



"COOL ONE" Top Mount 10-50A Current Transformer Assembly



APC5048CT
Current Transformer Module



APC7130 SSR Assembly
w/ APC5048CT Mounted

Functions as a load monitor for currents up to 50A AC. Current Transformer circuitry provides for either 0-50 ma ac or 0-10 volts dc, adjustable from a multi turn pot. The Current Transformer provides 1ma per amp. Assembly mounts on top of any solid state relay via press-on adaptor which also provides touch safe feature for active high voltage terminal of relay and allows the relay assemblies to be mounted side by side to save space.

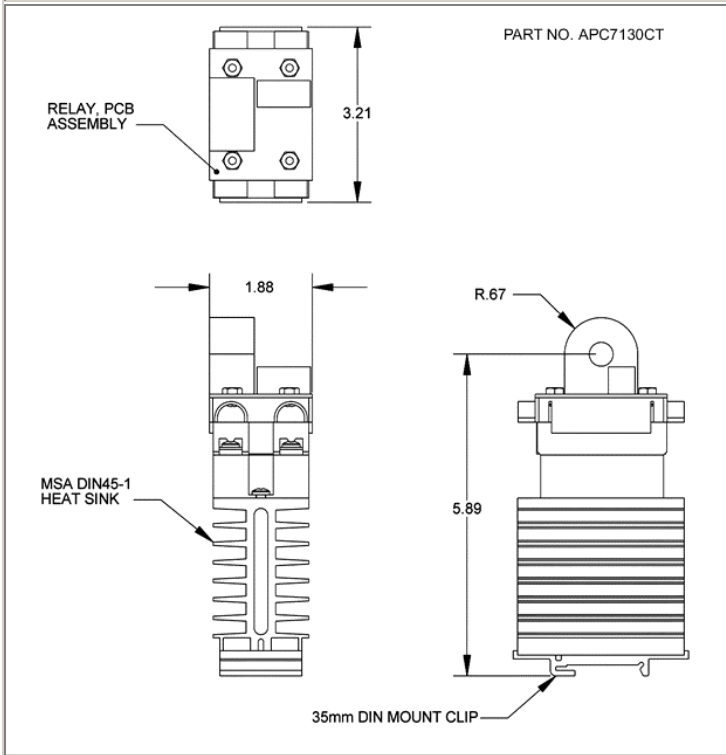
Standard "COOL ONE" Features:

- 0-10vdc signal proportional input amps
- Output voltage pot adjustable from 10 to 50Amps
- Over voltage zener protected to 15Vdc
- CT output 1ma/A
- Attaches to all standard Hockey Puck Style SSR's
- 2 3/16" Snap Track Mountable
- Small outline maintains SSR DIN side by side mounting

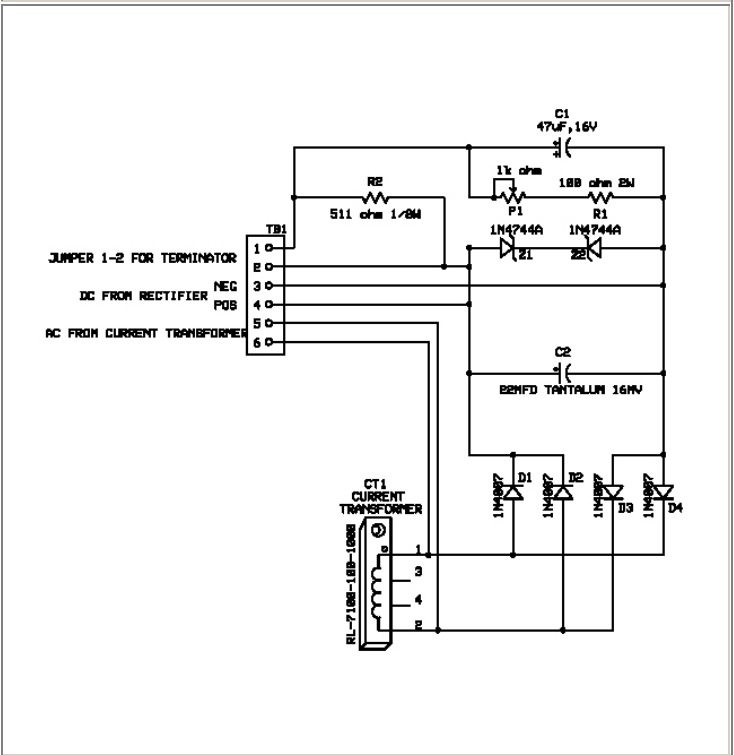
SPECIFICATIONS

PART NUMBER	LINE CURRENT	CT OUTPUT	LINE VOLTAGE	TRANSIENT VOLTAGE	RELAY TYPE
APC5048CT	10-50Amps AC	1ma AC per Amp or 0-10Vdc	24-660Vac	Zener Protected to 15Vdc Max	Zero Cross or RTO

MECHANICAL DRAWING



CT BOARD SCHEMATIC

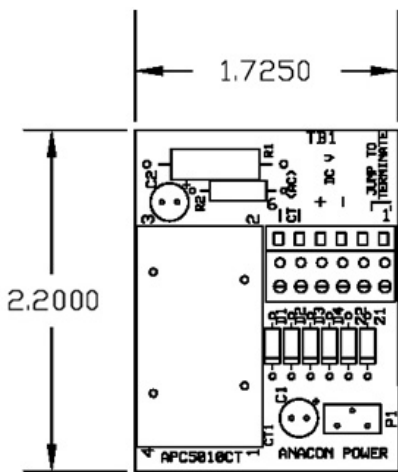




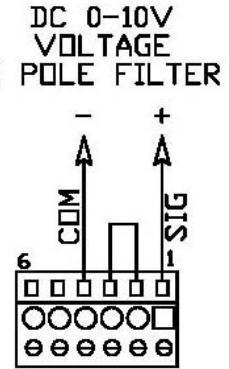
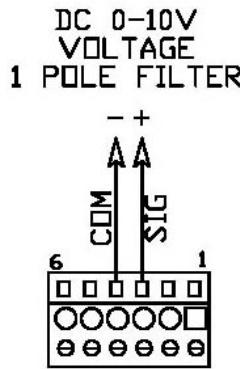
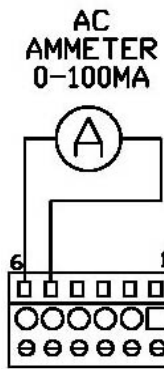
"COOL ONE" Top Mount 10-50A Current Transformer Assembly

CONNECTION DIAGRAMS

The APC5048CT provides an adjustable DC voltage when a lead from relay output terminal is passed through the CT opening to the load. The output can be scaled by adjusting the trim pot "P1" which is provided on the APC5048CT. This will allow the user to achieve a 0-10Vdc full scale for any current from 10A to 50A.



APC50505CT



NOTES:

The APC5048CT can be used to monitor load currents lower than 10Amps by following the equation:
 $A \times (1+T) = 10$. Where A= Load Current and T = the number of loops through the APC5048CT.

For example if A= 3Amps and T = 3, then $3 \times (1+3) = 12$.

In this example, three loops around the CT will make the 3Amps look like 12Amps to the APC5048CT. The result will meet the minimum value necessary to adjust the pot "P1" to 10Vdc full scale.

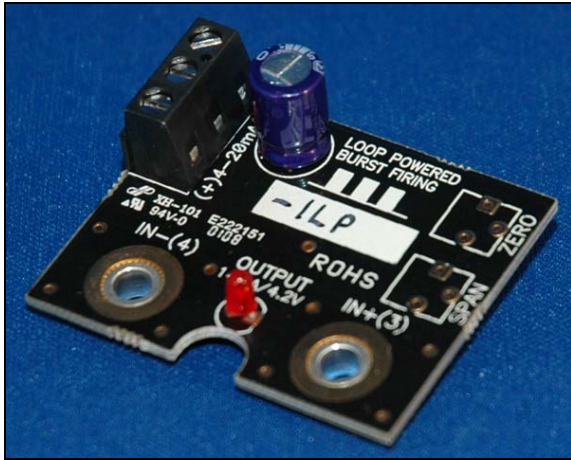


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4-20mA Loop Powered Time Proportioning Module



The APCMAN-1LP is designed for use in a broad range of 4 to 20mA power control applications where an external power supply is not available. The APCMAN-1LP mounts directly on the input connections of a Solid State Relay (SSR) and provides precise 0-100% time proportioned drive based on the input signal.

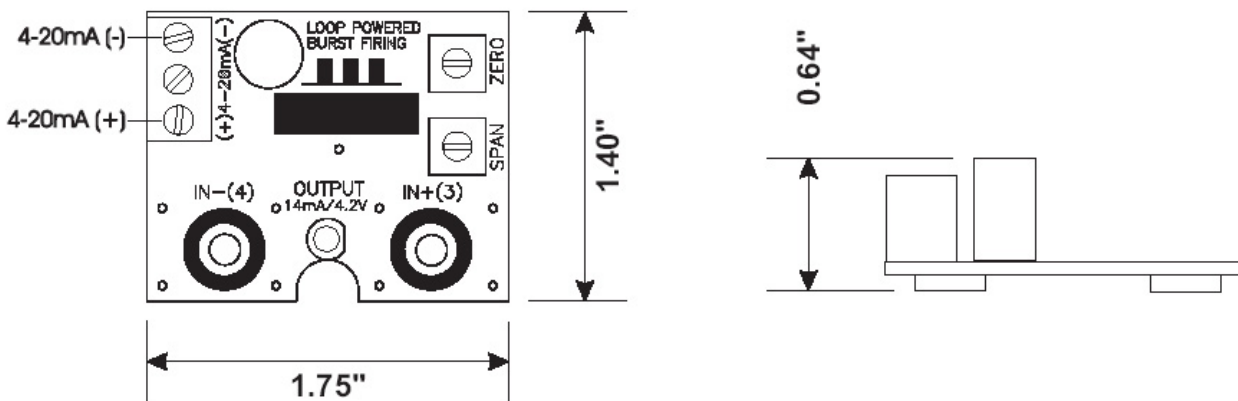
Standard Features:

- Provides precise time proportioned 0-100% output
- Loop powered - no external power supply required
- 4-20mA command signal input
- Drops only 6.3 Volts of total loop voltage
- Drives multiple Solid State Relays (SSRs)
- Single phase and three phase control
- Installs in seconds - mounts on SSR input terminals
- LED output indicator
- Limited Two Year Warranty

SPECIFICATIONS

PART NUMBER	COMMAND INPUT	CONTROL OUTPUT	CYCLE TIME	OUTPUT LINEARITY
APCMAN-1LP	4-20mA	<ul style="list-style-type: none"> • Provides 0-100% time proportioning based on command signal input • 14mA / 4.2V drive • Control output is short protected, direct acting 	<ul style="list-style-type: none"> • 350mS at 50% output • Cycle time greater at ends for optimal resolution 	+/-2% of Full Scale (+/-1% with -ZS) See User Manual for ZS Options.

DIMENSIONS





SCR Power Controller Cards

Power SCR Controller Assembly P/N	Description	Controller Card P/N
APCSCR25/40/50 <ul style="list-style-type: none"> DIN Mount Panel Mount 	SSR Mount Phase Angle Control Module, Volts, mA Input, Pot	MCC-1P
APCSCR25/40/50 - VL <ul style="list-style-type: none"> DIN Mount Panel Mount 	SSR Mount Phase Angle Control Module, Volts, mA Input, Pot, Voltage Limit Option	MCC1P-VL
APCSCR25/40/50 - 135 <ul style="list-style-type: none"> DIN Mount Panel Mount 	SSR Mount Phase Angle Control Module, 0-135Ω Input	MCC-1P-135
APCSCR25/40/50 - PWM <ul style="list-style-type: none"> DIN Mount Panel Mount 	SSR Mount Phase Angle Control Module, PWM Input	MCC-1P-PWM

Refer to the User Manual for technical details on Controller Cards.

DESCRIPTION:

The MCC-1P is a phase angle control module designed for use with standard footprint random fire SSRs (Solid State Relays). The module mounts directly on the SSR's input screws. The module operates by varying the firing point of the SSR's input. The power delivered to the load is proportional to the command input signal. The MCC-1P series will not operate correctly with zero cross fired SSRs.

FEATURES:

- Provides true linear power output phase angle control
- Small (1.75" x 1.40") module mounts on the input terminals of an inexpensive SSR
- Command input accepts 4-20mA, 0-10V, 0-5V, 0-135Ω, Pot, PWM
- Configurable line voltage compensation increases stability of your process
- Configurable soft start for high inrush loads
- Automatic 50/60Hz operation
- Adjustable Voltage Limit (-VL) Option
- Drives multiple solid state relays
- Single phase and three phase control



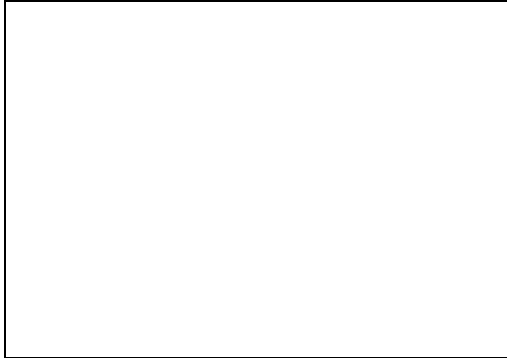


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Solid State Relay (SSR) Monitor Series



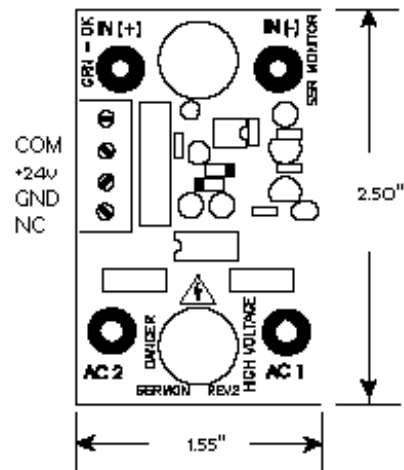
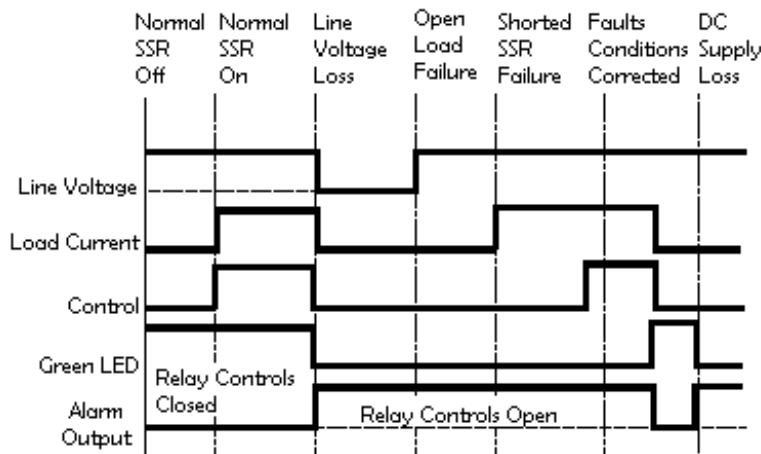
Solid State Relay Monitors:

- Monitors Solid State Relay for Failures
- Heater Break Alarm
- Installs in Seconds
- Mounts on Solid State Relay Connection Terminals
- Versatile Relay Contact Output
- Highly-Visible Status Indication
- Economically Priced
- Limited Two Year Warranty

SPECIFICATIONS

Monitoring Modes	Monitors SSR Output and Input for shorted SSR output, loss of line voltage, loss of load, short external to SSR, and loss of DC power.
Power/Status Indication	Green LED energized when power is applied and normal operating conditions are present, i.e. status is OK.
Power Supply	10-14 VDC (12VDC) or 20 - 30 VDC (24VDC), less than 1.5 Watts power consumption.
Input Mode	Interrupted; input to SSR and SSRMON is forced off for ~ 150 - 200mS every 10 seconds to test SSR and SSRMON is based on drive signal.
Control Input Impedance	~4K ohms
Control Voltage	Continuous: 5-32 VDC
Alarm Output	Single Relay Contact 200 VDC/0.5A max. Contacts open upon fault or loss of board power. Contacts are closed when no faults are present.
Alarm Response Time	Typically less than 50 mS from the last control input cycle. Up to 10 seconds on interrupted input version with control input on 100%.
AC Line Voltage	100-660 VAC 50/60 Hz.
Input/Output Isolation	400 Vrms (25 C for 1 second).
Off State Leakage Current	6 mA rms max across SSR output.
Off State Blocking Voltage	1200 Vpk (max 1 minute duration).
Operating Temp. Range	0 to 60 C.

Ordering Information: Part Number: APCMON C24





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APCSSRMON USERS MANUAL

SOLID STATE RELAY MONITOR





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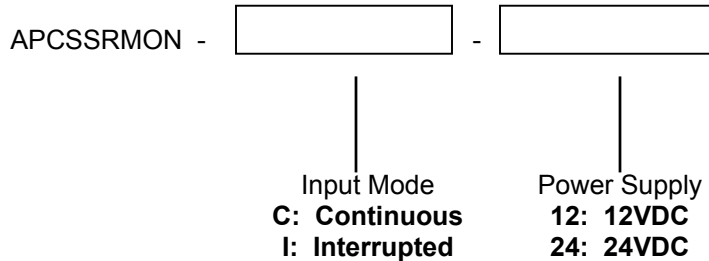
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1 Ordering Code (Figure 1)

The following is the ordering code for the Anacon Solid State Relay Monitor series.

ORDERING INFORMATION



For example: A 240 Volt Line Voltage type with a 5-15V input, 12V power Supply and Continuous mode would be ordered as follows:

APCSSRMON-C-12

2 Installation

2.1 Mounting Instructions

The APCSSRMON is designed to mount in a “piggy back” configuration on any standard footprint Solid State Relay module. The unit should be used with the Anacon touch-safe cover to minimize electrical shock hazards.

2.2 Wiring Instructions

The input and output terminals of the SSR should be wired with the board installed, but as if the board is not present. In high current applications (over 40A) we recommend wiring the connection lugs under the APCSSRMON Printed Circuit Board Bushings.

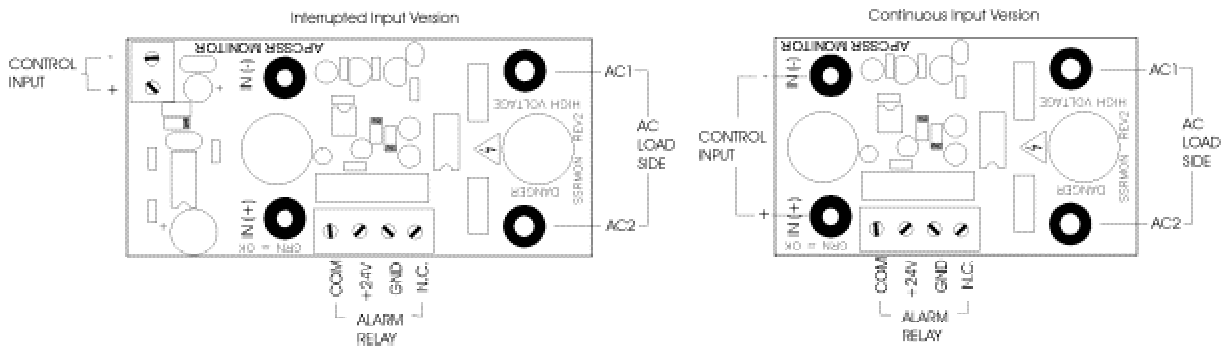
All I/O on the APCSSRMON is available with screw terminal connectors for ease of harness assembly. The screw connectors can accept up to 14 AWG wire.

The power, alarm, and ground wires are wired to the screw terminal block. In the case of the interrupted input version, the control input is wired to the screw terminal connector located at the top left hand corner of the board.

The AC Load Side and Signal connections should be wired as shown in Figure 2 on page 4. It is good practice to keep the AC Load Side wires away from the Control and Alarm wires to prevent any power line noise from coupling into them.



2.3 Wiring Diagram (Figure 2)



3 Operation

3.1 APCSSRMON Input

The APCSSRMON control input is optically isolated from both the AC output and the DC power supply. The control input has nominal input impedance of $\sim 4\text{ K}\Omega$. The input impedances on the Interrupted input version are typically about one half of the Continuous version, thus requiring more drive current.

3.2 Continuous Input Version Applications

The Continuous input version of the APCSSRMON can only detect a failure condition when the control input signal of the Solid State Relay and APCSSRMON become logic low. The control input is required to remain logic low for at least 100mS before the failure will be detected.

3.2.1 Time Proportioned Controlled Processes

The Continuous input version will perform well in the majority of applications where the SSR control input is being cycled periodically (time proportioned P, PI, PD, PID).

We recommend that the process controller or other device used to drive the APCSSRMON be setup to have a periodic off time of at least 100mS. This can usually be accomplished via an output percentage limit function in the temperature or process control. For example: if the cycle time on the process controller is set to 10 seconds and the output limit is set to 99% then the output will cycle off for 100mS every 10 seconds even if the controller output is on "full". As another option, some PLCs may also be programmed to periodically interrupt the SSR control signal.



3.2.2 On-Off Controlled Process

The Continuous input version may be used in on-off control applications. The trade-off is that no alarm can be detected until the process controller or other device driving the Solid State Relay and APCSSRMON turns its control output off. In most cases if the Solid State Relay becomes shorted this will force the process value to the required setpoint causing the control output to turn off.

3.3 Interrupted Input Version Applications

We recommend the Interrupted input version for on-off control and switched applications where the control input to the SSR and APCSSRMON may not be cycled regularly. The interrupted input version of the APCSSRMON forces the SSR control input off for a brief period 100mS-150mS approximately every 10 seconds. This results in a duty cycle of about 99%. In most processes a forced brief off period (~100mS) of the load is negligible (such as in an on-off temperature control application). The Performance on the control of heaters is negligible; it is approximately equivalent to having a 0.5% change in line voltage, which happens frequently everywhere.

3.4 Alarm Output

The alarm output of the APCSSRMON is a low voltage/current relay contact. Single Relay Contact 200 VDC/0.5 A max. Relay contacts open upon fault or loss of board power. Relay contacts are closed when no faults are present. The alarm output may be used to drive low voltage relay coils, indicators, audible alarms, PLCs, etc. The required output current should not exceed 0.5 Amps. If multiple APCSSRMONs are needed in a given installation such as in a polyphase application, the output relay contacts may be wired in series to "OR" the alarms into one signal. The APCSSRMONs output relays may also be wired in series with other devices normally closed alarm relays.

3.5 Fault Conditions

The APCSSRMON can detect a loss of load/line power, loss of DC power supply, a loss of load, and a shorted solid state relay. The APCSSRMON can detect either half wave or full wave shorted failure conditions of the SSR.

3.5.1 Continuous Input Fault Detection

Failure Condition	When Detected
Shorted SSR	After Control Input remains logic low for 100mS or more, i.e. when an attempt is made to turn the SSR off
Open Load	After Control Input remains logic low for 100mS or more, i.e. when an attempt is made to turn the SSR off
Load or Line Power Loss	After Control Input remains logic low for 100mS or more, i.e. when an attempt is made to turn the SSR off
DC Power Supply Loss	Anytime - Independent of control Input



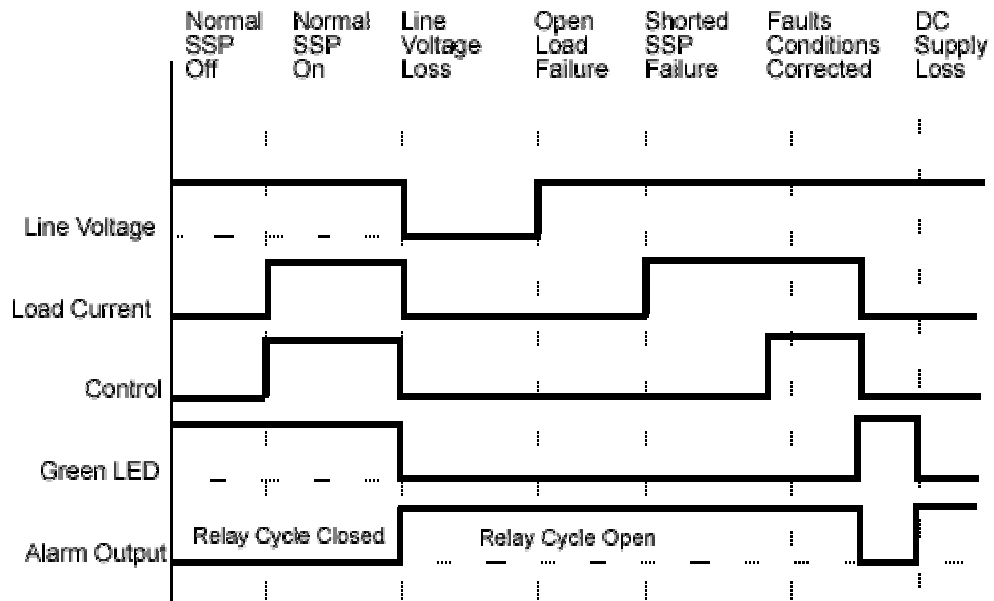
3.5.2 Interrupted Input Fault Detection

Failure Condition	When Detected
Shorted SSR	Anytime - Independent of control Input (forced off period)
Open Load	Anytime - Independent of control Input (forced off period)
Load or Line Power Loss	Anytime - Independent of control Input (forced off period)
DC Power Supply Loss	Anytime - Independent of control Input

3.6 Input / Output Logic

Once a fault condition is detected, i.e. loss of load/line power, loss of load, or a shorted solid state relay, the relay contacts are opened and held open until the fault condition is corrected and the control input of the APCSSRMON is toggled or DC power is removed and applied again. For further details, see the status diagram in figure 3.

3.7 Status Diagram (Figure 3)





4 Electrical Specifications

Monitoring Modes	Monitors SSR Output and Input for shorted SSR output, loss of line voltage, loss of load, short external to SSR, loss of DC power.
Power / Status Indication	Green LED energized when power is applied and normal operating conditions are present, i.e. status OK.
Power Supply	10-14 VDC (12VDC) or 20 to 32 VDC (24VDC), less than 1.5 Watts power consumption.
Input Mode	Interrupted: Input to SSR and APCSSRMON is forced off for ~ 150-200ms every 10 seconds to test SSR VO logic. Continuous: Input to SSR and APCSSRMON is based on drive signal.
Control Input Impedance	~4 K Ω
Control Voltage	Continuous: 5-32 VDC. Interrupt: 5-15 VDC.
Alarm Output	Single Relay Contact 200 VDC / 0.5 A max. Contacts open upon fault or loss of board power. Contacts are closed when no faults are present.
Alarm Response Time	Typically less than 50 mS from the last control input cycle. Up to 10 seconds on Interrupted Input version with control input on 100%.
AC Line Voltage	100-660 VAC50 / 60 Hz.
Input / Output Isolation	4000 Vrms (25° C for 1 second).
Off State Leakage Current	6mA rms max across SSR output.
Off State Blocking Voltage	1200 Vpk (max 1 minute duration).
Operating Temp. Range	0 to 60° C

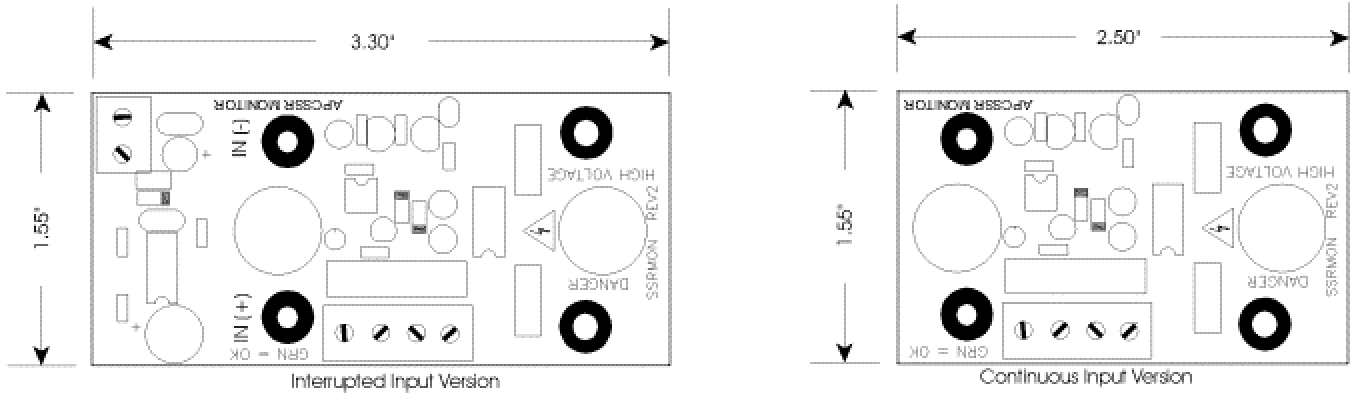


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5 Mechanical Dimensions



6 Contact Information

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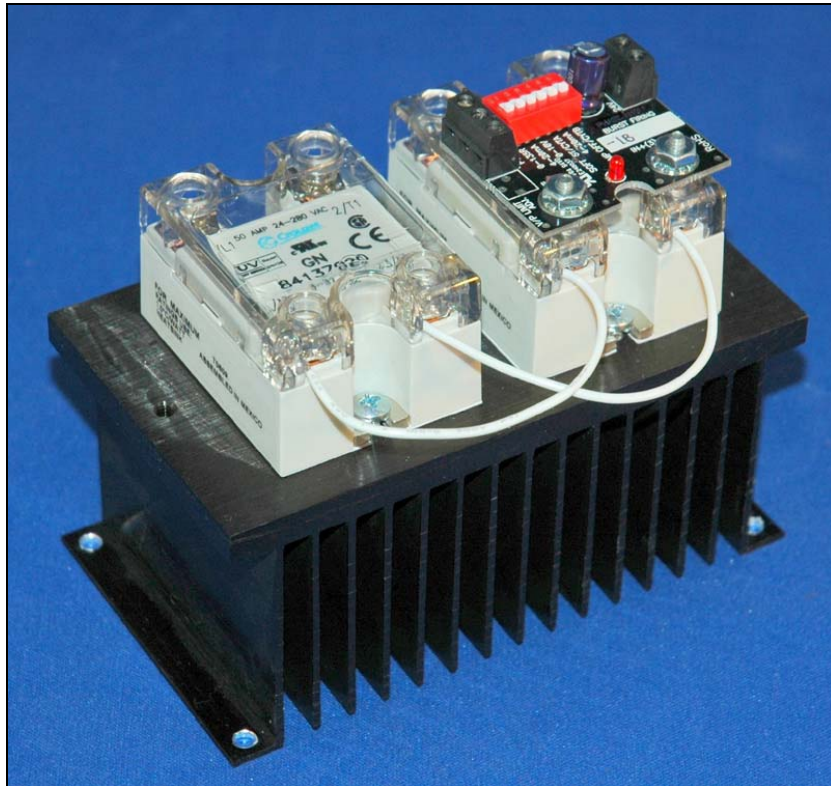


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APCMAN-1LP SERIES USERS MANUAL



4-20mA Loop Powered Burst Firing Module



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1 Ordering Code

APCMAN-1LP

SSR Mount Power Control Module, Burst Firing Output, 4-20mA Input

APCMAN-1LP-ZS

SSR Mount Power Control Module, Burst Firing Output, 4-20mA Input with Zero and Span Pots

2 Description

The APCMAN-1LP is power control module designed for use with standard footprint zero cross or random fire SSRs (Solid State Relays). The module mounts directly on the SSR's input screws and derives its power from the 4-20mA command input. The module operates by burst firing the SSR's control input. The power delivered to the load is proportional to the command input signal.

2.1 Features

- Provides precise time proportioned 0-100% output
- Loop powered – no external power supply required
- 4 to 20mA command signal input
- Drops only 6.3 Volts of total loop voltage
- Drives multiple Solid State Relays (SSRs)
- Installs in seconds – mounts on SSR input terminals
- On board LED Indication
- Limited Two Year Warranty

3 Installation



WARNING: FIRE HAZARD!! Even quality electronic components CAN FAIL KEEPING FULL POWER ON! Provide a SEPARATE (redundant) OVER TEMPERATURE SHUTDOWN DEVICE to switch the power off if safe temperatures are exceeded.



WARNING: HIGH VOLTAGE!! This control is installed on a Solid State Relay with high voltage on it. This control must be installed in a GROUNDED enclosure by a qualified electrician in accordance with applicable local and national codes including NEC and other applicable codes. Provide a safety interlock on the door to remove power before gaining access to the device.



3.1 Mounting Instructions

The APCMAN-1LP mounts directly to the control input terminals of an SSR. Some relays have short input screws and longer screws will be required to reach through the contacts on the APCMAN-1LP. Be sure to observe the correct polarity when mounting the module.

4 Operation

4.1 Command Input

The APCMAN-1LP can accept a 4-20mA input. If more than one APCMAN-1LP is to be used from the same drive signal, the APCMAN-1LP inputs should be connected in series. The command input is direct acting, meaning that as the input value increases, the control output increases in direct proportion.

4.1.1 Input Fail-Safe Protection

If the signal sent to the APCMAN-1LP's command input should become electrically open, the module's output will be forced to an off state since power will be lost.

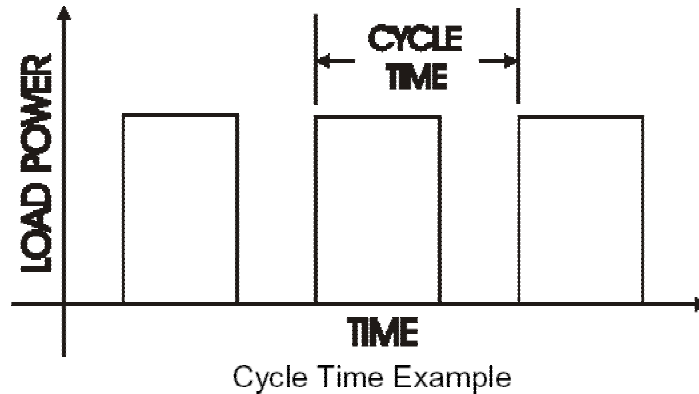
4.2 Control Output

The APCMAN-1LP's SSR output drive is a DC pulsed current limited 4.2V@14mA drive signal. This is more than enough current for driving most 3-32V standard SSRs, however it is still important to review the datasheet for the SSR you would like to use for compatibility with the APCMAN-1LP's output drive.



4.2.1 Cycle Time

The APCMAN-1LP has one available cycle time of 350mS (@50%). Custom cycle times are available upon request.



The APCMAN-1LP is designed to provide the maximum control resolution and response time using a varied output cycle time. While the cycle time is specified at 350mS, this is at 50% power or 12mA input. As 4mA or 20mA is approached, the cycle time increases to limit the minimum on / off times to 100mS. This advanced approach maximizes the control resolution when the module is used with a zero cross fired SSR.

The cycle times change with the command input as follows:

Command	5mA	6mA	8mA	12mA	16mA	18mA	19mA
Cycle Time	1.3s	0.7s	0.4s	0.35s	0.4s	0.7s	1.3s

4.2.2 Linearity

The control output linearity is +/-2% for the version without the zero and span potentiometers. Much tighter linearity can be achieved by adjusting the zero and span pots to optimize the linearity over the control range of the process.

4.2.3 Zero and Span Pots

The APCMAN-1LP can be ordered with Zero and Span pots as the APCMAN-1LP-ZS. This version allows the user to calibrate the low and high ends of the control range for the best possible linearity over the control range. It will also allow use of the module in load balancing applications and to skew the output response to meet specific needs.



4.3 Three Phase Operation

One APCMAN-1LP can be used to control two poles of a three phase load using two SSRs with their control inputs wired in parallel. The Module should be wired as shown in the wiring diagram, but with separate load circuits for each leg. Make sure that the total input current requirements of the two SSRs can be achieved with the APCMAN-1LP.

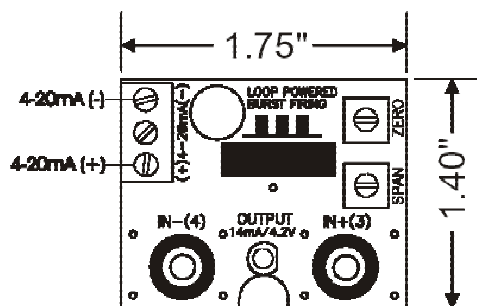
4.4 Wiring of Multiple APCMAN-1LPs

If more than one APCMAN-1LP is to be used from a single command signal, the command inputs should be wired in series, not in parallel.

5 Electrical Specifications

Command Input	4 to 20mA.
Control Output	4.2V/14mA. Short Circuit Protected. Control output is direct acting.
Cycle Time	350mS at 50% output. Cycle Time greater at ends for optimal output resolution.
Output Linearity	+/-2% of Full Scale. (+/-1% with zero and span pots).
Zero Pot Adjustment	+/-2% of Full Scale.
Span Pot Adjustment	+/-8% of Full Scale.

6 Mechanical Dimensions & Connection Diagram



Max Height is 0.6"

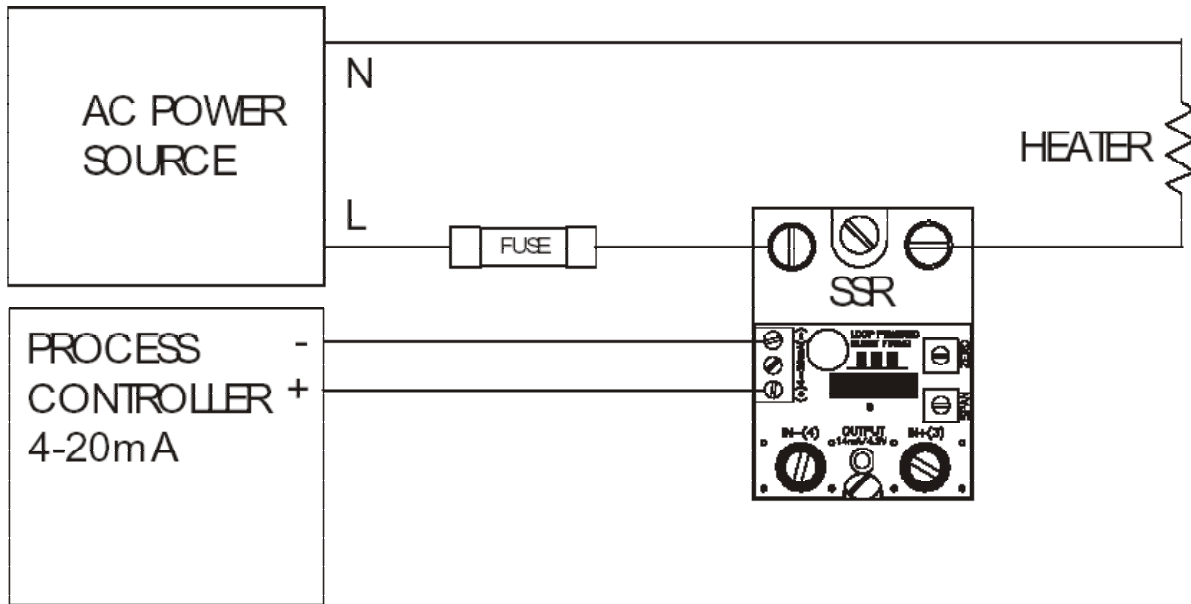


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7 APCMAN-1LP WIRING DIAGRAM



8 Contact Information

Anacon Power & Controls
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