WHITE-RODGERS

50M58-956

York, ECMx, 2-Stage, IFC
120V Hot Surface Ignition Control Kit

INSTALLATION INSTRUCTIONS

FAILURE TO READ AND FOLLOW ALL INSTRUCTIONS CAREFULLY BEFORE INSTALLING OR OPERATING THIS CONTROL COULD CAUSE PERSONAL INJURY AND/OR PROPERTY DAMAGE.

PARTS INCLUDED

- 50M58-956 Integrated Furnace Control
- Installation Instructions

DESCRIPTION

50M58-956 is an aftermarket direct replacement control kit for York two stage furnace products with ECMx blower motors.

Simple push-button fault recall and tri-color LED displays status and fault codes for easy troubleshooting.

SPECIFICATIONS

ELECTRICAL RATINGS:

Input Low Voltage: 25 VAC, 60 Hz

Input Line Voltage: 120 VAC, 60 Hz, 1φ

Max Input Current: 0.8 A @ 24 VAC

Relay Contact Ratings:

1st Stage Gas Valve: 1.5 A @ 24 VAC
2nd Stage Gas Valve: 0.5 A @ 24 VAC
Ignitor Relay: 2.0 A @ 132 VAC
Inducer Relay: 2.2 FLA – 3.5 FLA @ 120 VAC
Circulator Relay: 12 mA RMS @ 24 VAC
Humidifier Load: 1.0 A @ 120 VAC
Electronic Air Cleaner: 1.0 A @ 120 VAC

Flame Current Requirements:

Minimum current to ensure flame detection: 0.3 µA DC*
Maximum current for non-detection: 0.1 µA DC
Maximum allowable leakage resistance: 100 M ohms
* Measured with a DC ammeter
Flame Establishing Time: 0.8 seconds maximum
Flame Failure Response Time: 2.0 seconds maximum

OPERATING TEMPERATURE RANGE:

-40° to 176°F (-40° to 80°C)

HUMIDITY RANGE:

5 to 93% relative humidity (non-condensing)

AGENCY APPROVALS: UL USA / Canada

GASES APPROVED:

Natural, Manufactured, Mixed, Liquid Petroleum, and LP Gas Air Mixtures.

⚠ WARNING

Failure to comply with the following warnings could result in personal injury or property damage.

FIRE HAZARD

- **Do not exceed the specified voltage.**
- **Protect the control from direct contact with water (dripping, spraying, rain, etc.)**
- **If the control has been in direct contact with water, replace the control.**
- **Label all wired before disconnection when servicing controls. Wiring error can cause improper and dangerous operation.**
- **Route and secure wiring away from flame.**

SHOCK HAZARD

- **Disconnect electric power before servicing.**
- **Ensure proper earth grounding of appliance.**
- **Ensure proper connection of line neutral and line hot wires.**

EXPLOSION HAZARD

- **Shut off main gas to appliance until installation is complete.**

IMPORTANT NOTE: ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

Before removing the new control board from the static wrap, it is very important to discharge any static electricity. This can be accomplished in two methods. Servicer can wear a ground strap or by touching the metal chassis before replacing the board.

TIMINGS

50M58-956 TIMING TABLE
(All times are in seconds, unless noted otherwise)

Event	Definition	Time
Pre-purge Time	The period of time intended to allow for the dissipation of any unburned gas or residual products of combustion at the beginning of a furnace operating cycle prior to initiating ignition	15
Igniter Warm-up Time	The length of time allowed for the igniter to heat up prior to the initiation of gas flow.	17
Trial for Ignition Period (TFI)	The period of time between initiation of gas flow and the action to shut off the gas flow in the event of failure to establish proof of the supervised ignition source or the supervised main burner flame.	4
Ignition Activation Period (IAP)	The period of time between energizing the main gas valve and deactivation of the ignition means prior to the end of TFI	3
Retries	The additional attempts within the same thermostat cycle for ignition when the supervised main burner flame is not proven within the first trial for ignition period.	2 times
Recycles	The additional attempts within the same thermostat cycle for ignition when the supervised main burner flame is proven and then lost.	3 times
Inter-purge	The period of time intended to allow for the dissipation of any unburned gas or residual products of combustion between the failed trial for ignition and the retry period.	30
Post-purge Time	The period of time intended to allow for the dissipation of any unburned gas or residual products of combustion at the end of a furnace burner operating cycle. Post-purge begins at the loss of flame sense.	15
Lock-Out Time	ANSI standard rated module timing.	300
Heat Delay-To-Fan-On	The period of time between proof of the supervised main burner flame and the activation of the blower motor at Heat speed.	30
Heat Delay-To-Fan-Off*	The period of time between the loss of a call for heat and the deactivation of the blower motor at Heat speed.	60/90/120/180
Cool Delay-To-Fan-On	The period of time after a thermostat demand for cool before energizing the circulator blower motor at Cool speed.	0
Cool Delay-To-Fan-Off	The period of time between the loss of a call for cool and the deactivation of the blower motor at Cool speed.	60
Automatic Reset Time	After one (1) hour of internal or external lockout, the control will automatically reset itself and go into an auto restart purge for 60 seconds.	60 minutes

*These times will vary depending on option switch position.

INSTALLATION

NOTE: All wiring should be installed according to local and national electrical codes and ordinances.

1. Disconnect electrical power and shut off gas supply to unit, then remove unit access panels.
2. Mark and disconnect all wires from the existing control
3. Remove existing board from the mounting plate and install the replacement control board

   Caution: Apply only enough pressure to seat the mounting foot or the control board may be damaged
4. Transfer wires and connectors to replacement control board
5. Check / Set DIP switches to desired positions
6. Check to see that all wire connections were made properly
7. Ensure all wires are secure to the control board and unused blower speed wires are attached to the SPARE terminals
8. Verify Constant Fan Speed, Blower OFF Delay, and High/Low Fire Staging settings
9. Reinstall unit access panels and reconnect electric power. Restore gas supply to the unit.
10. Verify unit operation in heating, cooling, and fan only mode.

NOTICE: Upon start up, if there is an immediate 9 red flashes, reverse the two 24V secondary leads at the control transformer

CONFIGURATION

W2 DELAY		
DIP SW S1-1	DIP SW S1-2	NOMINAL (MINUTES)
OFF	OFF	OFF
ON	OFF	10
*OFF	ON	AUTO
ON	ON	20

HEAT OFF DELAY		
DIP SW S1-3	DIP SW S1-4	NOMINAL (SECONDS)
*OFF	OFF	60
ON	OFF	90
OFF	ON	120
ON	ON	180

CONT SPEED		
DIP SW S3-1	DIP SW S3-2	NOMINAL SPEED
*OFF	OFF	LO HEAT
ON	OFF	HI HEAT
OFF	ON	LO COOL
ON	ON	HI COOL

*FACTORY DEFAULT SETTING

OPERATION

HEAT MODE

In a typical system, a call for first stage heat is initiated by closing the W1 thermostat contacts. The inducer blower is energized at high speed and the control waits for the low pressure switch contacts to close. The humidifier (optional) is also energized at this time. Once the low pressure switch contacts close, a pre-purge is initiated. Then the inducer changes to low speed and the 120V ignitor is powered.

At the end of the ignitor warm-up time, the first stage of the two stage manifold gas valve is energized (low fire). Once flame is detected, the HEAT delay-to-fan-on period begins. After the delay-to-fan-on period ends, the 50M58-956 control will energize the circulator fan at low heat speed. The electronic air cleaner (optional) will also energize at this time.

For a two-stage thermostat, a call for **second stage** heat (W/W1 and W2) after a call for first stage heat will energize the inducer at high speed and the circulator at high heat speed. The second stage pressure switch contacts will close and energize the second stage gas valve (high fire).

For a single-stage thermostat, when a call for heat occurs (W/W1), a 10, 20 minute or auto mode heat staging timer will be activated (timing is selectable with option switches S1-1 and S1-2 positions). Following this delay, the second stage heat is energized as above. The AUTO model algorithm is a method of energizing the second stage gas valve based on the recent average of the heating duty cycle. During a typical heating day, the low to high stage delay is determined by using the average calculated duty cycle from the table below.

Average Calculated Duty Cycle %		Low to High Stage Delay	Demand
Equals	or less than		
0	38	12 minutes	Light
38	50	10 minutes	Light to Average
50	62	7 minutes	Average
62	75	5 minutes	Average to Heavy
75	88	3 minutes	Heavy Light
88	100	1 minute	Heavy

OPERATION

Once the specified delay time has expired the second stage valve will be energized.

When the second stage of the thermostat is satisfied, the inducer motor is reduced to low speed and the second stage gas valve is de-energized.

OPERATION

On the 50M58-956 control, the circulator will remain at high heat speed for 30 seconds following the opening of the second stage gas valve and then is reduced to low heat speed.

When the first stage of the thermostat is satisfied, the first stage gas valve is de-energized and the HEAT delay-to-fan-off begins timing. The inducer will postpurge for an additional 15 seconds, then the inducer and humidifier will turn off. Upon completion of the HEAT delay-to-fan-off period, the 50M58-956 circulator is turned off. The electronic air cleaner on the control is also de-energized at this time.

If flame is not detected during the trial-for-ignition period or if the flame is detected/sensed and then lost before completion of 10 seconds of establishment, the gas valve is de-energized, the ignitor is turned off, and the control goes into the “retry” sequence.

The “retry” sequence provides a 30-second wait with the inducer interpurge following an unsuccessful ignition attempt (flame not detected). After this wait, the ignition attempt is restarted. Two retries will be attempted before the control goes into system lockout.

If flame is established for more than 10 seconds after ignition, the 50M58-956 controller will clear the ignition attempt (or retry) counter. If flame is lost after 10 seconds, the control will restart the ignition sequence.

A momentary loss of gas supply, flame blowout, or a shorted or open condition in the flame probe circuit will be sensed within 2.0 seconds. The gas valve will de-energize and the control will restart the ignition sequence. Recycles will begin and the burner will operate normally if the gas supply returns, or the fault condition is corrected, before the last ignition attempt. Otherwise, the control will go into system lockout.

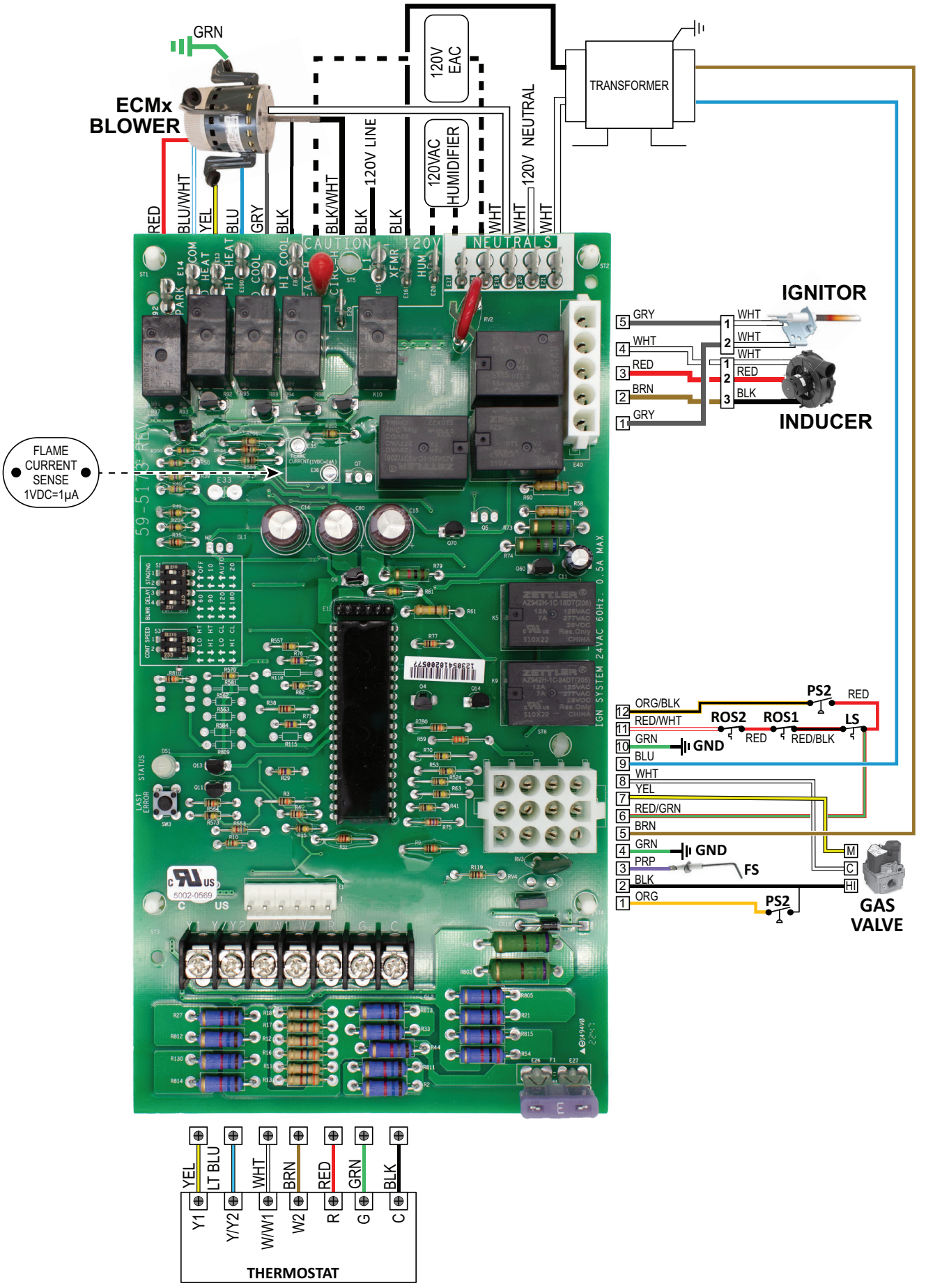
If the control has gone into system lockout, it may be possible to reset the control by a momentary power interruption of 10 seconds or longer. Refer to SYSTEM LOCKOUT AND DIAGNOSTIC FEATURES.

COOL MODE

In a typical system, a call for cool is initiated by closing the thermostat contacts Y1 or Y/Y2 and G. Once the control receives a call for cool, the indoor circulator is activated. After the thermostat is satisfied, the compressor is de-energized and the control starts a 60 second circulator off delay. After the cool off delay period expired the indoor circulator is de-energized.

MANUAL FAN ON MODE

If the thermostat fan switch is moved to the ON position, the circulator fan (determined by dipswitch S3-1 and S3-2) and the electronic air cleaner (optional) are energized. When the fan switch is returned to the AUTO position, the circulator and electronic air cleaner are de-energized.


GRN
ECMx BLOWER
RED
BLU/WHT
YEL
BLU
GRY
BLK
BLK/WHT
BLK
120V LINE
BLK
120VAC HUMIDIFIER
WHT
120V NEUTRAL
WHT
WHT
120V EAC
TRANSFORMER
CAUTION 120V
NEUTRALS
IGNITOR
INDUCER
5 GRY
4 WHT
3 RED
2 BRN
1 GRY
WHT
WHT
WHT
RED
BLK
FLAME CURRENT SENSE 1VDC=1µA
IGN SYSTEM 24VAC 60Hz. 0.5A MAX
PS2
RED
12 ORG/BLK
11 RED/WHT
ROS2
ROS1
LS
10 GRN
GND
RED
RED/BLK
9 BLU
8 WHT
7 YEL
6 RED/GRN
5 BRN
4 GRN
GND
3 PRP
FS
2 BLK
1 ORG
PS2
M
C
HI
GAS VALVE
YEL
LT BLU
WHT
BRN
RED
GRN
BLK
Y1
Y/Y2
W/W1
W2
R
G
C
THERMOSTAT

TROUBLESHOOTING

Green LED Flash	Amber LED Flash	Red LED Flash	Error/Condition
		1	Flame sensed with gas valve off
		2	Pressure switch closed with inducer off
		3	1st-stage pressure switch open with inducer on
		4	Limit/Rollout switch open
		5	Limit/Rollout switch open more than 15 minutes
		6	Pressure switch cycle lockout
		7	Lockout due to failed ignition
		8	Lockout due to too many flame dropouts
		9	Incorrect line voltage polarity
		10	Gas valve fault code
		11	Limit/Rollout switch open from 5 to 15 minutes
		13	2nd stage pressure switch open with high inducer on
		Solid	Control failure
	1		Call for heat active
	4		Y thermostat demand without a G
	Rapid		Low flame current
Rapid			Control in test mode
1			Standby mode

Fault Recall

When the control is in standby mode, press and hold the "FAULT RECALL" button (approximately 3-5 seconds) until the solid green LED turns off, then release the button. The control will sequentially flash, on the STATUS LED, the series of stored error codes (up to the last 5 since active error codes were last cleared) starting with the most recent. There will be a 2 second delay between error codes. The series may be repeated by pressing LAST ERROR push button again. If there are no error codes stored in memory, the STATUS LED shall give a 2 Green Flash code.

NOTE: Any new call for heat, cool or fan while displaying the stored fault codes, the control will cancel the fault recall and follow the thermostat command.

Fault Code Reset

When the control is in standby mode, press and hold the "FAULT RECALL" button until the diagnostic LED begins to rapid flash (approximately 7-10 seconds) then release the button. The control shall flash the green STATUS LED 3 times to indicate that the error memory has been cleared. Faults will automatically be cleared from memory after 14 days.

NOTE: If the switch is held pressed for over 10 seconds, faults will not be cleared, rapid flash will stop, and the LED will be solid green to indicate return to standby.

Control Reset

Control reset is automatic after 1 hour in lockout. Removing 24 VAC power to the control for greater than 20 seconds will manually reset the control.

Flame Current Test

Set multimeter to DC volts and place leads on the flame current sense pads. Read the voltage directly as microamps (1 VDC = 1µA) with the burners on.
Reading results: 0.5 – 1.0 = marginal,
1.0 – 5.0 = good.

NOTES

NOTES

TECHNICAL SUPPORT: 1-888-725-9797

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COPELAND