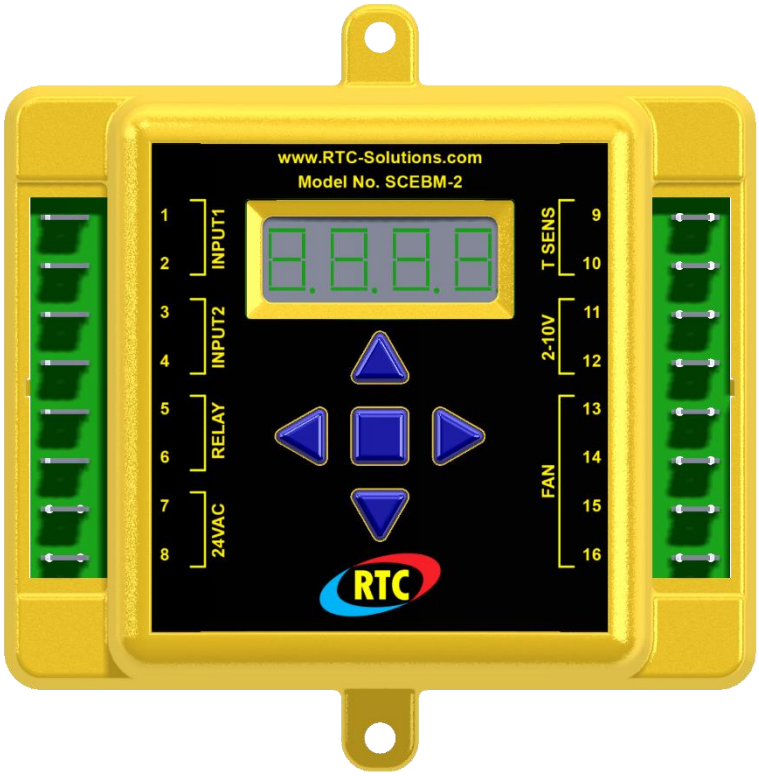
Model No. SCEBM-2

DIGITAL SIGNAL CONDITIONER FOR COMBUSTION AIR BURNERS



This manual covers the following product(s):

SCEBM-2 Signal Conditioner for ECM fan burner control

Table of Contents

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Overview

The Signal Conditioner EBM (SCEBM-2) is a digital signal conditioner for combustion air burners. The control has a simple five button interface with a four digit LED display. All programmable parameters can be accessed through the user menu with the five button interface. The SCEBM-2's temperature sensing operation ranges from 40°F (4°C) to 250°F (121°C). There is one temperature sensor input that connects to provide a discharge temperature, one relay output switch, and one 2-10V DC input. There is a modulating output that will power a 24V DC ECM. User parameters are stored in non-volatile memory and are retained even during a power outage. Also, the SCEBM-2 is powered by 24V AC.

Normal Operation

The SCEBM-2 will always display the current sequence of operation, unless override is enabled or an alarm is active. There are three different application modes that may be set for normal operation. First is VA-A, which is used for hot intermittent piloted burners. Second is VA-B, which is used for burners with an interrupted pilot. Third is NOX, which is used for low nox burners. There is a parameter access menu that may be shown by pressing the RT or LT keys.

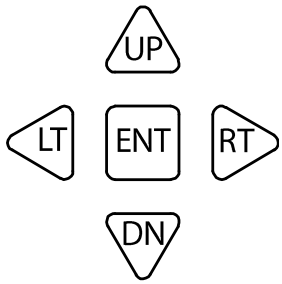

Figure 1: SCEBM-2 Keys

By pressing the UP or DN key the user may change the discharge setpoint temperature. Once the key is pressed, the LED will display the text for the current setpoint temperature. Use the UP or DN key in order to set a new discharge temperature. Then press the ENT key to save the changes made. If a key is not pressed for 10 seconds, the SCEBM-2 will exit without saving. When adjusting the setpoint range, the setpoint cannot surpass the set Low (tLo) and High (thi) values. For instance, if the Low is set to 80°F and High is set to 150°F, the setpoint is adjustable between 80°F to 150°F.

Programming

Please refer to the "SCEBM-2 Menu Map" on Page 5 for programming in program mode. To enter program mode, hold the ENT key down for 3 seconds until "APP" is displayed. Use the UP and DN keys to navigate to the desired menu parameter as shown in column 1 on page 5. To edit a menu parameter, press the RT key once on the desired parameter. The current value of the parameter will be displayed in column 2. Use the UP and DN keys again to edit the parameters for column 2. Press the ENT key to save changes made or the LT key to cancel without saving and return to column 1. If a key is not pressed for 10 seconds or the ENT key is held for 3 seconds while in program mode, the control will return to normal mode.

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Features

Parameter Access Menu (PAM):

To enter the parameter access menu use the RT▶ or LT◀ keys while the control is running in normal operation with the sequence of operation displayed. The following chart shows the parameters within the menu and their value ranges. When accessing the menu with the RT▶ key, then the value of the PWM will be shown first.

PAM		Range
PWM	→	0 -100%
RPM	→	0 -5000
Input Voltage	→	0.00 – 10.0V
Setpoint	→	-40°F to 250°F
Discharge Temperature	→	-40°F to 250°F

Alarms:

Error messages on the SCEBM-2 will be scrolled across the display with a detailed message. This will allow users to realize the issue in order to resolve the error faster. The errors are as follows.

1. "dAS oPEn" – There is no Discharge Temperature Sensor connected to the SCEBM-2.
2. "Fan oFF" – The control is not receiving RPM feedback.

To resolve an issue check the wiring connections. Please refer to "Installation" on page 6 for proper terminal connections.

Password:

When trying to access program mode, if the SCEBM-2 is password protected the display will show "PASS". Otherwise the display will show "APP", which is the start of program mode. If password protected, no menu settings may be altered until the correct password is entered. In order to enter the password press the ENT key while "PASS" is displayed and use the UP▲ and DN▼ keys to set the SCEBM-2 to the factory set password "21". Once on the number 21, press the ENT key again to access program mode. If the wrong password is entered then the SCEBM-2 will return to normal mode.

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Schematic Layout

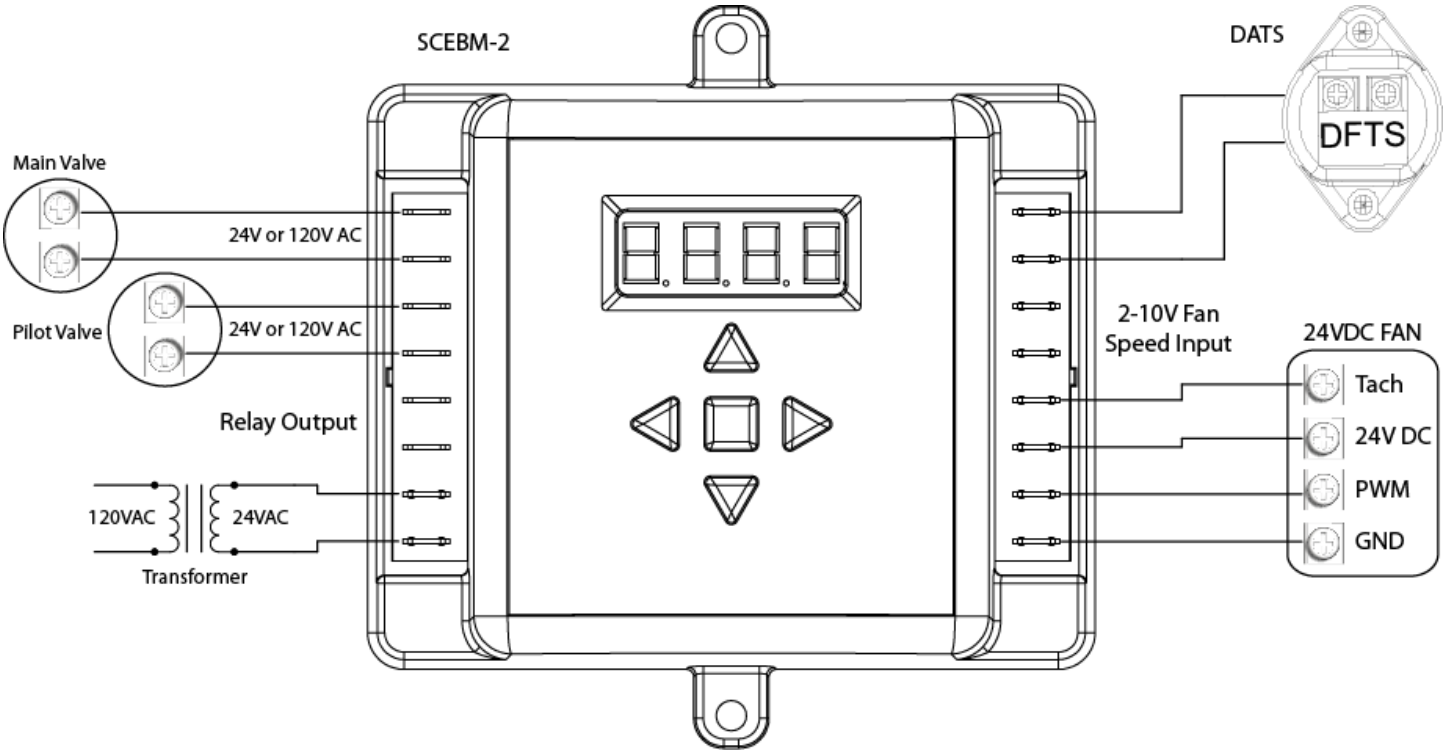

Figure 2: SCEBM-2 Schematic Layout

Sequence of Operations

		Inputs								
Application		**Pilot**	**Main**	**Tach**		**Display**		**Relay**		**PWM Output**
VA-A		-	-	-		PRGE		Open		100%
		X	-	-		PIL		Close		Min
		X	X	-		RUN		Open		Modulate
		-	X	-		ERR		Open		Min

VA-B		-	-	-		PRGE		Open		100%
		X	-	-		PIL		Open		Min
		X	X	-		IGN		Open		Min
		-	X	-		RUN		Open		Modulate

NOX		-	-	>0		PRGE		Close		100%
		X	-	>0		SLOW		Close		Min
		X	X	>0		IGN		Close		Min
		-	X	>0		RUN		Close		Modulate
		Any		=0		AIR		Open		100%

PRGE	Purge fresh air in burner before ignition	IGN	
PIL	Detect power to the pilot valve for flame[TS1]	SLOW	
RUN	Fan speed is modulating	AIR	Error. No airflow, Tach = 0
ERR	Error. Check valve connections		

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Menu Map

SCEBM-2 Menu Map

What you want to do	What you see	What it means

Column 1 Column 2

Control applications for Variable Air or NOX

Set the lowest the user can adjust the temperature to in normal mode for setpoint.

Set the highest the user can adjust the temperature to in normal mode for setpoint.

Set the minimum percentage the user can adjust the Fan to in normal mode

Set the maximum percentage the user can adjust the Fan to in normal mode

Control input modes

Override allows the user to manually control the Fan percentage

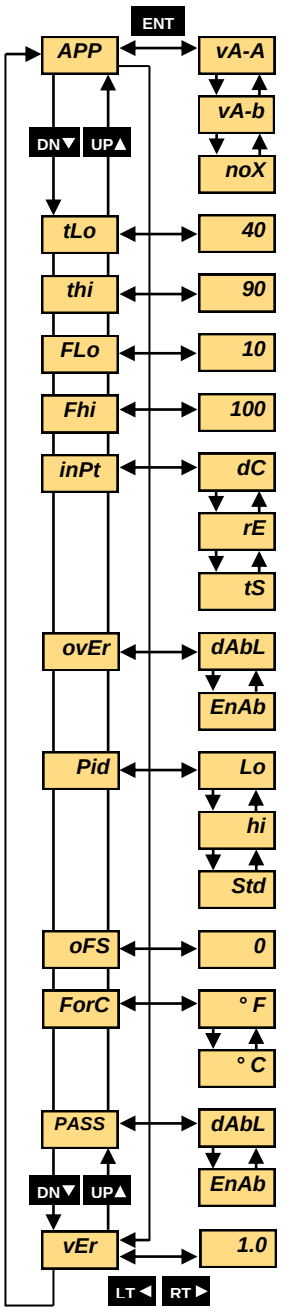
Select the desired aggression/speed of the PID curve for the valve (Standard, Low, or High).

Set a temperature offset. For examples, to correct for duct losses or sensor calibration errors.

Set the control to convert the temperature to display either °F or °C.

The password may either be enabled or disabled.

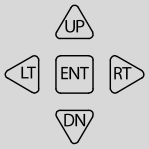
View the software version number.



Column 1 shows the menu parameters

Column 2 shows the factory set defaults for each parameter. Temperature defaults are shown in °F.

Arrow Keys:



Up and Down: to navigate or adjust a menu parameter
Right: to access column 2 for editing a parameter
Left: to return to column 1 without saving a parameter
Enter: to return to column 1 with saving a parameter

Low (tLo) can be set from 40°F - 240 °F and must be at least 10°F less than the High. High (thi) can set be from 50°F - 250°F and must be at least 10°F greater than the Low. These will limit how far the user can change the temperature outside of programming mode.

Setpoint may be adjusted on the main screen with the up and down arrows, then pressing enter to save the selected setpoint.

Applications (APP):
VA-A is the intermittent piloted burners
VA-B is burners with an interrupted pilot
NOX is for low nox burners

Input (inPt) modes:
dC: Allows the user to directly control the fan speed with a 2-10V input
rE: Allows the user to use an external remote 2-10V input
tS: Allows the user to use the built-in onboard setpoint and ignores the 2-10V input

Figure 3: Menu Map

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Installation

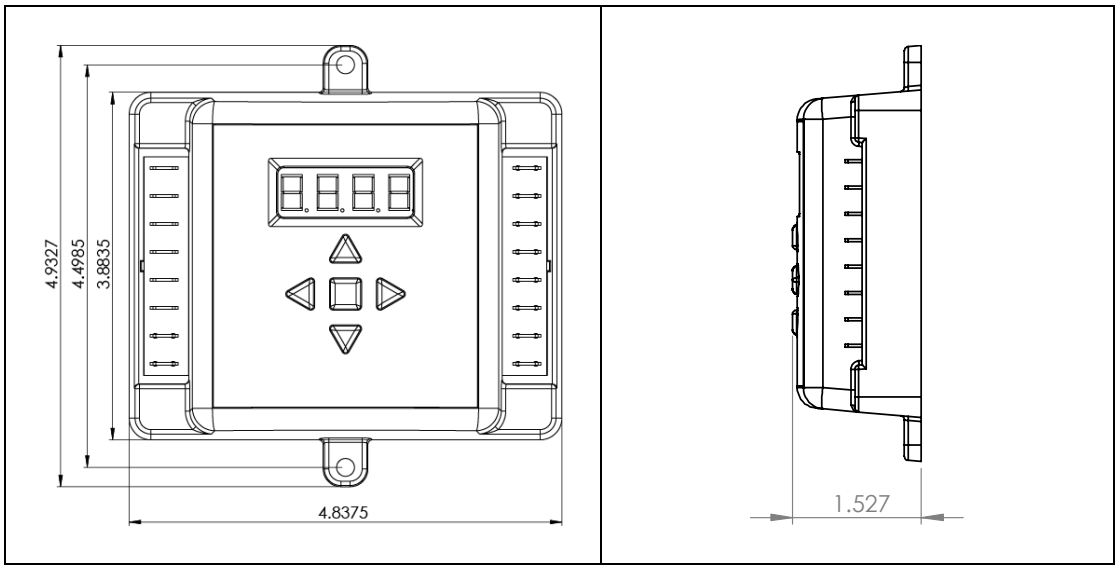
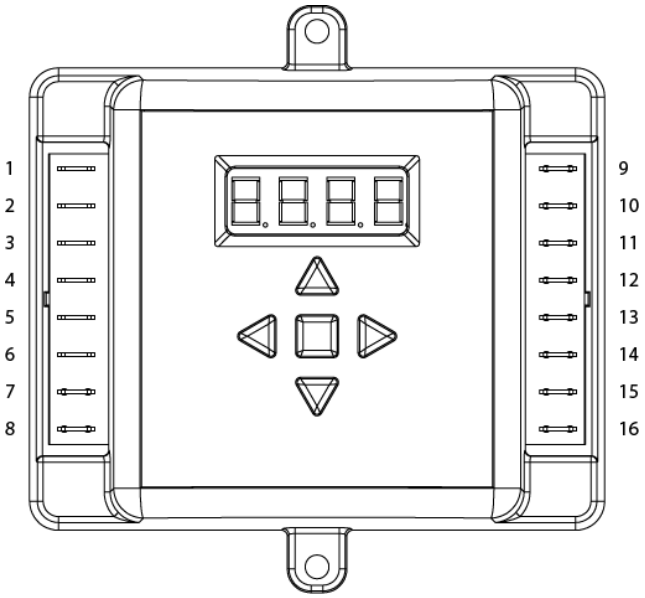


Figure 4: SCEBM-2 Front Panel **Figure 5: SCEBM-2 Side view**

***All dimensions are in inches ***

Wiring for the SCEBM-2 is convenient for the user with easy access to all terminal connections.

1	ACIN 1 "MAIN"
2	ACIN 1 "MAIN"
3	ACIN 2 "PILOT"
4	ACIN 2 "PILOT"
5	RELAY "NO"
6	RELAY "C"
7	24V AC Hot
8	24V AC Neutral



9	DATS
10	DATS
11	0-10V Input
12	0-10V Input
13	Tach
14	24V DC
15	PWM
16	GND

Figure 6: SCEBM-2
Terminal Number Layout

Specifications

Power Requirements	24V AC
Current Rating 24V Output	1A
Ambient Temperature Limits Operating	-40°F-120°F (-40°C-49°C)[TS2]
Accuracy	+/-3°F (1°C)

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