

MAXITROL®

Selectra® SC30-SM2 Series Signal Conditioners

⚠ WARNING

Read these instructions carefully and completely before installing or operating. Failure to follow them could result in a fire or explosion causing property damage, personal injury, or loss of life. The product must be installed and operated according to all local regulations.

Service and installation must be performed by a trained/experienced service technician.

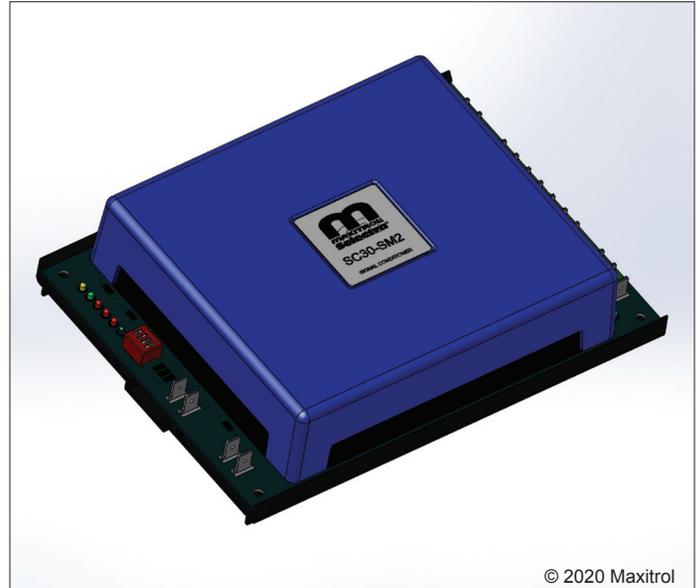
DESCRIPTION

The SC30-SM2 Series signal conditioner, used with the M420, M520, and M620 Series modulating gas valves, is designed to modulate atmospheric indirect fired heaters that have a sectioned gas manifold and 2-speed inducer. The sectioned - or split - manifold design operates as two independent manifolds sharing a single 2-speed inducer. One manifold section is fully modulating and the other section operates as a 2-stage. Typical applications achieve a turndown of approximately 10:1.

SYSTEM FEATURES

SC30-SM2 Series Signal Conditioner

- Fixes the modulation output voltage and SPDT inducer relay for a predetermined time after receiving EST VDC input.
- Conditions temperature control signal to:
 - Control Maxitrol M Series modulating gas valve.
 - Energize/de-energize SPDT Relay 1 - sets inducer speed to high or low position.
 - Energize/de-energize NO Relay 2 and Relay 3 - activates high and low stage of non-modulated section.
- Maintains 100% modulation rate for selected time after Relay 2 is energized.
- Limits minimum VDC to modulator when non-modulated section stages become active.
- SC30-SM2A Models: Fixes M Series modulating valve VDC and de-energizes Relay 3, when desired AFS VDC input is not present.



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Figure 1: SC30-SM2 Series Signal Conditioner

SYSTEM COMPONENTS

SC30-SM2N, SC30-SM2AN, SC30-SM2L, SC30-SM2AL Signal Conditioners

M420, M520, M620 Series modulating gas valves

SPECIFICATIONS

Ambient Temperature Limits

Operating:	-40° F to 150° F (-40° C to 66° C)
Non-operating:	-50° F to 185° F (-46° C to 85° C)
RH:	95% non-condensing

Mounting

Snap Track, multipoise

Power Supply

24 VAC +10-15% (50/60 Hz), Class II Transformer
40 VA - Rating for Maxitrol electronics and modulating gas valve only.

Half-Wave Rectified

NOTE: Polarity is specified - Transformer can be externally grounded.

External Wiring

Gauge:	18-22 AWG, copper only
Connection:	1/4" male spade .032 thk

Relays

A: When relay R1, R2, or R3 common voltage input is externally supplied (dry contact), the voltage should not exceed 24 VAC, VDC nominal.

B: When relay R1, R2, or R3 common 24 VAC input is internally supplied, the circuit load through jumper J1, J2, or J3 should not exceed 1A.

SPDT Relay 1 (R1)

Rated load:	2 A Max. @ 24 VAC (Resistive load)
Max switching capacity:	50 VA (Resistive load)

NO Relay 2 (R2)

Rated load:	10 A @ 120 VAC: 8 A @ 30 VDC (Resistive load)
Max switching capacity:	AC 10 A; DC 8 A (Resistive load)

NO Relay 3 (R3)

Rated load:	10 A @ 120 VAC: 8 A @ 30 VDC (Resistive load)
Max switching capacity:	AC 10 A; DC 8 A (Resistive load)

Temperature Control (TC) Signal Input

0 - 10 VDC, 2 - 10 VDC
Impedance 100k ohms (nominal)
0 - 20 mA, 4 - 20 mA
Impedance 500k ohms (nominal)

Modulating Gas Valve Output

Voltage range:	2 - 15, 18 max (REF: NAT Gas) - "N" Models 2 - 20, 24 max (REF: LP Gas) - "L" Models
Rated load:	2.0 A max

See Figure 2, page 3 for locations of the following:

Relay - Trigger Adjustment (TC Signal)

Nominal +/- 10%
Relay 1: 25%
Relay 2: 50%
Relay 3: 75%

Relay - Trigger Span Adjustment (TC Signal)

1 - 5% centered around Trigger

Start Timer

5-55 seconds

Start Modulating Valve Voltage

5-15 VDC

Stage 3 Delay - Modulated Section Hold

5-30 seconds

Stage 3 Minimum Voltage Adjustment

2-10 VDC

Stage 4 Minimum Voltage Adjustment

2-10 VDC

AFS Fault Voltage (SC30-SM2A)

5-15 VDC

SHUNT JUMPER AND DIP SWITCH SETTINGS

Table 1: DIP Switch Settings

TC INPUT	DIP Switch (SW1) Settings			
	1	2	3	4
0 - 10 VDC	OFF	ON	OFF	Set to ON to <i>disable</i> AFS Function (SC30-SM2A only)
2 - 10 VDC	OFF	OFF	ON	
0 - 20 mA	ON	ON	OFF	
4 - 20 mA	ON	OFF	ON	

Table 2: Jumper Settings

J1	Connects T2 to T5	24 VAC - shunt installed Dry contact - no shunt
J2	Connects T2 to T8	
J3	Connects T9 to T10	R2 output to R3 input

ADJUSTMENTS (If equipped)

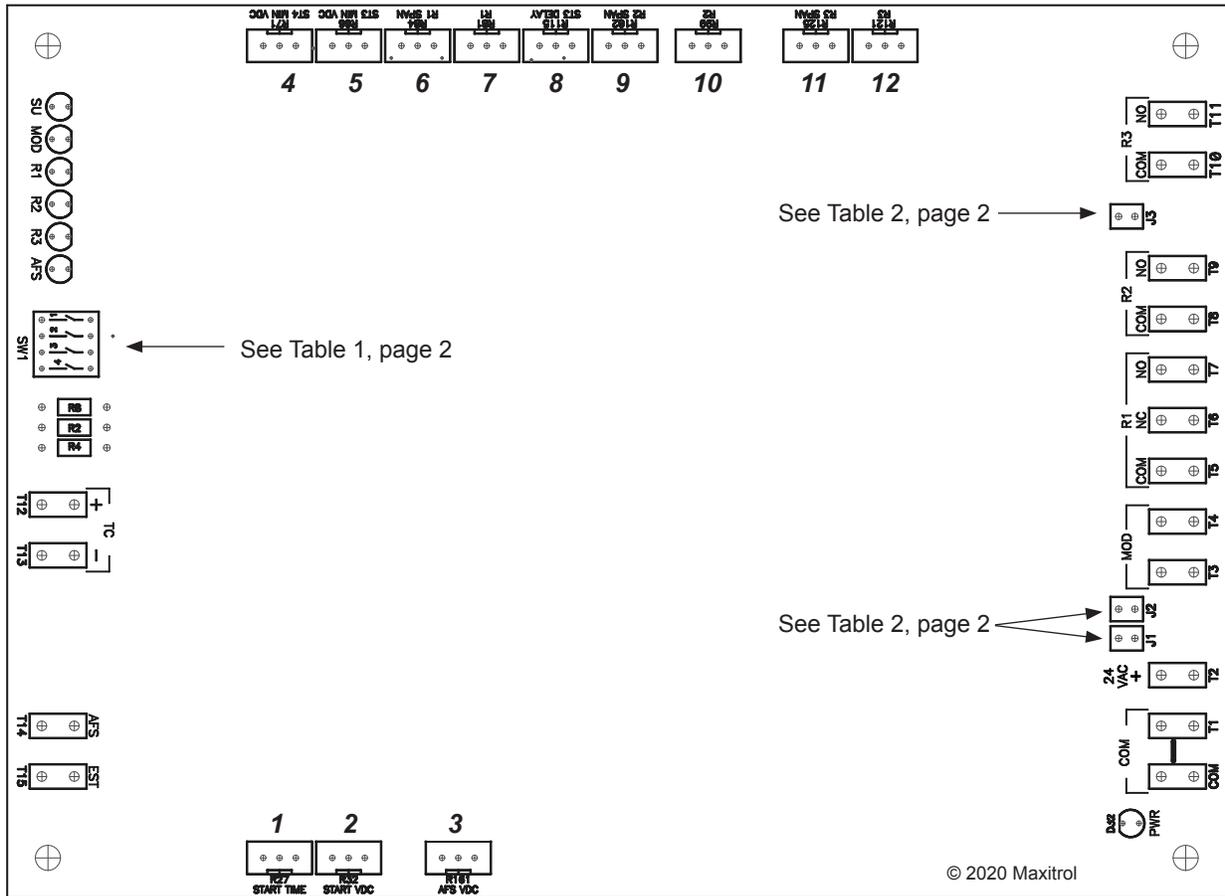


Figure 2: SC30-SM2 Trimpot and Jumper Locations

Setting			
1	Start Time	7	Relay 1 Trigger
2	Start Voltage	8	ST3 Time Delay
3	AFS Limit (SC30-SM2A)	9	Relay 2 Deadband
4	ST4 MIN Voltage	10	Relay 2 Trigger
5	ST3 MIN Voltage	11	Relay 3 Deadband
6	Relay 1 Deadband	12	Relay 3 Trigger

NOTE: Turn trimpot clockwise to increase, counterclockwise to decrease.

NOTE: Some versions have fixed Settings. Trimpots are not installed. Consult Maxitrol for further information.

PCB CONNECTIONS

No	PCB Label		Description	Notes	
COM	COM		Power Common	Internally connected to T1	
T1			Power Common	Polarity sensitive	
T2	24 VAC	+	Power Input		
T3	MOD		2 - 15 VDC, 18 VDC max	REF: NAT Gas - "N" Models	Not polarity sensitive
T4			2 - 20 VDC, 24 VDC max	REF: LP Gas - "L" Models	
T5	R1	COM	Relay 1 Common	24 VAC - internally (J1)	
T6		NC	Normally Closed Contact	Inducer Speed Stage	
T7		NO	Normally Open Contact		
T8	R2	COM	Relay 2 Common	24 VAC - internally (J2)	
T9		NO	Normally Open Contact	Ignition Control W - TH, Non-Modulated Section	
T10	R3	COM	Relay 3 Common	24 VAC - internally (J3)	
T11		NO	Normally Open Contact	Gas Valve (MV) 2nd Stage, Non-Modulated Section	
T12	TC	+	TC Input	Control signal, polarity sensitive	
T13		-			
T14	AFS		Air Flow Switch	AFS Circuit, 24 VAC Input (SC30-SM2A only)	
T15	EST		Electronic Start Trigger	MV Circuit, 24 VAC Input, Modulated Section	

NOTE: COM, T1, and T13 are internally connected.

LED STATUS INDICATORS

Status	PCB Label	Color
Main Power	PWR	Blue
Start Up	SU	Yellow
Relay 1 energized	R1	Red
Relay 2 energized	R2	Red
Relay 3 energized	R3	Red
AFS	AFS	Green
Modulation	MOD	Green

OPERATION

CALL FOR HEAT MODE

- Thermostat relay is energized (completes W input).
- SC30-SM2 is powered with 24 VAC.
- SPDT Inducer Relay 1 is not energized.
- Inducer operates in high speed.

LEDs: PWR, AFS

BURNER START UP MODE

24 VAC EST input from the ignition control gas valve (MV) circuit.

- Timer starts and modulation voltage is fixed.
- SPDT inducer Relay 1 remains de-energized, keeping the inducer in the high-speed stage.

The system remains in this mode throughout start up timer's duration regardless of the TC input.

LEDs: PWR, SU, AFS

OPERATIONAL MODE

- Fixed modulating valve voltage timer expires.
- TC control signal now determines the mode.

LEDs: PWR, MOD,
R1, R2, R3 - Lit when energized
AFS - Lit with 24 VAC input

Table 3: Temperature Controller Input to SC30-SM2

TC Input Signal	Mode			Approx % of total*
	Modulated	Non-Modulated	Inducer	
0 - 25%	Low - Mid	Off	Low	10% - 30%
25 - 50%	Mid - High	Off	High	30% - 50%
50 - 75%	Low - High	Low	High	50% - 75%
75 - 100%	Low - High	High	High	75% - 100%

* Percentages are approximations of what one would expect to achieve.

OPERATION

OPERATION: (see Table 3, page 6)

Stage I

- TC Input: 0 - 25% (nominal).
- Minimum to 30% of total rate.^A
- Modulated Section is operational and modulating. Output range to M valve is approx. 2 - 7.5 VDC or 2 - 9.5 VDC.
- SPDT Relay 1 is energized.
- Inducer operates in low-speed mode.

LEDs: PWR, MOD, R1

Stage II

- TC Input: 25 - 50% (nominal).
- 30% to 50% of total rate.^A
- Modulated Section is operational and modulating.
- Output range to M valve is approx. 7.5 - 15 VDC or 9.5 - 20 VDC.
- TC Input voltage trigger is reached and SPDT Relay 1 is de-energized.
- Inducer operates in high-speed mode.
- SC30-SM2A: 24 VAC input to AFS or SW1-4 is "ON".

LEDs: PWR, MOD, AFS

Stage III

- TC Input: 50 - 75% (nominal).
- 50% to 75% of total rate.^A
- Modulated Section is operational and modulating.
- Relay 2 is energized.
- Output to mod valve to remain at 15 VDC or 20VDC nominal for 5 - 30 seconds (adjustable).
- Non-Modulated Section becomes operational and operates in low stage (approx 50% of non-modulated section).
- Output range to M valve is 2^B - 15VDC or 2^B - 20 VDC.

LEDs: PWR, MOD, R2, AFS

Stage IV

- TC input: 75 - 100% (nominal).
- 75% to 100% of total rate.^A
- Modulated Section is operational and modulating.
- NO Relay 3 is energized. Gas valve switches to high stage (100% of non-modulated section).
- Output range to M valve is 2^B- 15 VDC (18 VDC @ 10 VDC) or 2^B- 20 VDC, (24 VDC @ 10 VDC).

LEDs: PWR, MOD, R2, R3, AFS

AFS (TERMINAL 14) SC30-SM2A Models

AFS LED

- Lit when 24 VAC input is present or SW1-4 is "ON".
- Off when 24 VAC input is not present.
- Operating Condition #1
Relay 1 is energized and 24 VAC input is present or not present.
Result: Normal operation of Stage I.
- Operating Condition #2
Relay 1 is de-energized and 24 VAC input is present.
Result: Normal operation of all stages.
- Operating Condition #3
Relay 1 is de-energized and 24 VAC input is not present for duration greater than 3 seconds.
Result:
 - AFS Fault.
 - VDC output to valve is fixed to user-selected voltage.
 - Relay 2 operation dependent on TC input. Relay 3 de-energized regardless of TC input.
 - VDC output remains fixed, even if the 24 VAC signal is re-established, until reset.
- Resetting AFS Fault
Perform one of the following:
 - Cycle main power
 - Cycle EST input
 - Energize Relay 1 with TC input

AFS Fault Override: Set SW1-4 to "ON"

^A - Percentages are approximations of what one would expect to achieve.

^B - Adjustable low.

