

Welcome –

To a new era in solid fuel heating. You have chosen to improve your household comfort and increase the efficiency of your heating dollars.

The Coal-trol Digital™ system has been specifically developed to improve the performance and convenience of your anthracite coal stove. A new type of digital thermostat and solid-state control module make this possible.

An investment of a small amount of time to review this manual will ensure proper performance of your Coal-Trol Digital™ system.

Introduction

This manual contains operating instructions for the Coal-trol Digital™ Model TS2 Thermostat when used with a model CM2 Control Module. This equipment has been factory supplied by your stove manufacturer.

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Coal-trol Digital Feature Overview

The Coal-trol Digital is a complete control system designed for automatically fed stoker stoves and furnaces utilizing anthracite fuel. The stove-mounted Control Module and the wall-mounted Coal-trol Thermostat work together to supervise all stove operations and typically maintain room temperature to within $\pm 1^{\circ}\text{F}$ of the desired setting.

The Control Module controls the coal feed rate, combustion blower fan, convection blower fan, and fire igniter accessory, when installed.

All connections to stove blowers, motors, and safety interlocks are done through standard 120VAC cord receptacles or plug connectors on some configurations.

The Coal-trol Thermostat may be located up to 100 ft. from the Control Module. Proper temperature control only requires that the heat generated by the stove be readily communicated to the thermostat.

Fuel feed is continuously adjusted to maintain room temperature as set on the Coal-trol thermostat. The convection blower is automatically started and speed adjusted according to amount of fuel fed into the stove.

Two temperature setbacks automatically change the temperature at prescribed times set by the user on a 24 hour time cycle.

A room high temperature limit shuts off the stove if feeder failure occurs.

Manual speed setting of the convection blower is provided for occasions when reduced fan noise is desired.

A fuel feed mode assists in starting a fire by feeding fuel for 10 minutes at a 100% rate.

All settings, except for time of day clock, are maintained during power loss without batteries.

Power loss ride-through allows the thermostat to continue stove operation if power is restored within 2 hours.

Test Mode sequences all motors and blowers to assist in installation and troubleshooting.

The Coal-trol Digital TS2 Thermostat features an LCD display, one LED indicator, and 3 pushbuttons for indication and control of all settings.

User initiated fire start and fire stop controlled from the Thermostat. (Additional hardware required).

Safety Information

Read and pay careful attention before proceeding!

ATTENTION - Please follow all manufacturers instructions that came with your stove or furnace. The Coal-Trol Digital is designed to complement and enhance the safe operation of your appliance. Specifically, the Coal-Trol Digital control system has been designed for use with appliances tested to ANSI Standard Designation: E1509-95, Standard Specification for Room Heaters, Pellet Fuel-Burning Type and/or UL1482, Room Heaters, Solid Fuel Type.

Use of the Coal-trol Digital™ on appliances not permanently marked with one of the above designations voids all warranties and may be unsafe. Contact us or your stove manufacturer if you are not sure that your stove/furnace is built in compliance with these safety standards.

WARNING - The Coal-trol Digital™ is capable of regulating a coal fire smaller than required to maintain proper chimney draft. Follow all manufacturers recommendations for minimum draft pressures and temperature. The use of mechanical means such as a draft inducer fan may be required to ensure proper draft at low fire. Installation of a carbon monoxide detector (not-included) is highly recommended.

Please Keep reading... Additional Safety Information:

THIS PRODUCT HAS A GROUNDING TYPE PLUG AND REQUIRES A GROUNDING TYPE OUTLET. IF THE PLUG DOES NOT FIT, CONTACT A QUALIFIED ELECTRICIAN. DO NOT MODIFY THE PLUG IN ANY WAY.

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT CONNECT TO A CIRCUIT AT MORE THAN 150 VOLTS TO GROUND.

RISK OF ELECTRICAL SHOCK: THE CONTROL MODULE AND THERMOSTAT HAS NO SERVICEABLE PARTS INSIDE. SEE WARRANTY FOR SERVICE.

WARNING: BYPASS OF MECHANICAL VENT SPILLAGE SWITCH (FUME SWITCH) OR BONNET TEMPERATURE LIMIT, IF INSTALLED IS DANGEROUS. OPERATION MAY CAUSE SERIOUS INJURY OR DEATH, DUE TO CO POISONING OR FIRE.

FOR INDOOR USE ONLY.

For Service or Repair

Contact your dealer, or our company.

Phone: (315) 299-3589

Email: coaltrol@automationcorrect.com

Web: www.coaltroidigital.com

Coal-trol Digital™ Limited Warranty

THREE-YEAR WARRANTY - Automation Correct LLC (us) warrants TS2 Thermostat and Control Module to be free from defects in material and workmanship. If a defect is found within three years from the date of original installation of the product (whether or not actual use begins on that date) Automation Correct LLC will provide a new or remanufactured part, at our sole option, to replace any defective part, without charge for the part itself.

This warranty does not include labor or other costs incurred for diagnosing, repairing, removing, installing, shipping, servicing or handling of either defective parts or replacement parts.

Warranty Conditions:

1. Warranties only apply to products in their original installation location.
2. Installation, use, care, and maintenance must be normal and in accordance with the instructions contained in the Operation Manual, Installation Manual and Automation Correct LLC's Service Information.
3. Defective parts must be returned to us or an authorized dealer for credit.
4. All work is performed during normal business hours.
5. This warranty applies only to residential use.

LIMITATIONS OF WARRANTIES - All implied warranties (including implied warranties of merchantability and fitness for a particular purpose) are hereby limited in duration to the period for which the LIMITED WARRANTY is given and applies. Some states do not allow limitations on how long an implied warranty lasts, so the above may not apply to you. The expressed warranties made in this warranty are exclusive and may not be altered, enlarged, or changed by any distributor, dealer, or other person whatsoever.

Automation Correct LLC will not be responsible for:

1. Damage or repairs as a consequence of faulty installation, misapplication, abuse, improper servicing, unauthorized alteration or improper operation.
2. Failure to operate due to voltage conditions, blown fuses, open circuit breakers or other conditions beyond the control of Automation Correct LLC.
3. Parts not supplied or designated by us, or damages resulting from their use.
4. Automation Correct LLC products installed outside the 50 US states or Canada.
5. Cost of heating fuel of any kind whatsoever including electricity.
6. Any special indirect or consequential property or commercial damage of any nature whatsoever. Some states do not allow the exclusion of incidental or consequential damages, so the above limitation may not apply to you.

This warranty gives you specific legal rights, and you also may have other rights, which vary from state to state.

Locating the Thermostat

The room temperature sensor is located in the Thermostat. For proper operation, the sensor must be exposed to the heat produced by the stove. The preferred mounting locations include: An inside wall, away from the direct air stream of the convection blower, and away from radiant heat produced by the stove. The Thermostat does not have to be within the same room as the stove if air readily circulates to the location of the Thermostat.

Connect the Motor Cords to the Control Module

On Coal-trol systems with plug cords, match the color coded power cords with the corresponding plug cords. On other models, identify the appliance motors and plug into the corresponding outlets on the Control Module. NOTE: A qualified HVAC Technician should be used to adapt the appliance to the control module. For more information see our website.

Connect Thermostat to Control Module

Connect the Thermostat cable to the THERMOSTAT connector on the Control Module and the Connector on the rear of the TS2 Thermostat. Push connectors in until you hear it click.

25 ft. Thermostat Cord



The provided 25 ft. cord may be extended up to 100 ft. with an eight pin, RJ45 to RJ45 coupler and/or standard computer network cable. The cable must be a 'through' type, not a crossover type. Note: The Coal-trol thermostat and Power Module cannot be connected to computer networks through this cable.

Power On/Off





Power to the Coal-trol system is controlled by the On/Off switch on the Control Module. When illuminated the control is on. Power to the thermostat is always on when the control module is plugged in and has power.

Operating Controls of the Thermostat

Purpose of the Buttons and Lights



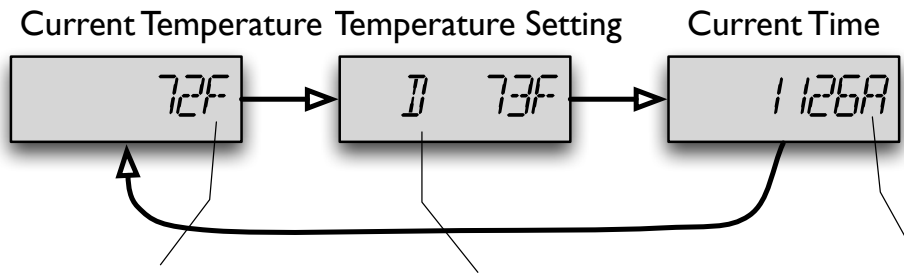
Coal-trol Digital™ Model TS2 Thermostat

	<p>MENU button - Each press will display next OPERATION menu setting. Pressing and holding will enable access to SETUP and EXTENDED menu options.</p>
	<p>DOWN button - Each press will decrease a setting. Press and hold to decrease fast. Also used to enable a selected setting.</p>
	<p>UP button - Each press will increase a setting. Press and hold to increase fast. Also used to enable a selected setting.</p>
	<p>STATUS Light - When On indicates a startup, manual setting, or over temperature condition.</p>

Quick Usage Guide

**"Everything is installed and setup.
Tell me how to work the thing!"**

Round-robin Display



In regular operation the display shows the current temperature, the temperature setting and current time. This is called the Round-robin Display.

- "F" for Fahrenheit
- "C" for Celsius
- "D" for Daytime Temperature setting.
- "N" for Nighttime Temperature setting.
- "O" for Override Temperature setting.
- "A" for AM
- "P" for PM

I want to...

Return to the Round-robin Display: (I might be lost)	Momentarily press the MENU button two or more times until the Round-robin Display is shown.
Change the temperature setting for awhile:	Press the UP button to increase or press the DOWN button to decrease the temperature setting.
Set the time of day clock:	Press and hold the MENU button until the display shows SETUP, then release. Display will show "S1200P" or the current incorrect time. Press the UP/DOWN buttons as needed to set the correct time.
Turn the blower down for awhile:	Press the MENU button once. Display will show "FSA". Press the UP or DOWN buttons to adjust convection blower speed as desired. Setting the speed to "0" will return the blower to automatic.
Start the stove: (I have a Coal-trol Igniter installed.)	Turn on your power vent, if you have one. Press and hold the MENU button until the display shows "FEED". Press the MENU button once. Display will show "IGNITE". Press the UP button.
Stop the stove: (I have a Coal-trol Igniter installed.)	Press and hold the MENU button until the display shows "FEED". Press the MENU button twice. Display will show "BRNOUT". Press the UP button. Do not turn off a power vent until display shows "NOFIRE" and the stove temperature is cool.
Reduce dust when emptying the ash-pan:	Temporarily turn the power off on the Control Module. Empty the ash and then turn the power back on.
Maintain SAFE operation of my solid-fuel appliance:	Are all combustibles a safe distance from the appliance? Got working smoke alarm(s)? Got working carbon monoxide detector(s)? Proper draft? Regular appliance maintenance?

Power-up Sequence

Upon first power to the thermostat, the display will momentarily show the firmware version number, the thermostat type, and a manufacture type. The thermostat will then enter and wait for the time of day clock to be set, with the status light blinking. If the thermostat has been running normally and the power is interrupted, the display will sequence as above, but will skip the clock setting step and proceed directly to control of the appliance.

MENU Button Operation

Overview of the MENU System

The MENU button is used to access all settings of the thermostat. Three areas are accessible depending on the manner that the MENU button is pressed. The MENU may be momentarily pressed, or pressed and held for 2 seconds, or pressed and held for 5 seconds.

Starting from the Round-robin display



OPERATION Menu Access

Momentary press MENU button.

Display changes to:

FSA

Momentary press MENU button

FAN SPEED Control
FEED RATE Indication
DAYTIME Setback
NIGHTTIME Setback
See page 9

SETUP and EXTENDED Menu Access

Press and hold MENU button for 2 seconds.

OR

Press and hold MENU button for 5 seconds.

Display changes to:

SETUP

Momentary press MENU button

SETUP Menu Operations
See page 11

Display changes to:

FEED

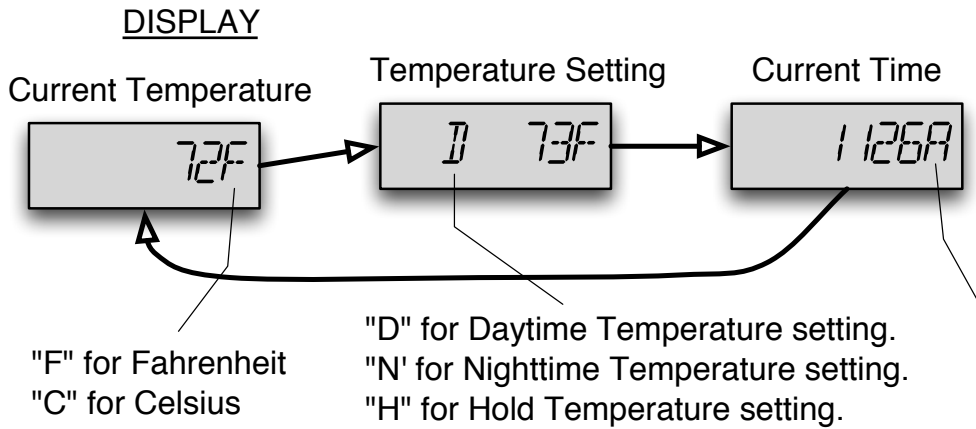
Momentary press MENU button

EXTENDED Menu Operations
See page 13

In the documentation that follows, it is assumed that the Round-robin display is the 'Action' step starting point.

Round Robin Temperature/Time Display

While in regular operation, the thermostat cycles between the Current Temperature, the Temperature Setting, and the Current Time.

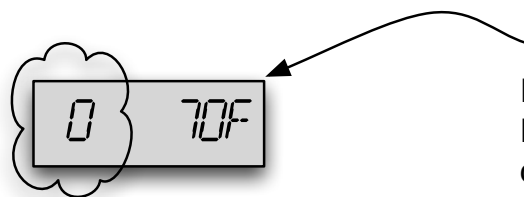


NOTE

The Round-robin display occurs automatically if the Thermostat is left alone for 30 seconds. (No button presses)

For the remainder of the manual, it is presumed that the ACTION starts from the Round-robin Display.

Override Temperature Setting (Temporarily)



ACTION

Press UP or DOWN button. Display shows "O" and current temperature setting.

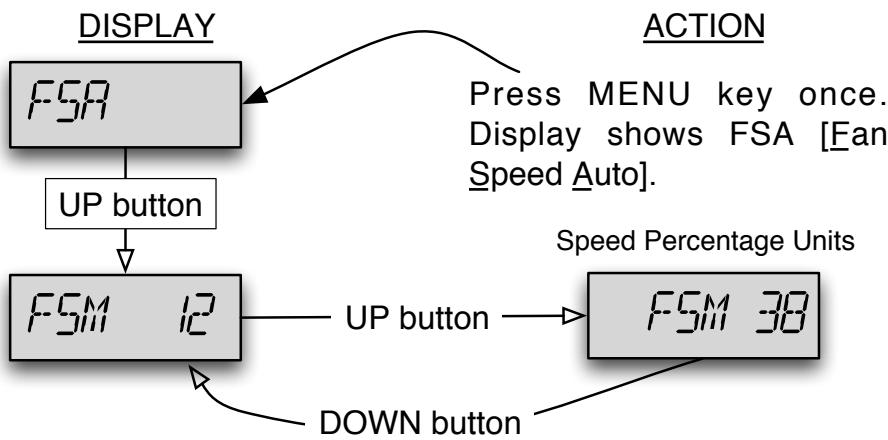
NOTE

The new temperature setting remains in effect until the time for the next programmed daytime or nighttime setback setting.

It can take an hour or more for the room temperature to move from one setting to another.

Fan Speed Control

Automatic or Manual control of the room air blower.



NOTE

Sometimes you may want to reduce or eliminate the sound of the Convection Blower. Fan Speed Control allows you to manually set the fan speed.

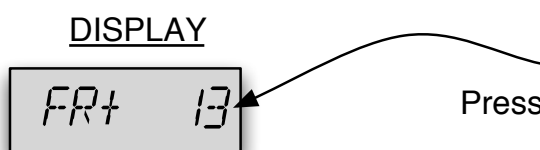
If FR [Firing Rate] is greater than 60% then the Fan Speed will automatically revert to Fan Speed Auto in 1 hour.

Setting FSM=0 returns the thermostat to automatic fan speed control (FSA).

The thermostat indicates manual fan control by adding "MANFAN" to the Round-robin Display and blinking the STATUS light periodically.

Firing Rate Indicator

How much fuel is being fed?



ACTION

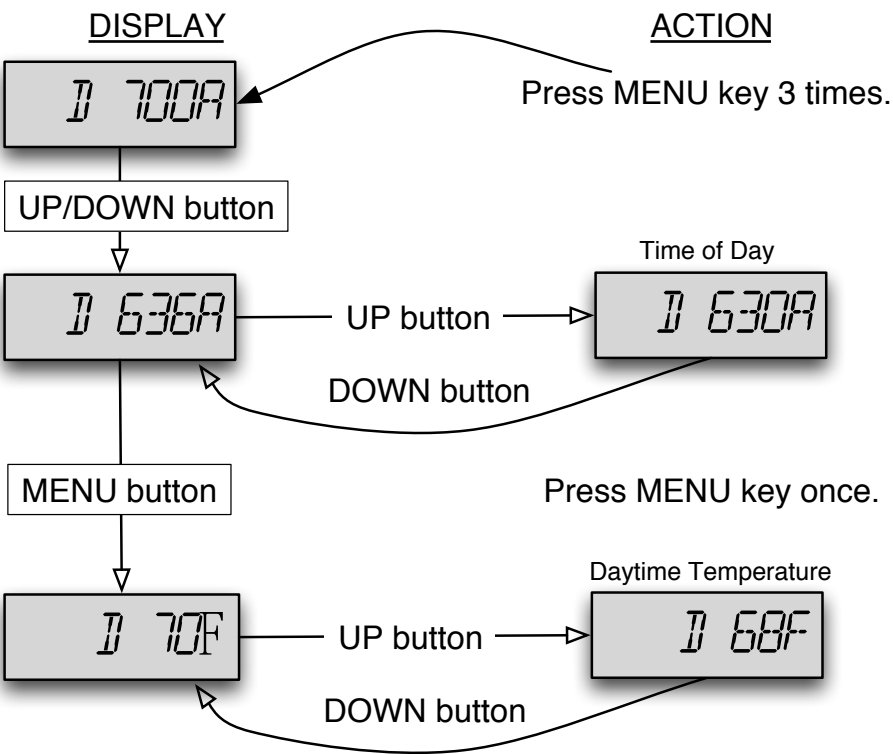
Press MENU key 2 times.

NOTE

Displays the fuel feed rate in percent. (0-99%).

If the display shows a plus sign (+), this indicates that the stoker motor is currently feeding fuel.

Day Temperature Setting (Daytime Setback)



NOTE
First set the time of day for the temperature setback. This is the time when the Daytime Temperature setting will occur.

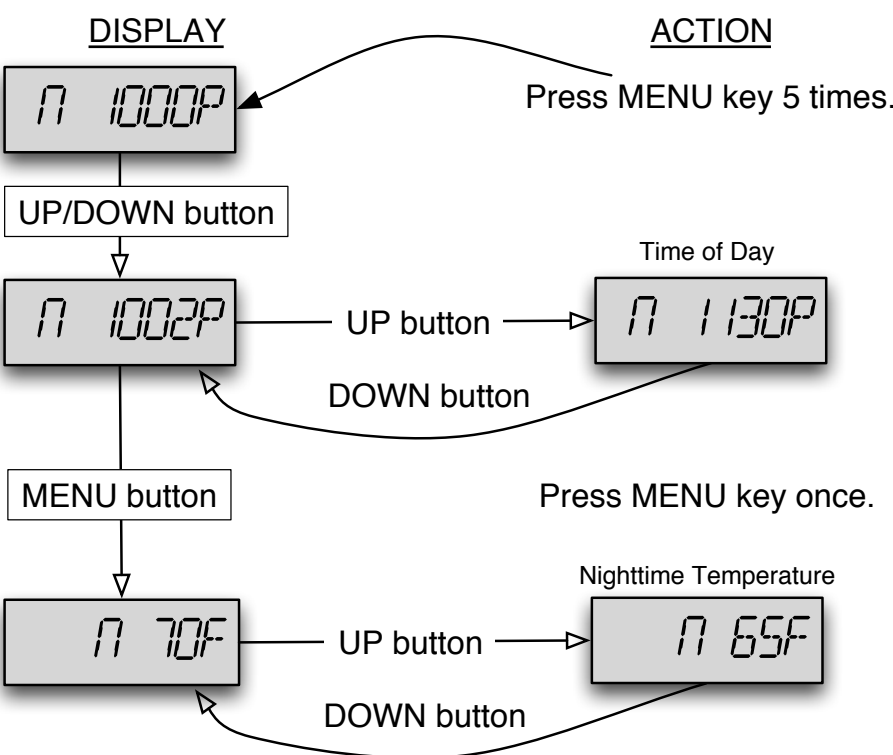
Press UP/DOWN buttons to set the time of day. Press and hold UP/DOWN to increase/decrease setting rapidly. When finished press MENU button.

Now set the setback temperature.

In this example, at 6:30 AM the thermostat will set the temperature to 68°F.

It can take an hour or more for the room temperature to move from one setting to another.

Night Temperature Setting (Nighttime Setback)



NOTE
First set the time of day for the temperature setback. This is the time when the Nighttime Temperature setting will occur.

Press UP/DOWN buttons to set the time of day. Press and hold UP/DOWN to increase/decrease setting rapidly. When finished press MENU button.

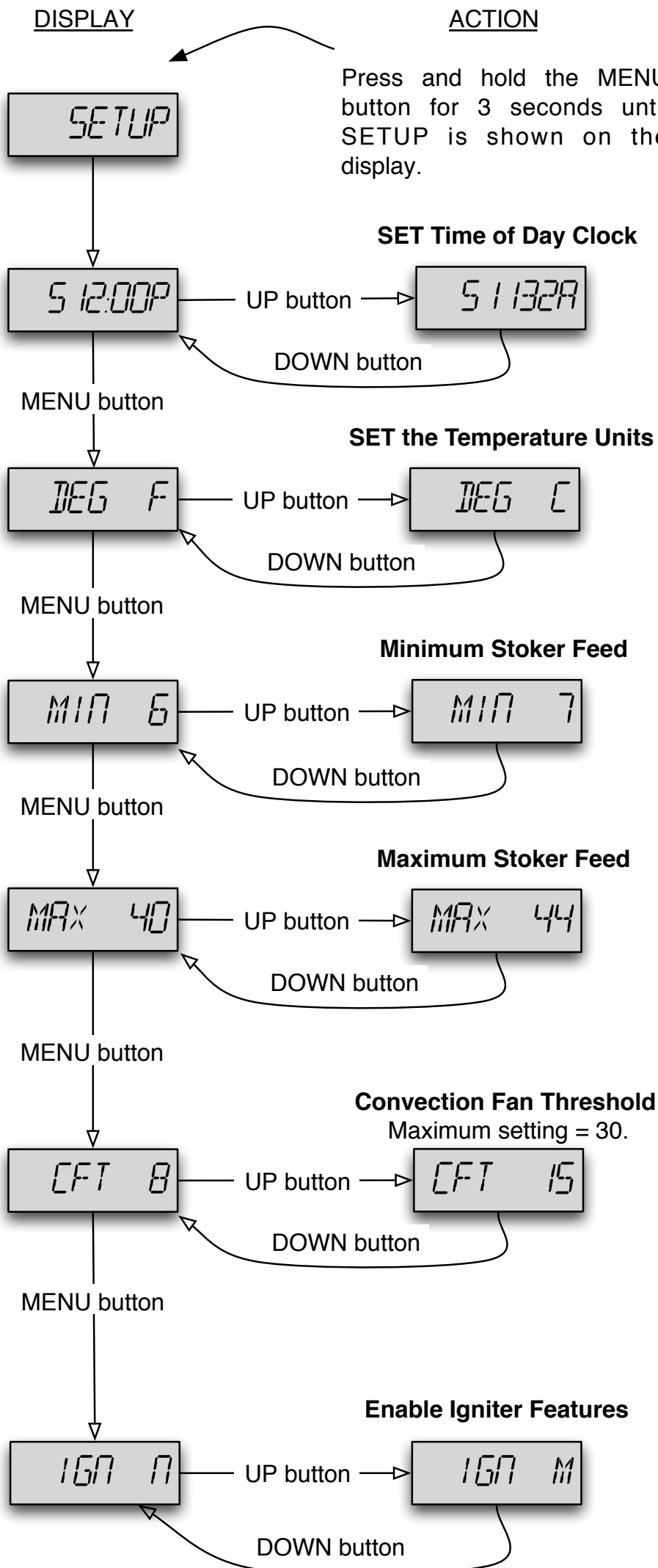
Now set the setback temperature.

In this example, at 11:30 PM the thermostat will set the temperature to 65°F.

It can take an hour or more for the room temperature to move from one setting to another.

SETUP Menu Operation

The SETUP menu is for initial setup. Once done, these settings need not be adjusted. Except for the time of day clock, the settings are maintained in the thermostat.



MIN/MAX Adjustment

The Coal-trol Thermostat uses the values set by MIN and MAX as limits to determine the minimum and maximum fire size allowed on the grate. The factory settings for your stove should be the starting point for any adjustment. The need for large adjustment from the factory default settings may indicate mechanical problems with the stove that will not be solved by MIN/MAX adjustment.

While displaying MIN or MAX, the Coal-trol Digital runs the stoker at the MIN or MAX value and NOT according to desired room temperature. When finished making a MIN or MAX adjustment, press the MENU button to return to the Round-robin display which resumes normal thermostatic control.

To adjust the Minimum feed rate go to MIN and observe the fire. Allow the fire to "settle into" its minimum firing rate. Adjust MIN to the desired fire size. Allow enough time between adjustments for fire to settle in to a new value. MIN values typically range between 2 and 12, If MIN is set too low, the fire can go out.

To adjust the Maximum feed rate go to MAX and observe the fire. Allow the fire to "settle into" its maximum firing rate. Adjust MAX to the desired fire size. Allow enough time between adjustments for fire to settle in to a new value. MAX values typically range between 17 and 85. If MAX is set too high partially burned coal may be driven off the grate into the ash-pan. Coal should be completely burned about 1 to 2 inches from the end of the grate.

WARNING - The Coal-trol Digital™ is capable of regulating a coal fire smaller than required to maintain proper chimney draft. Follow all manufacturers recommendations for minimum draft pressures and temperature. The use of mechanical means such as a draft inducer fan may be required to ensure proper draft at low fire. Installation of a carbon monoxide detector (not-included) is highly recommended.

SETUP Menu Settings and Mechanical Adjustment

This table contains the TS2 thermostat settings as shipped from the factory and typical settings for various stove models. The "MECHANICAL" setting is adjustment needed for your stove mechanism.

Setting	Display	Factory Value	Keystoker 90/105/ Koker	Reading (Tri-burner)	Reading (separate combustion blower)	Alaska (paddle)	Harman (Magnum)
Clock	S	12:00P	adjust	adjust	adjust	adjust	adjust
Temperature Units	DEG	F	F	F	F	F	F
Minimum Feed Rate	MIN	6	10	50	3	4	6
Maximum Feed Rate	MAX	40	85	99	24	30	99
Convection Fan Threshold	CFT	8	8	8	8	8	8
Igniter Features Enable	IGN	N	N	N	N	N	N
Mechanical			Set Feeder Screw full clockwise	Set red nut to 5/8" from acorn nut.	Set red nut to tight against acorn nut, then back off 2 turns.		Set adjustment handle to 11/16" from acorn nut

Extended Menu Operations

DISPLAY

ACTION

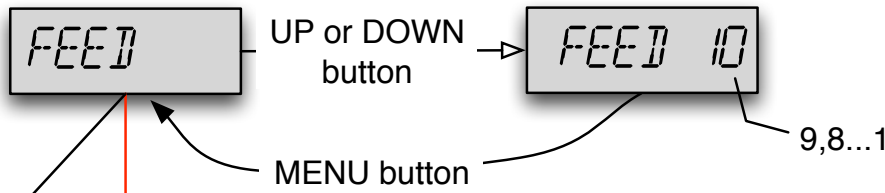
NOTE

Press and hold MENU button for 5 seconds.

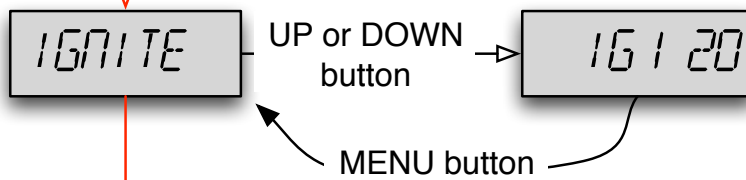
Use FEED when manually kindling a fire to help fill and even-out the grate.

The display counts down from 10, once a minute until complete.

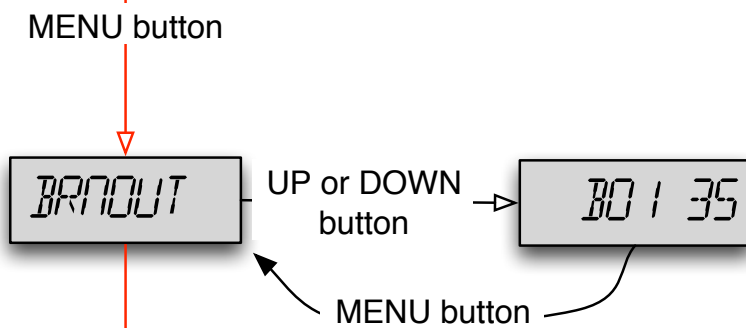
When complete, the thermostat will revert to the Round-robin display.



IF IGNITER INSTALLED and (IGN = M)

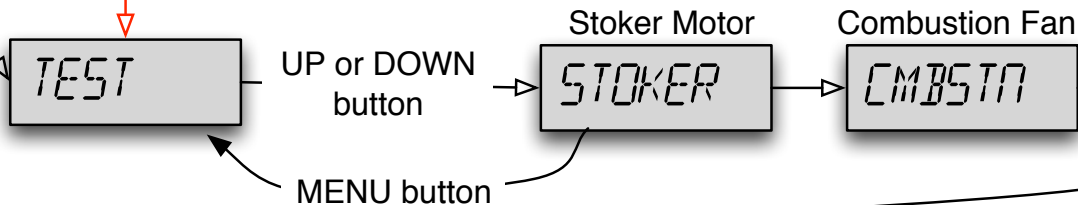


The IGNITE sequence will operate the stove to start the fire. If necessary, the fuel is primed onto the grate before igniting. Before starting the stove make sure draft controls are operating.



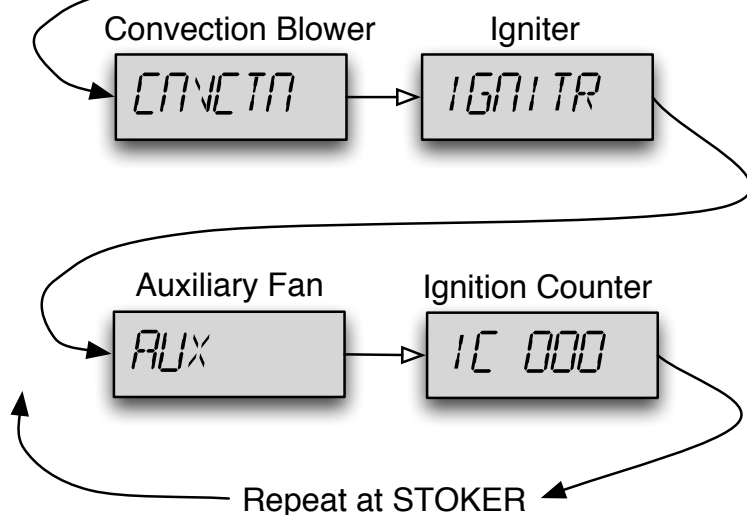
The Burnout (BRNOUT) sequence will stop the fuel feed and after a time, the combustion blower. It will then prime fresh fuel onto the grate and will turn off all the stove motors, except the Convection fan, if it is being manually operated. Mechanical vent motors will only be turned off if they are controlled by the Coal-Trol.

When finished, "NOFIRE" is added to the Round-robin display.



NOTE

In turn, each control item is turned on for 5 seconds until MENU button is pressed. This can be a good way to determine if the controls are connected correctly and to determine if they are working.



Repeat at STOKER

Room Over-Temperature Cutout

DISPLAY

ACTION

NOTE



The STATUS indicator light blinks every second.

CAUTION: Before proceeding, investigate the cause of the over-temperature condition.

Press the MENU button to Reset.

The temperature sensor in the thermostat has detected a room temperature above 97°F/36°C and has disabled all the controlled motors.

The HI TEMP display may indicate a problem with your stove, chimney, or Coal-trol Digital System.

The thermostat will not allow the MENU button to reset the thermostat until the room temperature is less than 96°F/35.5°C

Maintenance and Troubleshooting

The Coal-trol Digital System is only the command and control piece of a properly operating stove. If the Control Module power light is ON, and the Thermostat is displaying normally, the easiest way to determine the source of an electrical or mechanical problem is to go to TEST mode and observe for proper operation of the controlled item.

Problem	Possible Cause(s)	Possible Solution(s)
Power Light on Control Module is not ON	1) No power to Control Module. 2) Fuse blown in Control Module.	Check power. Turn Power switch ON. Replace fuse. Bad Motor or bad wiring. Bad Control Module.
Thermostat has no display.	1) No power to Control Module. 2) Cable not snapped in. 3) Bad cable.	Check power. Snap in both ends of cable. Replace cable. Bad Thermostat. Bad Control Module.
Fire goes out now, but was working before.	1) Stoker mechanism jamming or dragging. 2) Hopper clogged or empty. 3) Stoker motor defective. 4) Combustion blower defective.	Go to TEST mode and verify that the Stoker motor and Combustion blower are working. Troubleshoot mechanicals. Verify fuel quality and sizing. Bad control cable. Bad Thermostat Bad Control Module.
Hot coals falling off of grate.	1) MAX set too high. 2) Control problem.	1) Go to TEST mode and verify that the Stoker motor and Combustion blower are working properly. If not, replace Control Module. 2) Perform MAX/MIN adjustment.

Coal-trol Digital Specifications

Note: Automation Correct LLC is constantly working to improve our products. For this reason, all specifications are subject to change without notice. Not all versions include all control options.

Control Module (CM2-X/PB1/CM1): FOR INDOOR USE ONLY

Electrical: Design Specification: UL-873

Input Power	120VAC 60Hz, 1200W
Fuse	10A 125V Fast, (IR10kA/125V), BK/GMA-10A or Equivalent.
Output Power	
Stoker	1A Continuous, 2A MAX
Convection Blower	4 A Continuous, 8A MAX
Igniter	3A Continuous, 8A MAX
Combustion Blower	1.5A Continuous, 2A MAX
Power Vent	4 A Continuous, 8A MAX

**All motors loads must be shaded-pole or PSC type.
Combined Output Power - 1200W MAX**

Mechanical:	
Dimensions	PB1/CM1: 6 1/2"L x 9"W x 2 1/2"H 16.5 cm L x 22.9 cm W x 6.35 cm H CM2: 6 1/4" L x 5 1/8"W x 2 1/8" K 15.7 cm L x 10.3 cm x 5.2 cm
Construction	16 GA galvanized steel
Environmental:	
Operating Temperature	113°F/45°C MAX
Storage Temperature	40°F to 120°F
Weight	PB1/CM1: Approx. 3.5lbs/1.59Kg

Thermostat (TS2): FOR INDOOR USE ONLY

Temperature:	
Displayed Precision	1°F/1°C
Accuracy	±2°F/±1.8°C @ 68°F/20°C
Electrical:	
Input Power	8VAC, 2.5VA CLASS 2
Connection to Power Module	RJ45 - 8PIN, 100 ft. Maximum (Standard Ethernet Straight Cable)
Mechanical:	
Dimensions	5.367" L x 2 5/8"W x 1.260 "H (13.63 cm L x 6.68 cm W x 3.2 cm) (With mounting bracket)
Construction	ABS Plastic, UL94V-0
Environmental:	
Operating Temperature	97°F/35°C (Limited by software)
Storage Temperature	40°F to 120°F
Weight	Less than 1 lb./0.45Kg

Igniter Power Supply FOR INDOOR USE ONLY

Electrical: Design Specification: UL-873

Input Power (Thermally Protected)	120VAC 60Hz, 240W
Fuse	3A 125V Fast, (IR10kA/125V), BK/GMA-3A or Equivalent.
Output Power	6VAC

Designed for use with the Coal-trol Digital System and igniter elements only.



**AUTOMATION
CORRECT LLC**
Syracuse • NY

www.automationcorrect.com

Automation Correct LLC designs and manufactures technology products for home and industry. Combining over 75 years of practical experience, the Engineers and Technicians of Automation Correct LLC are dedicated to supporting our customers with innovative products.

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