

WHITE-RODGERS

21V51D-751

Two-Stage Integrated Furnace Control for PSC,
Variable Speed, and ECMx Blower Motors

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

The kit contains:

- 50V51-751 Integrated Furnace Control with Mounting Tray
- 3 Harness Assemblies
- Control Label
- 8 Wire Nuts
- Installation Instructions

DESCRIPTION

The 21V51D-751 is a Two-Stage HSI Integrated Furnace Control kit for many Carrier and ICP equipment brands with PSC, Variable Speed, and ECMx Blowers configured via dipswitch selection.

TWINNING: 21V51D-751 CANNOT be twinned with any Carrier, ICP, or ICM brand controls. Both control boards must be from the same manufacturer for proper functionality.

SPECIFICATIONS

ELECTRICAL RATINGS:

Input Voltage: 18 to 30 VAC, 60 Hz

Current: 0.8 amp @ 25 VAC

Relay Contact Ratings:

Gas Valve 1st Stage: 1.5 A 0.6 PF @ 30 VAC

Gas Valve 2nd Stage: 0.5 A @ 30 VAC

Ignitor Relay: 2.0 A @ 120 VAC

Inducer Relay: 2.2 A FLA @ 120 VAC

Inducer Relay: 3.5 A LRA @ 120 VAC

PSC Circulator Relay: 14.5 A FLA @ 120 VAC

PSC Circulator Relay: 25 A LRA @ 120 VAC

ECMx Circulator Relay: 4.0 mA RMS @ 18 VAC

ECMx Circulator Relay: 12.0 mA RMS @ 30 VAC

Humidifier Load: 1.0 A @ 120 VAC

Electronic Air Cleaner: 1.0 A @ 120 VAC

Flame Current Requirements:

Min current to insure flame detection: 0.25 μ A DC*

Max current for non-detection: 0.1 μ A DC

Max allowable leakage resistance: 150 M ohms

* Measuring with a DC voltmeter (1VDC = 1 μ A)

OPERATING TEMPERATURE RANGE:

-40° to 175°F (-40° to 80°C)

HUMIDITY RANGE:

5 to 95% relative humidity (non-condensing)

AGENCY APPROVALS:

CSA USA / Canada

GASES APPROVED:

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

⚠ CAUTION



Risk of Electric Shock. Disconnect electric power to system until installation is complete. Do not use on circuit exceeding specified voltage. Higher voltage will damage control and could cause shock or fire hazard.



This control is not intended for use in locations where it may come in contact with water.



May cause flame rollout. Shut off main gas to heating system until installation is complete.



INSTALLATION

MOUNTING AND WIRING

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

1. Disconnect electrical power and gas supply to unit, then remove unit access panel
2. Mark and disconnect all wires from the existing control, then remove existing control
3. Refer to the Harness Descriptions, Harness Table, Wiring Diagram, and Dipswitch Configurations to connect and setup new control board to unit

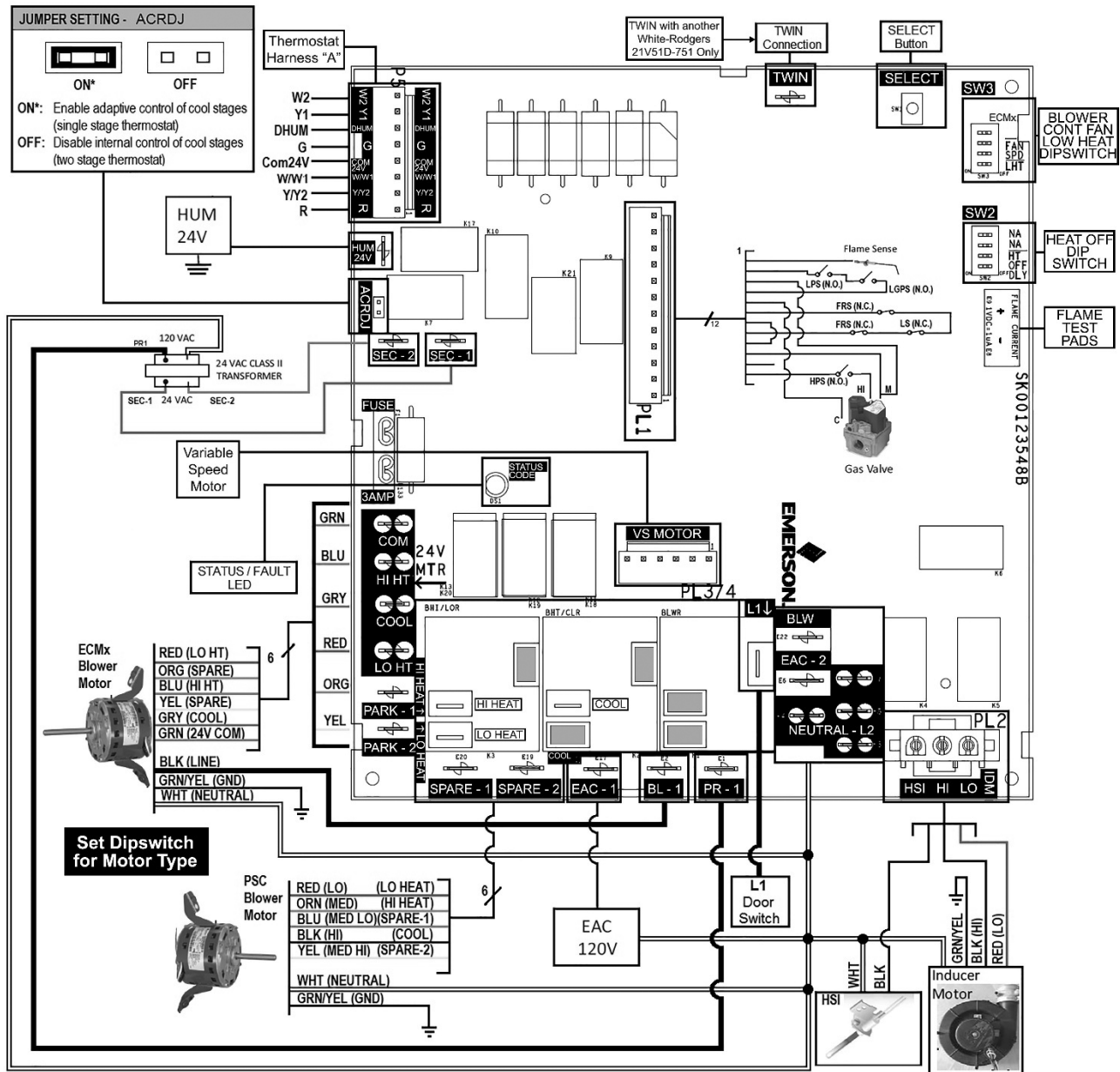
HARNESS DESCRIPTIONS

- **“A”** Used to make the thermostat I/O connections, using the included wire nuts. Plugged into connector **P5** on the new control board.
- **“B”** Used to convert the inline main harness wiring from the Carrier pinout to the reversed ICP pinout. Carrier pin 1 = ICP pin 12, Carrier pin 2 = ICP pin 11 and so on. Plugged into connector **PL1** on the new control board, factory wiring then plugs into other end. For ICP PSC controls only, **NOT REQUIRED** for ICP ECMx controls.
- **“C”** Used with old style Carrier furnaces to convert block style connectors to inline style. Plugged into connectors **PL1, PL2, and 2 NEUTRAL ¼” Spades** on the new control board.

HARNESS TABLE

Control	Brand	Blower	Thermostat "A"	ICP Flip "B"	Old Style Carrier "C"	Control
CEPL130948-01	Carrier	ECMx	✓			CEPL130948-01
CEPL130948-02						CEPL130948-02
HK42FZ028						HK42FZ028
HK42FZ040						HK42FZ040
325879-751		PSC / VS*				325879-751
CEPL130455-01						CEPL130455-01
HK42FZ017						HK42FZ017
HK42FZ005						HK42FZ005
HK42FZ010						HK42FZ010
HK42FZ015						HK42FZ015
ICM2807	ICM	PSC / VS*			ICM2807	
1184408	ICP	ECMx				1184408
CEPL131043-01						CEPL131043-01
HK42FZ041						HK42FZ041
1172551		PSC Only				1172551
1172809						1172809
CEPL130591-01						CEPL130591-01
CEPL130591-41						CEPL130591-41
HK42FZ019						HK42FZ019
HK42FZ020						HK42FZ020

***NOTE:** For Variable Speed units, plug existing 6-pin connector to “VS MOTOR” PL3/4 on new control board. **Set blower type dipswitch to PSC / VS.** The green DEHUM wire from the VS motor connects to G terminal (green wire of “A” harness) if previously connected to G on old style control board. Cut the existing ¼” spade terminal off and strip the wire to do this. Alternately, the green DEHUM wire from the VS motor may have been spliced to a thermostat wire connected to the Thermidstat™ DHUM terminal. Leave it this way and DO NOT connect it to the DHUM terminal (black wire of “A” harness) on new control board. The 2 white wires previously connected to the ¼” HUM spade terminal of the old style control board need to be connected to the ¼” HUM 24V terminal on the new control board.



ACRDJ – Air Conditioning Relay Disable Jumper (Adaptive Cooling)

The control can operate a two-speed A/C unit with a single-stage thermostat using an adaptive algorithm which selects between low-cooling or high-cooling operation. Operation is based on the length of the previous cooling period. For single stage thermostat applications with a two-stage outdoor unit, ensure the **ACRDJ** jumper is present.

NOTE: For adaptive cooling operation, connect thermostat cool input to Y1 terminal (yellow wire of “A” harness).

LHT – Low Heat Only (Adaptive Heating)

The control can operate a two-speed furnace with a single-stage thermostat using an adaptive algorithm which selects between low-heating or high-heating operation. Operation is based on the length of the previous heating period. For single stage thermostat applications with a two-stage furnace, ensure the **LHT** dipswitch is set to **OFF**.

NOTE: For adaptive heating operation, connect thermostat heat input to W/W1 terminal (white wire of “A” harness).

DIPSWITCH CONFIGURATION

Blower Type Configuration	Low Heat Only Mode	Heat - Blower Off Delay
<p>SW3</p> <p>PSC / VS*</p> <p>ON OFF</p>	<p>SW3</p> <p>ON OFF*</p>	<p>SW2</p>
<p>Continuous Fan Speed</p> <p>SW3</p>	<p>OFF*: Enable adaptive control of heat stages (single stage thermostat)</p> <p>ON: Disable internal control of heat stages (two stage thermostat)</p>	<p>*default</p> <p>NOTE: Cycle power after changes are made.</p>

OPERATION

COOL MODE

Output	Standby	Call for Cool	Cool ON Delay	Cooling until Thermostat is Satisfied	Blower Off Delay	System Off
			3 sec		90 sec	
Thermostat - Y2						
Thermostat - Y1						
Outdoor Compressor						
Outdoor Fan						
Blower (Cool Speed)						
Blower (High Heat Speed)						
Blower (Low Heat Speed)						
EAC						
LED			Green LED – 1 flash	Green LED – 2 flashes		

HEAT MODE

Output	Standby	Call for Heat	Self-Check	Pre-Purge 15 s	Ignitor Warm-Up 17-19 s	Ignition Activation Period <5 s	Heat ON Delay 45 s	Heating until Thermostat is Satisfied	Post-Purge 15 s	Blower Off Delay 90, *120, 150, 180	System Off
Thermostat - W2											
Thermostat - W1											
High Speed Inducer (IND HI)											
Low Speed Inducer (IND LO)											
Pressure Switch (HPS)											
Pressure Switch (LPS)											
Ignitor (HSI)											
Second Stage Gas (MVH)											
First Stage Gas Valve (MVL)											
Flame Sensor (FS)											
Blower (High Heat Speed)											
Blower (Low Heat Speed)											
Humidifier (24V)											
EAC											
LED				Amber LED – 1 flash				Amber LED – 2 flashes	Green LED ON		

OPERATION

DEHUMIDIFICATION MODE

Output	Standby	Call for Cool	Cool ON Delay	Cooling/Dehum until Thermostat is Satisfied					Blower Off Delay	System Off
			3 sec		10 min	10 min	10 min	5 sec		
Thermostat - DEHUM										
Thermostat - Y2										
Thermostat - Y1										
Outdoor Compressor										
Outdoor Fan										
Blower (Cool Speed) Blower (High Heat Speed) Blower (Low Heat Speed)										
EAC										
LED		Green LED – 1 flash		Green LED – 2 flashes						

Blower Off Delay reduced from 90 seconds (default) to 5 seconds if DEHUM output is active when cooling call ends.

FAN MODE

Output	Standby	Call for Fan	Fan until Thermostat is Satisfied		System Off
Thermostat – G					
Blower (Fan Speed)					
EAC					
LED		Green LED – Rapid Flash			

HEAT PUMP MODE

When installed with a heat pump, the furnace control automatically changes the timing sequence to avoid long blower off times during defrost cycles.

Output	Standby	Call for Heat Pump Heat Pump ON Delay	Heating until Thermostat is Satisfied	Call for Defrost Self Check	Pre-Purge	Ignitor Warm-Up	Ignition Activation Period	Heat ON Delay	Blower Staging	Defrost until Unit is Satisfied	Heating until Ther- mostat is Satisfied	Post-Purge	Blower Off Delay	System Off
		3 s			15 s	17-19 s	<5 s	5 s	5 s			15 s	90, *120, 150, 180 s	
Thermostat - W/W1														
Thermostat - Y/Y2														
Thermostat - Y1														
Hi Speed Inducer (IND HI)														
Low Speed Inducer (IND LO)														
Pressure Switch (HPS)														
Pressure Switch (LPS)														
Ignitor (HSI)														
Second Stage Gas (MVH)														
First Stage Gas Valve (MVL)														
Flame Sensor (FS)														
Blower (Cool Speed)														
Blower (High Heat Speed)														
Blower (Low Heat Speed)														
Humidifier (24V)														
EAC														
LED		Green LED - 1 flash	Green LED - 2 flashes	Amber LED - 3 flashes								Green - ON		

SELF-TEST

The 21V51D-751 furnace control is equipped with a self-test routine used during the control's installation. Self-test checks the functionality of the control, ignitor, inducer, and blower to verify they are in proper working order. Ensure thermostat is turned OFF or thermostat wires are disconnected to enable.

NOTE

The self-test functionality is available after power up and until a solid green LED is present (5 seconds after power up). During this time, the control will ignore all active calls. If a solid green LED is present, disconnect power for 10 seconds and refer above to enter self-test routine.

Enter Self-Test by:

- Turn on power and manually close blower door switch.
- Wait 1 second.
- Slowly double-click SELECT button within 3 seconds.

Sequence is as follows:

- LED will flash in red the previous error code 4 times
- Afterward, the LED will slowly flash alternate colors (red, amber, green) to indicate Self-Test is active and continue until Self-Test is complete
- Inducer motor will turn ON at HIGH speed and continue running until Self-Test is complete
- After 7 seconds, the ignitor will turn ON for 15 seconds, then OFF
- Blower motor operates on LOW HEAT speed for 10 seconds
- Blower motor operates on HIGH HEAT speed for 10 seconds
- Blower motor operates on COOL speed for 10 seconds
- Blower motor turns OFF
- Inducer motor goes to LOW speed for 10 seconds and then turns OFF
- LED will display solid green to indicate Standby mode

TROUBLESHOOTING

FAULT AND STATUS CODES

The LED will indicate fault or status codes as shown in the table below:

TROUBLESHOOTING			
Green LED Flash	Amber LED Flash	Red LED Flash	Error / Condition
Up to 5 Flash Codes Stored in Memory (Auto-Erased After 14 Days)			
		11	No Stored Codes
		12	Reversed 120 VAC Polarity / Grounding
		14	Ignition Lockout (Due to Excessive Retries)
		15	Ignitor Failure
		16	Gas Valve De-Energized When It Should Be Energized
		21	Gas Heating Lockout (Gas Valve Energized When It Should Be De-Energized)
		22	Abnormal Flame Proving Signal (Flame Sensed When Flame Should Not Be Present)
		23	Low Heat Pressure Switch Did Not Open (Shorted Pressure Switch, 1st stage)
		24	Fuse is Open
		25	High Heat Pressure Switch Did Not Open (Shorted Pressure Switch, 2nd stage)
		31	High-Heat Pressure Switch or Inducer Relay Did Not Close or Re-opened (Open Pressure Switch, 2nd stage)
		32	Low-Heat Pressure Switch or Inducer Relay Did Not Close or Re-opened (Open Pressure Switch, 1st stage)
		33	Limit Circuit Fault (Open Limit or Roll Out)
		34	Ignition Proving Failure (Due to Ignition Recycles)
Flash codes NOT stored in memory			
OFF	OFF	OFF	No 120 VAC and 24 VAC Power Control Circuitry Lockout
Alternate	Alternate	Alternate	Self-Test Mode Active
Solid ON			Standby
Rapid Flash			Fan Only Call
1			Call For Low Cool
2			Call For High Cool
3			Blower On After Power Up
	Rapid flash		Weak Flame Error
	1		Call For Low Heat
	2		Call For High Heat
	3		Defrost Mode
		Rapid flash	Twinning Error
<p>NOTE: Rapid Flash LED flash code uses 250ms ON time and 250ms OFF time. Two-digit Red LED flash codes use 1s ON time, 250ms OFF time. There is a 1s OFF time between 1st and 2nd digit of the error code. There is a 2s OFF time between each error code.</p>			

FAULT RECALL

When the control is in standby mode (no call for heat or cool), press the "SELECT" button for approximately 2 to 5 seconds or until the diagnostic LED turns off. Up to 5 fault codes are stored.

NOTE: While displaying the stored fault codes, the control will ignore any new call for heat, cool or fan.

FAULT CODE RESET

When the control is in standby mode (no call for heat or cool), press the "SELECT" button for 5 to 10 seconds or until the diagnostic LED begins to rapid flash.

NOTE: If the switch is held pressed for over 10 seconds the rapid flash will stop and the LED will be on to indicate return to normal status.

TECHNICAL SUPPORT: 1-888-725-9797

