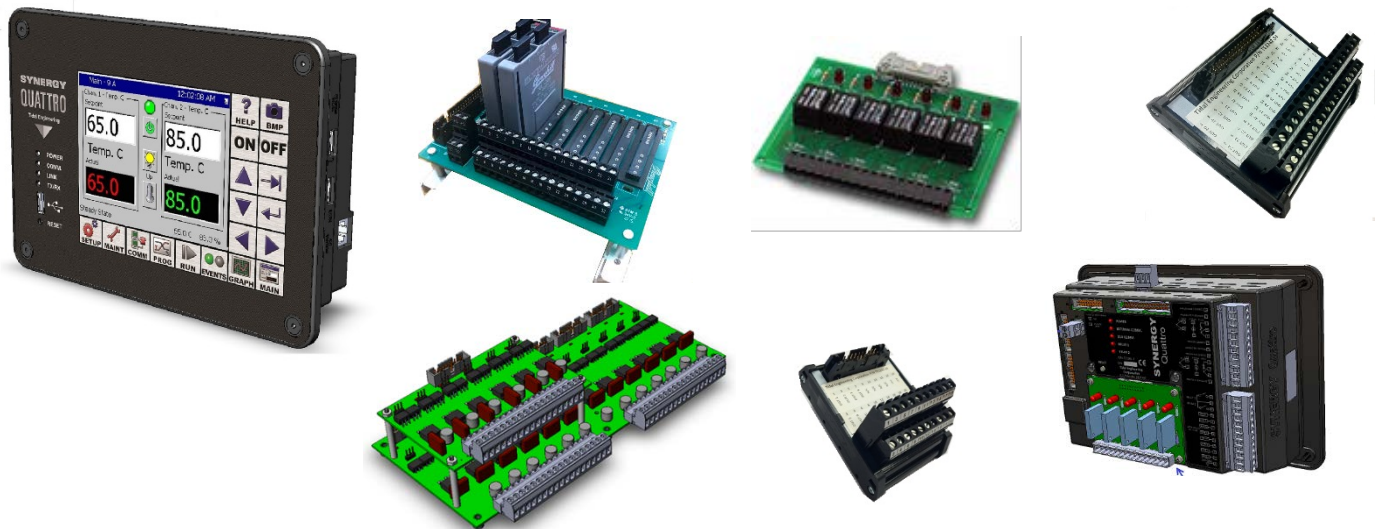


Synergy Quattro Controller Output Options



A variety of output options are available for Synergy and VersaTenn controllers from Tidal Engineering Corporation. These include legacy output systems compatible with Tenney and Thermotron chambers as well as de facto standard output systems from Opto-22 and Grayhill. This application note covers the specification for these output options.

Tenney compatible (1SM, 2SM, 3SM)

Open Collector, 24 VDC Max

P/N TE2242-20, TE2242-34

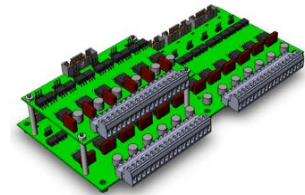
SSR, 220 VAC, 3 Amps

P/N TE2551-12, TE2551-12S

P/N TE2551-6, TE255-6S

Relays, 220 VAC, 6 Amps, Form C

P/N TE1708-6



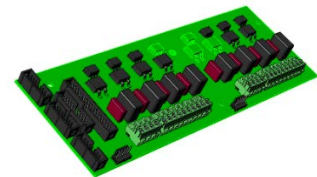
Thermotron Compatible

7800 Controller Compatible 220 VAC SSR Outputs

P/N TE1151-8

2800/4800 Compatible board drivers

P/N TE2251-1



Opto-22 and Grayhill Compatible Drivers

24-Channel 70LRCK24-HL

16-Channel 70LRCK16-HL and 8-Channel 70LRCK8-HL

8-Channel 70LRCK8-HL and 8-Channel 70LRCK8-HL

P/N TE2380

P/N TE2251-2



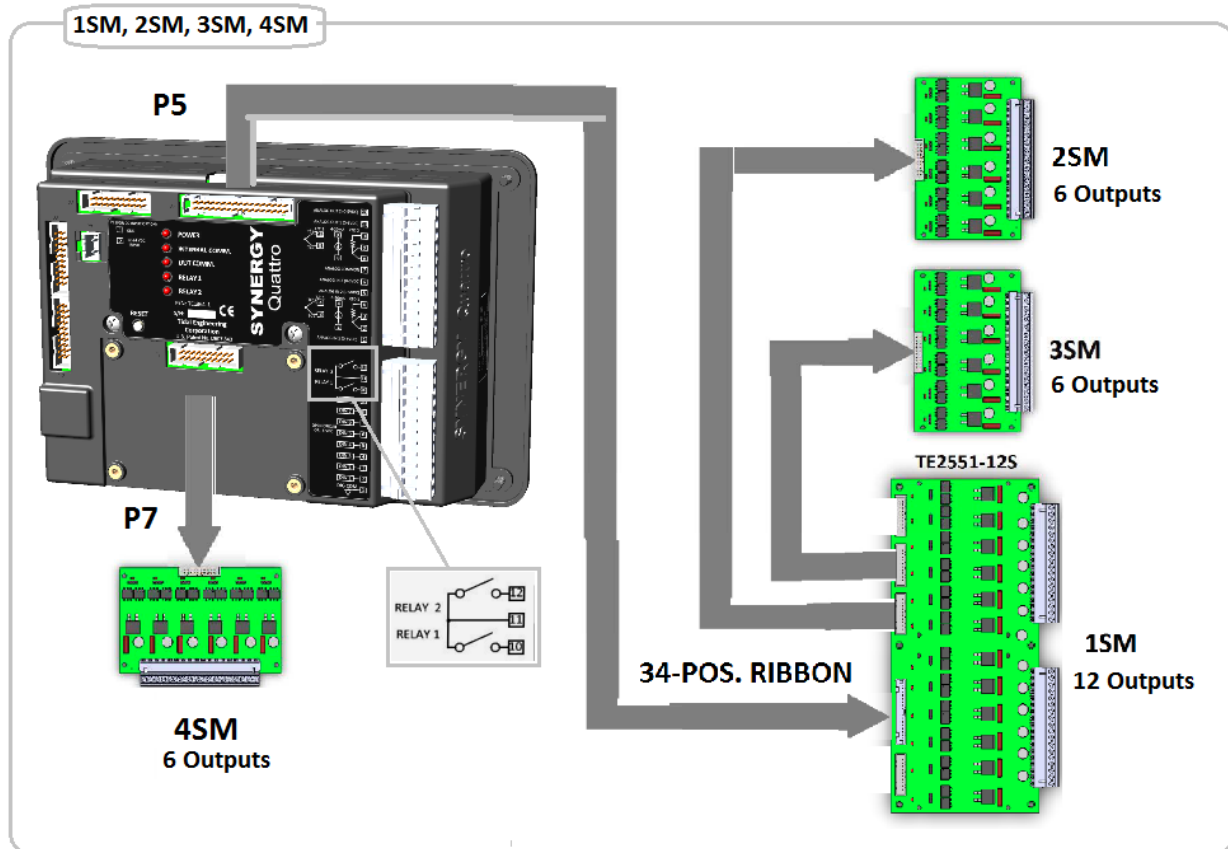
Synergy Controller Output Boards, Tenney Compatible

P/N	Plug	Outputs	Type	Rating
TE2551-12S	P5	12	SSR	90-220VAC, 3 Amps Fused, Legacy, Super
TE2551-12	P5	12	SSR	90-220VAC, 3 Amps Fused

The Synergy Quattro can handle up to 32 outputs in this arrangement.

The TE2551-12 board has 12 SSR (Triac) outputs and can drive two more 6-output boards as shown below.

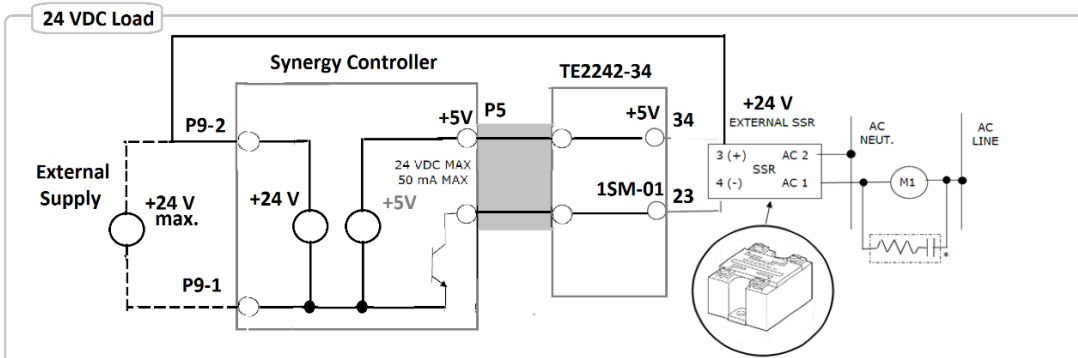
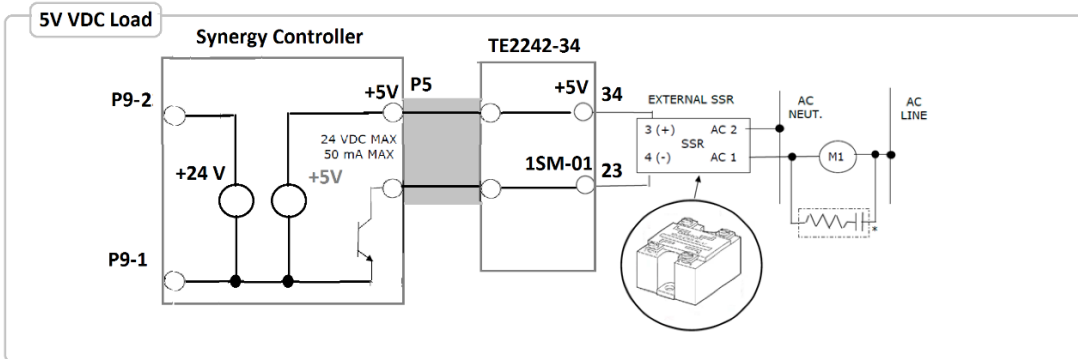
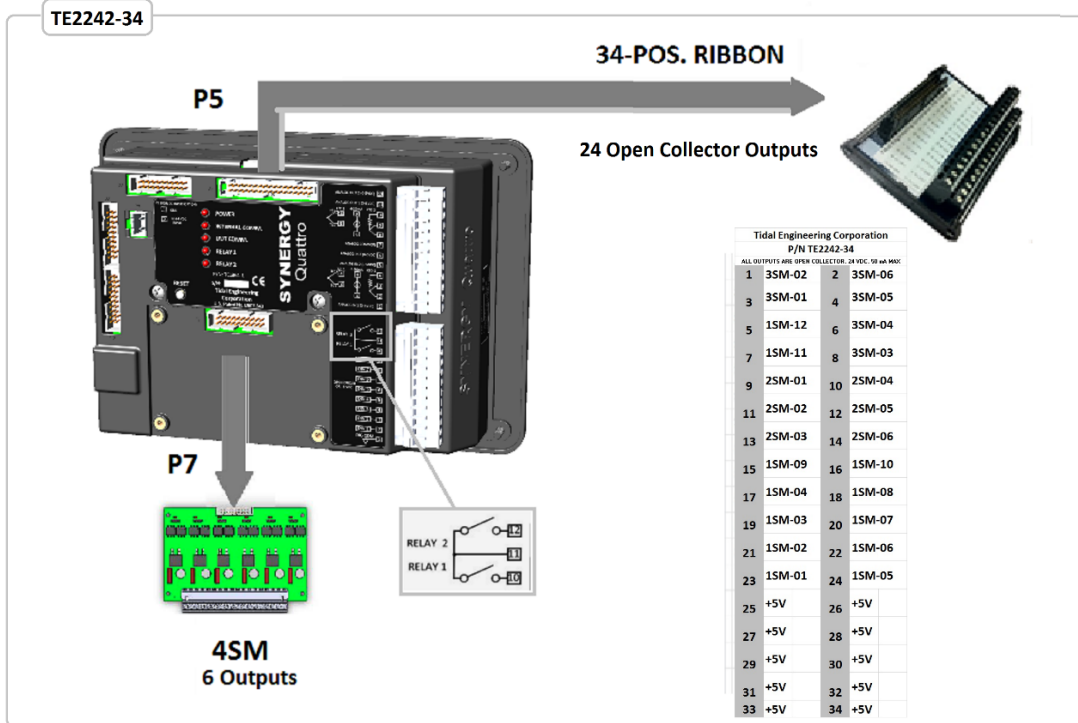
An additional six outputs can be accommodated using the P7 plug (4SM). Two alarm relays contacts are available on the P1 plug.



Synergy Controller Output Boards, Open Collector

P/N	Plug	Outputs	Type	Rating
TE2242-34	P5	24	OC	24 VDC Max. 50 mA Max.

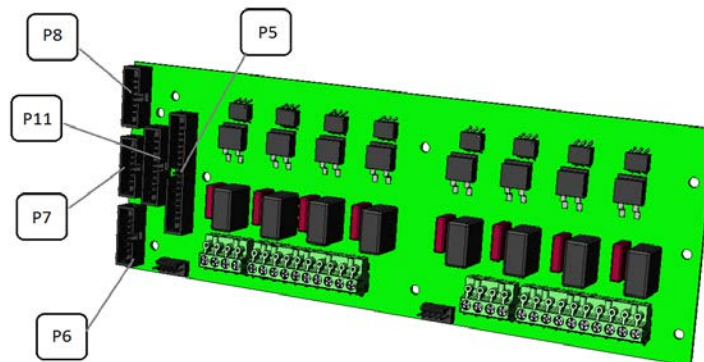
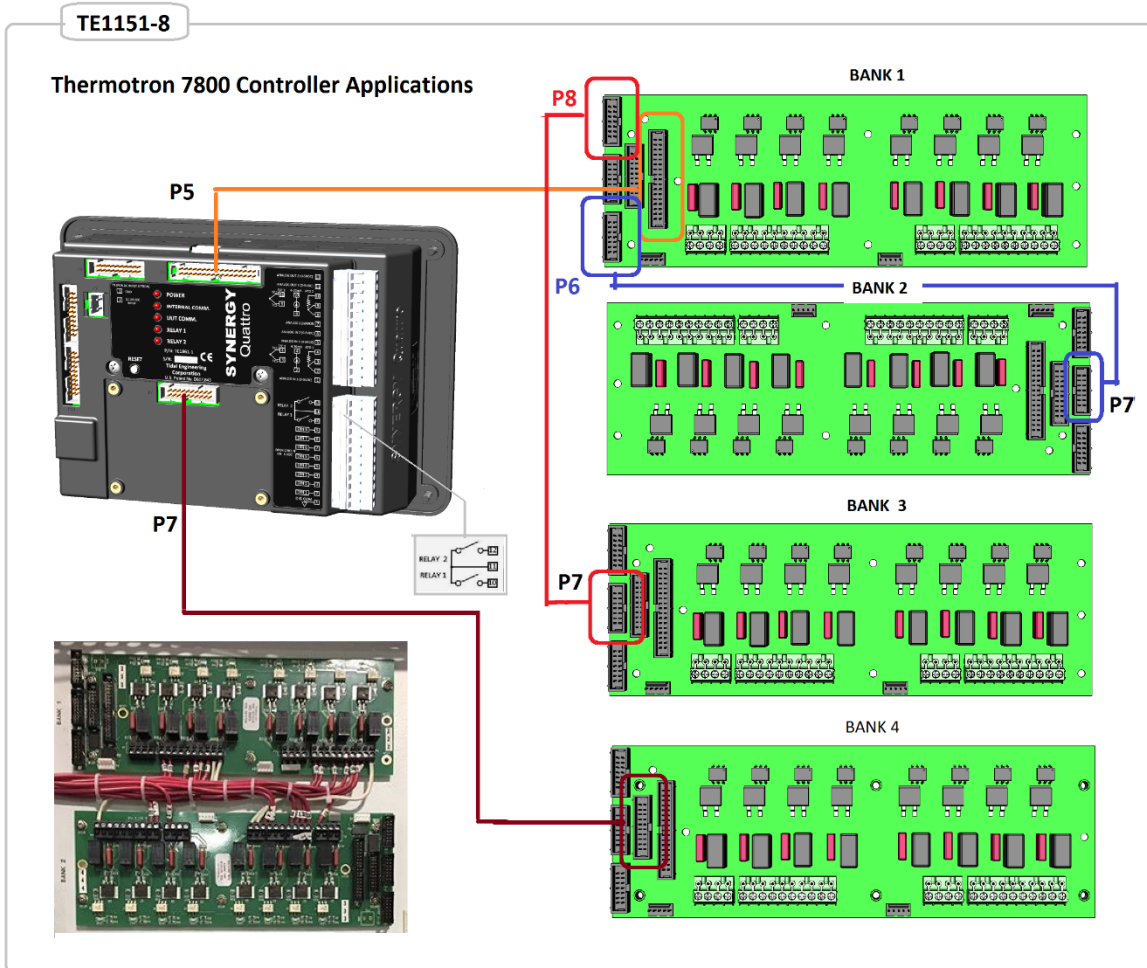
TE2242-34 output option handles 24 Open Collector (OC) outputs. An additional six outputs can be accommodated using the P7 plug (4SM). In addition, two alarm relays contacts are available on the P1 plug.



Synergy Controller Output Boards, Thermotron Compatible

P/N	Plug	Outputs	Type	Rating
TE1151-8	P5	8	SSR	90-220VAC, 6 Amps

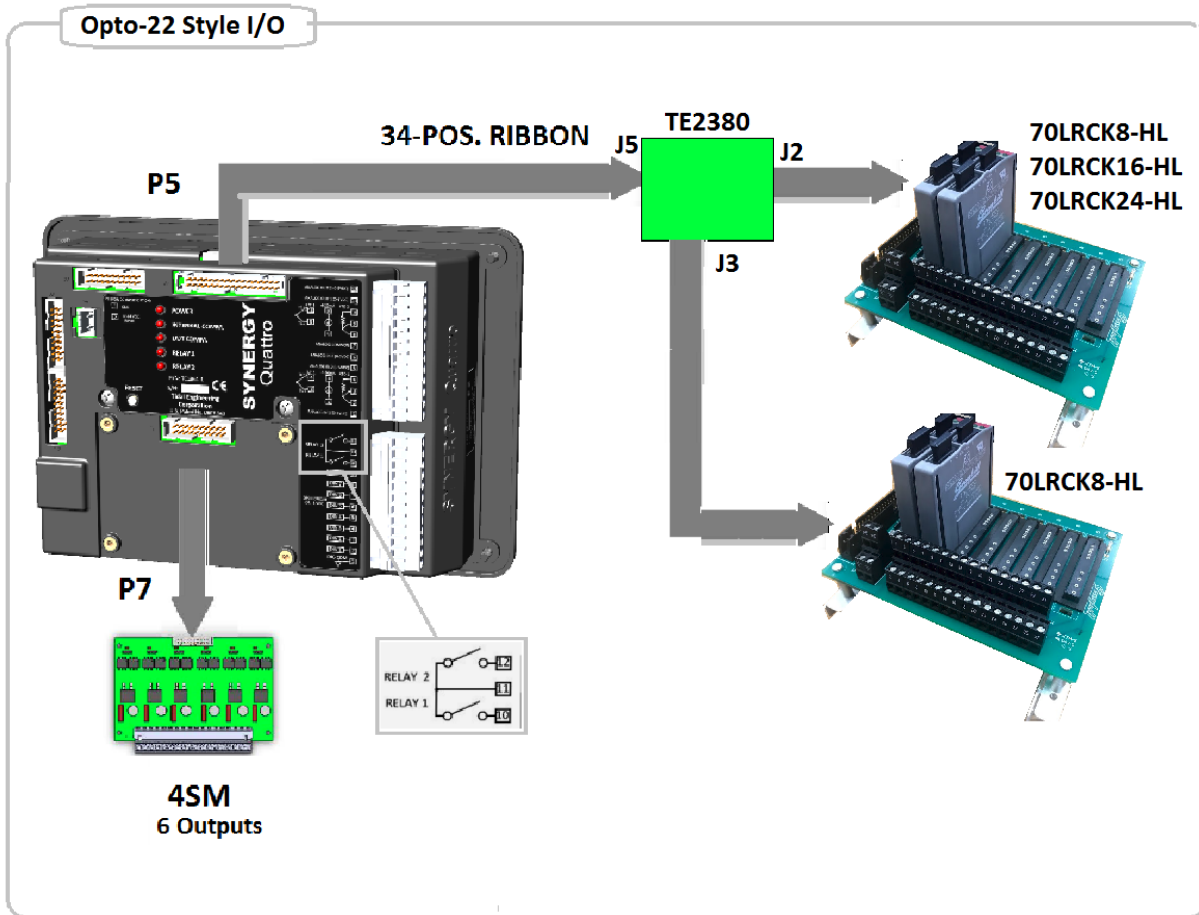
The TE1151-8 output board is designed to save time in Thermotron 7800 Controller retrofits. These boards drop-in over factory control modules so the existing harnessing and connectors can be used as is. Up to four boards for a total of 32 outputs can be accommodated. Two alarm relays are also available.



Synergy Controller, Opto-22/Grayhill Output Adapters

P/N	Plug	Outputs	Type	Rating
TE2251-2	P7	32	OC	24 VDC Max. 50 mA Max.
TE2380	P5	24	OC	24 VDC Max. 50 mA Max.

The TE2380 breakout board provides two 50-Pin Opto-22 Style ribbon cable connections to drive two Opto-22/Grayhill Style I/O racks. The controller can drive an additional six outputs (4SM) and two alarm relays for a total of 32 Outputs as shown below.



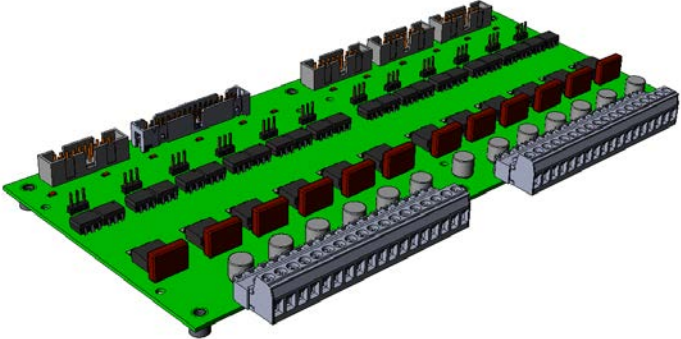
Synergy Quattro Expansion I/O

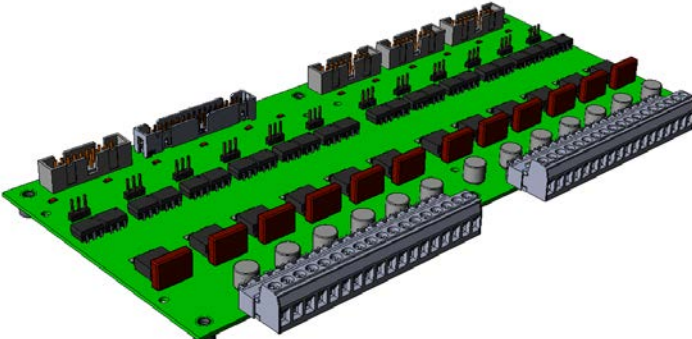
P/N	Outputs		Type	Rating
TE2251-5	5	Synergy	SSR	90-220VAC, 2 Amps

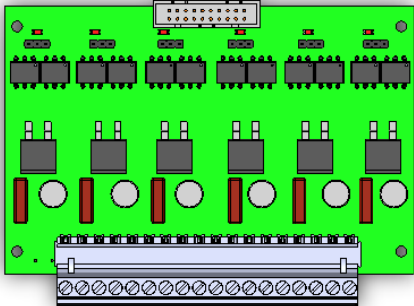
The TE2251-5 Synergy Quattro Expansion I/O module plugs into the back of the controller as shown below and provides five, 90-220VAC, 2 Amp outputs. This module is compatible with the SSR Outputs on the VersaTenn III controller used for Humidity outputs.

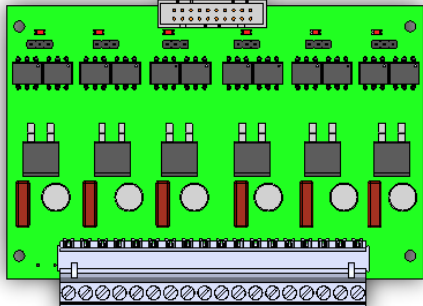



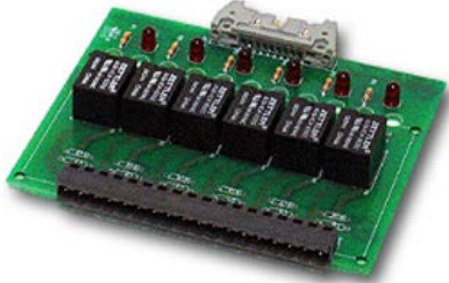

Appendix A Output Board Specifications

Parameter	Value	TE2551-12S
Part Number	TE2551-12S	
Outputs	12	
Current	3 Ampere AC	
Voltage	90 - 220 VAC	
Special Features	Individually Fused with socketed spare. Each output can also drive an external Triac for larger loads. See Appendix A	
Special Features	J2 and J3 drive 6-Channel output boards	

Parameter	Value	TE2551-12
Part Number	TE2551-12	
Outputs	12	
Current	3 Ampere AC	
Voltage	90 - 220 VAC	
Special Features	Individually Fused with socketed spare See Appendix A	
Special Features	J2 and J3 drive 6-Channel output boards	

Parameter	Value	TE2551-6S
Part Number	TE2551-6S	 <p>The image shows the TE2551-6S Synergy Controller PCB. It is a green printed circuit board with six output channels. Each channel includes a triac, a fuse, and a terminal block. The board has a multi-pin connector at the bottom and a smaller connector at the top.</p>
Outputs	6	
Current	3 Ampere AC	
Voltage	90 - 220 VAC	
Special Features	Individually Fused with socketed spare. Each output can also drive an external Triac for larger loads. See Appendix A	
Special Features		

Parameter	Value	TE2551-6
Part Number	TE2551-6	 <p>The image shows the TE2551-6 Synergy Controller PCB. It is a green printed circuit board with six output channels. Each channel includes a triac, a fuse, and a terminal block. The board has a multi-pin connector at the bottom and a smaller connector at the top.</p>
Outputs	6	
Current	3 Ampere AC	
Voltage	90 - 220 VAC	
Special Features	Individually Fused with socketed spare See Appendix A	
Special Features		

Parameter	Value	TE1151-8																																																	
Part Number	TE1151-8																																																		
Outputs	8																																																		
Current	6 Ampere AC																																																		
Voltage	90 - 220 VAC																																																		
Special Features																																																			
Part Number	TE1708-6																																																		
Outputs	6																																																		
Current	6 Ampere AC																																																		
Voltage	90 - 220 VAC																																																		
Special Features	PCB locations are available on the Normally Open (N.O.) Contact of each relay for an RC Snubber.																																																		
Part Number	TE2242-20																																																		
Outputs	6																																																		
Current	Open Collector, 50 mA max.																																																		
Voltage	24 VDC max.																																																		
Special Features	<table border="1"> <thead> <tr> <th colspan="10">Tidal Engineering Corporation P/N TE2242-20</th> </tr> <tr> <th>1</th> <th>3</th> <th>5</th> <th>7</th> <th>9</th> <th>11</th> <th>13</th> <th>15</th> <th>17</th> <th>19</th> </tr> </thead> <tbody> <tr> <td>OUT 1</td> <td>OUT 2</td> <td>OUT 3</td> <td>OUT 4</td> <td>N/C</td> <td>N/C</td> <td>N/C</td> <td>N/C</td> <td>+5V</td> <td>+5V</td> </tr> <tr> <th>2</th> <th>4</th> <th>6</th> <th>8</th> <th>10</th> <th>12</th> <th>14</th> <th>16</th> <th>18</th> <th>20</th> </tr> <tr> <td>OUT 5</td> <td>OUT 6</td> <td>N/C</td> <td>N/C</td> <td>N/C</td> <td>N/C</td> <td>N/C</td> <td>N/C</td> <td>+5V</td> <td>+5V</td> </tr> </tbody> </table>		Tidal Engineering Corporation P/N TE2242-20										1	3	5	7	9	11	13	15	17	19	OUT 1	OUT 2	OUT 3	OUT 4	N/C	N/C	N/C	N/C	+5V	+5V	2	4	6	8	10	12	14	16	18	20	OUT 5	OUT 6	N/C	N/C	N/C	N/C	N/C	N/C	+5V
Tidal Engineering Corporation P/N TE2242-20																																																			
1	3	5	7	9	11	13	15	17	19																																										
OUT 1	OUT 2	OUT 3	OUT 4	N/C	N/C	N/C	N/C	+5V	+5V																																										
2	4	6	8	10	12	14	16	18	20																																										
OUT 5	OUT 6	N/C	N/C	N/C	N/C	N/C	N/C	+5V	+5V																																										

Synergy Controller

February 2019, Revision E

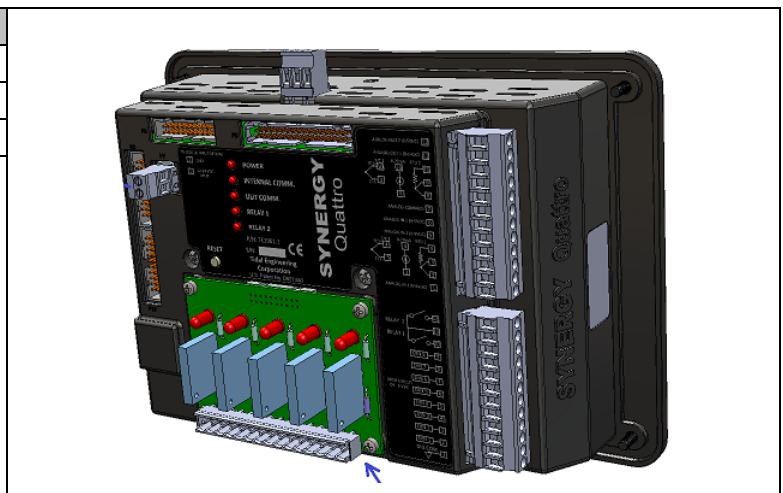
Application Note 144

Tidal Engineering Corporation © 2019

Part Number	TE2242-34																																																																																			
Outputs	24																																																																																			
Current	Open Collector, 50 mA max.																																																																																			
Voltage	24 VDC max.																																																																																			
Special Features	<p align="center">Tidal Engineering Corporation P/N TE2242-34</p> <p align="center">ALL OUTPUTS ARE OPEN COLLECTOR, 24 VDC, 50 mA MAX</p> <table border="1"> <thead> <tr> <th>1</th><th>3</th><th>5</th><th>7</th><th>9</th><th>11</th><th>13</th><th>15</th><th>17</th><th>19</th><th>21</th><th>23</th><th>25</th><th>27</th><th>29</th><th>31</th><th>33</th> </tr> </thead> <tbody> <tr> <td>3SM-02</td><td>3SM-01</td><td>1SM-12</td><td>1SM-11</td><td>2SM-01</td><td>2SM-02</td><td>2SM-03</td><td>1SM-09</td><td>1SM-04</td><td>1SM-03</td><td>1SM-02</td><td>1SM-01</td><td>+5V</td><td>+5V</td><td>+5V</td><td>+5V</td><td>+5V</td> </tr> <tr> <th>2</th><th>4</th><th>6</th><th>8</th><th>10</th><th>12</th><th>14</th><th>16</th><th>18</th><th>20</th><th>22</th><th>24</th><th>26</th><th>28</th><th>30</th><th>32</th><th>34</th> </tr> <tr> <td>3SM-06</td><td>3SM-05</td><td>3SM-04</td><td>3SM-03</td><td>2SM-04</td><td>2SM-05</td><td>2SM-06</td><td>1SM-10</td><td>1SM-08</td><td>1SM-07</td><td>1SM-06</td><td>1SM-05</td><td>+5V</td><td>+5V</td><td>+5V</td><td>+5V</td><td>+5V</td> </tr> </tbody> </table>																1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	3SM-02	3SM-01	1SM-12	1SM-11	2SM-01	2SM-02	2SM-03	1SM-09	1SM-04	1SM-03	1SM-02	1SM-01	+5V	+5V	+5V	+5V	+5V	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	3SM-06	3SM-05	3SM-04	3SM-03	2SM-04	2SM-05	2SM-06	1SM-10	1SM-08	1SM-07	1SM-06	1SM-05	+5V	+5V	+5V	+5V	+5V
1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33																																																																				
3SM-02	3SM-01	1SM-12	1SM-11	2SM-01	2SM-02	2SM-03	1SM-09	1SM-04	1SM-03	1SM-02	1SM-01	+5V	+5V	+5V	+5V	+5V																																																																				
2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34																																																																				
3SM-06	3SM-05	3SM-04	3SM-03	2SM-04	2SM-05	2SM-06	1SM-10	1SM-08	1SM-07	1SM-06	1SM-05	+5V	+5V	+5V	+5V	+5V																																																																				



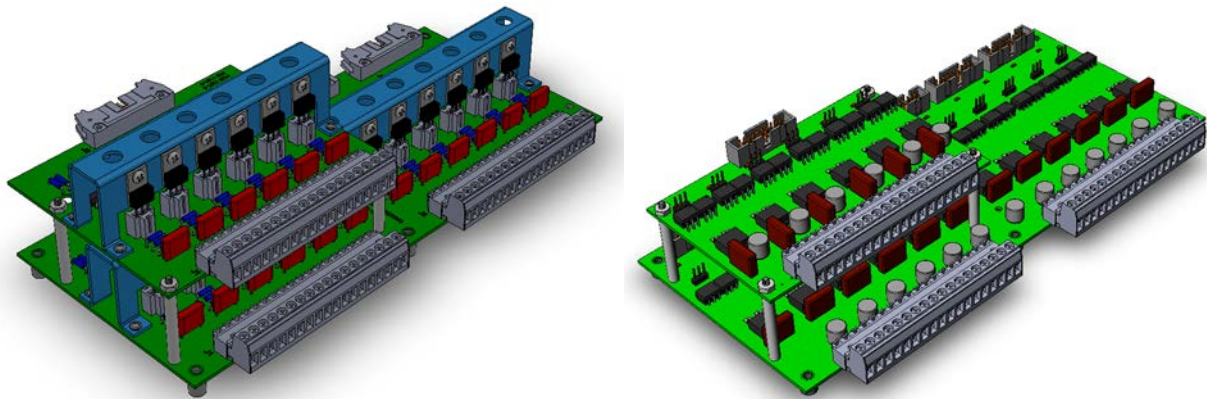
Part Number	TE2251-5
Outputs	5
Current	2 Amps AC
Voltage	90-220VAC
Special Features	



Appendix B Next Generation, TE2551-x Switching Module Family (Tenney Compatible 1SM, 2SM)

Part Numbers: TE2551-12S, TE2551-6S, TE2551-12, TE2551-6.

1. These boards are mechanically interchangeable with the legacy switching module family (on the left below).



2. Socketed output fuses (see specification below) protect the circuit traces on all channels. A spare fuse is provided for both 12 and 6 channel units.

Fuse Specifications:

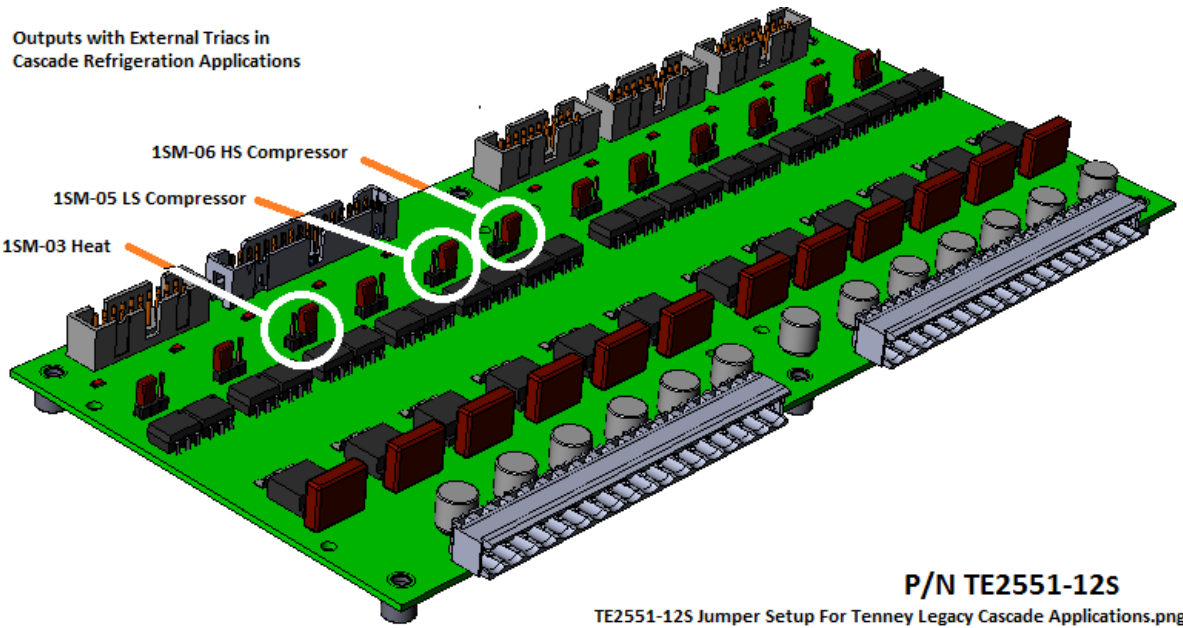
Manufacturer:	Schurter Inc.
Part Number:	0034.6620
Description:	Board Mounted Fuse, 3.15A, 250VAC 125VDC, Slow Blow
Approvals:	CCC, cURus, KC, PSE/JET, VDE

4. The TE2551-12S and TE2551-6S models can drive external triacs like the original TE1151 family switching modules. These "S" versions are required for some Tenney retrofit applications, specifically, in Tenney legacy applications that use high current triacs to control large loads including Heaters and Compressors.

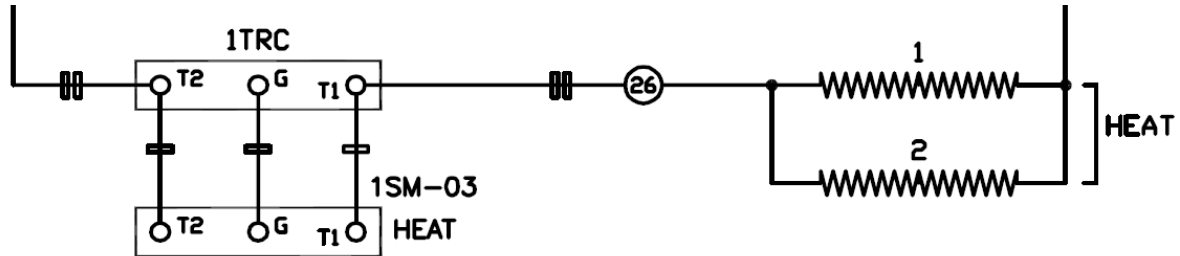
In these legacy applications, with the legacy switching modules, the installer/OEM was required to remove the on-board triac for the specific TE1151-12 and TE1151-6 channels driving external triacs.

With the new TE2551-12S and TE2551-6S triac boards, a jumper is switched between the On Board Triac (OBT) and External Triac position as shown below.

Note that the TE2551-12 and TE2551-6 switching modules will not drive external triacs.



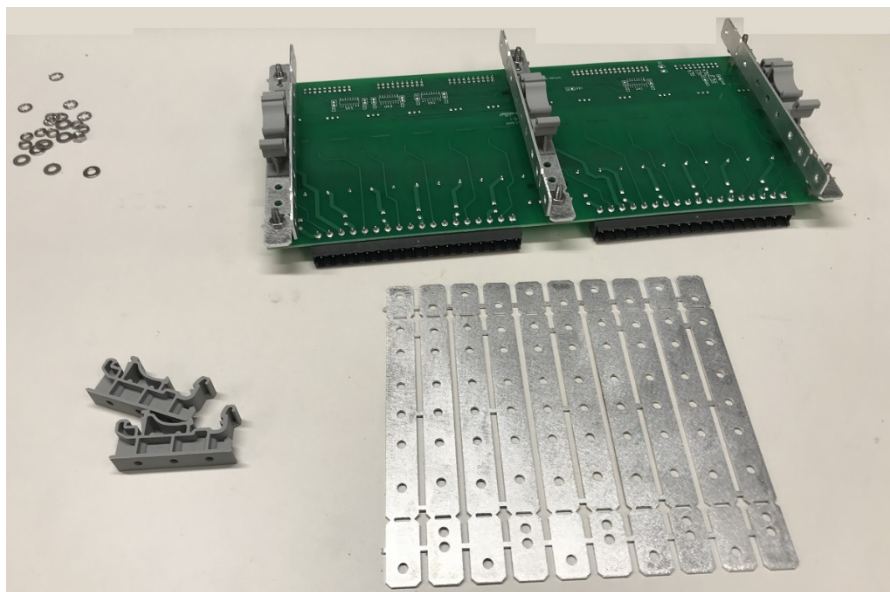
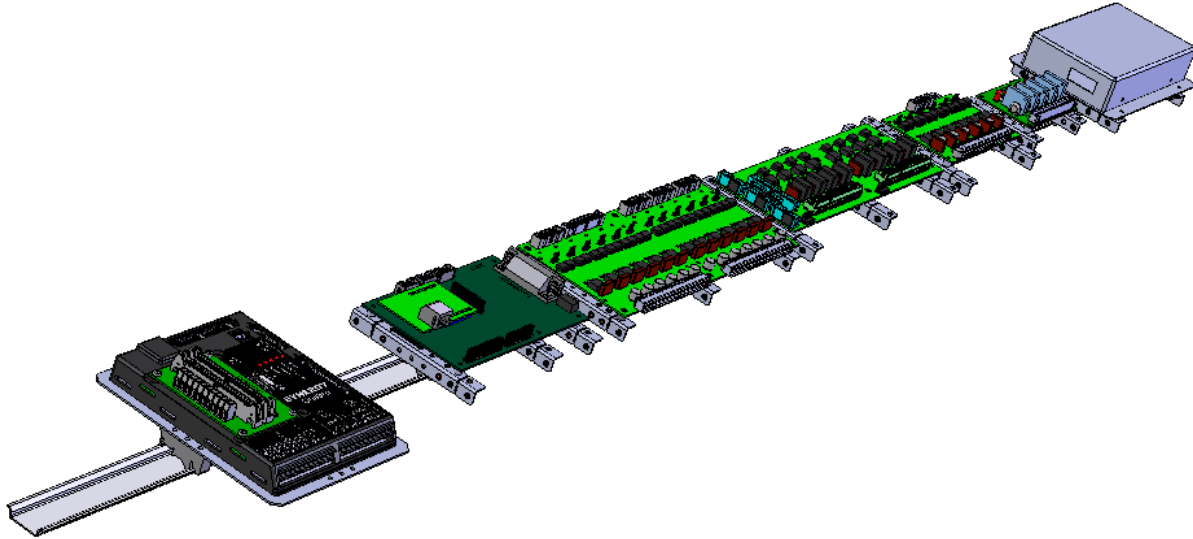
Typical External Triac Circuit



Appendix C Synergy Controller DIN Rail Mounting System

Part Number: TE2419

The DIN rail mounting system is designed to handle all Synergy Controller Output boards as well as the Grayhill 70L Output Rack systems. The kit includes ten DIN Rail brackets and required hardware.



Appendix D Synergy Quattro Expansion Option Guide

P/N TE2251-1

Four 8 Output Open Collector
24 Total Outputs



P/N TE2251-2

Two 50 position Opto-22 Style I/O Rack
24 Total Outputs



P/N TE2251-4

I/O Expansion
8 Analog Inputs (0..5 VDC)
8 Digital Inputs (Dry Contact, 0, 5VDC)
6 Open Collector Outputs



P/N TE2251-5

Five 90-220 VAC, 2A SSR Outputs





About the Synergy Controller Family

Tidal Engineering's Synergy Controllers, both the Synergy Micro 2, Synergy Quattro, and the ¼ DIN Synergy Nano provide state-of-the-art usability and connectivity for environmental test control and data acquisition and combine the functions of a chamber controller and a data logger. These controllers are designed to improve test efficiency by supporting both factory automation and test and measurement protocols and standards.

Synergy Controller feature highlights includes:

- ➔ Color touch screen
- ➔ Ethernet, RS-232 and GPIB communications
- ➔ Built in 100 MB Data logger with USB drive support
- ➔ Data Acquisition, up to 64 T-type thermocouples (Optional)
- ➔ Built-in Web Server for remote control; WebTouch Remote™
- ➔ Compatible with Synergy Manager for PC based control, monitoring and programming.
- ➔ Built-in FTP Server for factory automation and test and measurement applications

For more information regarding these controllers please see the full Synergy Controller Technical Manual on our website at <http://www.tidaleng.com/synergy.htm>

About Tidal Engineering

Headquartered in Randolph, NJ, Tidal Engineering Corporation has been designing and building award-winning embedded hardware and software for test and measurement and data acquisition applications since 1992. The company is recognized for technical expertise in such areas as Embedded IEEE 488, and turnkey SCADA (Supervisory Control and Data Acquisition) systems.

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