min. / max. 5 - 30 VDC min / max
Max. Load Current	2A / pt., 6 A / common
Max. Leakage Current	0.1 mA @ 264 VAC
Max. Inrush Current	6A for 10 ms / pt.; 20 A for 10 ms / common
Min. Load	5 mA @ 5 VDC
OFF to ON Response	< 15 ms
ON to OFF Response	< 10 ms
Base Power Requirements	700 mA @ 5 VDC
Status Indicators	Logic Side
Error Status Indicators (LEDs)	FU1 / FU2 ON = fuse 1 or fuse 2 blown FU3 / FU4 ON = fuse 3 or fuse 4 blown
Fuses (User Replaceable) T1K-FUSE-2	4 (10 A, 250 V / common), (4 pts. / fuse) 5 x 20 mm type
Weight	200 g



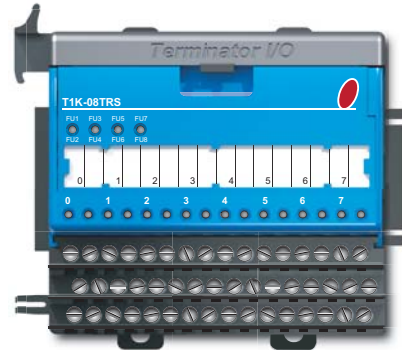
Typical Relay Life (Operations) at Room Temperature		
Voltage & Type of Load	Load Current	
	1 A	2 A
24 VDC Resistive	500 K	250 K
24 VDC Solenoid	100 K	50 K
110 VAC Resistive	500 K	250 K
110 VAC Resistive	200 K	100 K
220 VAC Resistive	350 K	200 K
220 VAC Resistive	100 K	50 K



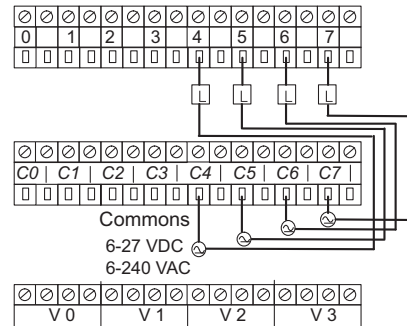
T1K-08TRS - Isolated Relay Output

5

Specifications	
Outputs Per Module	8
Output Type	Relay Form A (SPST) normally open
Commons Per Module	8, 1 pt. / common (isolated)
Operating Voltage Range	6 - 240 VAC (47 - 63 Hz), 6 - 27 VDC
Output Voltage Range	5 - 264 VAC (47 - 63 Hz) min. / max. 5 - 30 VDC min. / max.
Max. Load Current	7A / pt. common (subject to derating)
Max. Leakage Current	0.1 mA @ 264 VAC
Max. Inrush Current	8A for 10 ms
Min. Load	5 mA @ 5 VDC
OFF to ON Response	< 15 ms
ON to OFF Response	< 10 ms
Base Power Requirements	400 mA @ 5 VDC
Status Indicators	Logic Side
Error Status Indicators (LEDs)	FU1 / FU2 ON = fuse 1 or fuse 2 blown FU3 / FU4 ON = fuse 3 or fuse 4 blown FU5 / FU6 ON = fuse 5 or fuse 6 blown FU7 / FU8 ON = fuse 7 or fuse 8 blown
Fuses (User Replaceable) T1K-FUSE-3	8 (10 A, 250 V / common), (1 pt. / fuse) NQ3-10 SOC Corp.
Weight	185 g



Output Points

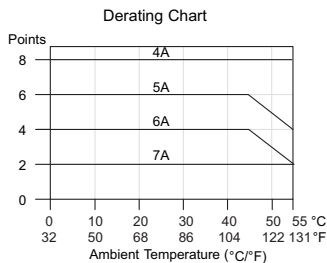


Note: V 0 – V 3 not used on Relay Output Modules

Note: Apply the labels that come with the I/O module to the I / O base to properly identify the terminal points.

Typical Relay Life (Operations) at Room Temperature				
Voltage & Type of Load	Load Current			
	1 A	2 A	5 A	7 A
24 VDC Resistive	1000 K	500 K	200 K	100 K
24 VDC Solenoid	300 K	100 K	*	*
110 VAC Resistive	1000 K	500 K	200 K	100 K
110 VAC Resistive	300 K	100 K	*	*
220 VAC Resistive	500 K	250 K	125 K	60 K
220 VAC Resistive	300 K	100 K	*	*

*Solenoid (inductive) loads > 2A cannot be used.



Equivalent Output Circuit

