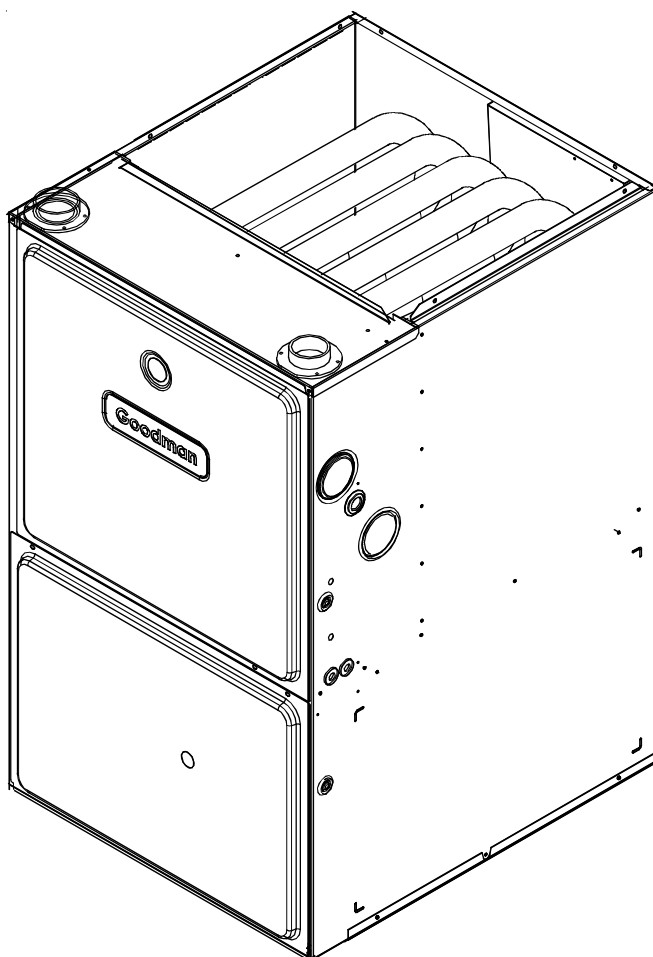


# Goodman<sup>®</sup> TECHNICAL MANUAL

## GCH9 40" 95% Gas Furnace

- Refer to Service Manual RS6610004 for installation, operation, and troubleshooting information.
- All safety information must be followed as provided in the Service Manual.
- Refer to the appropriate Parts Catalog for part number information.
- Model numbers listed on page 3.



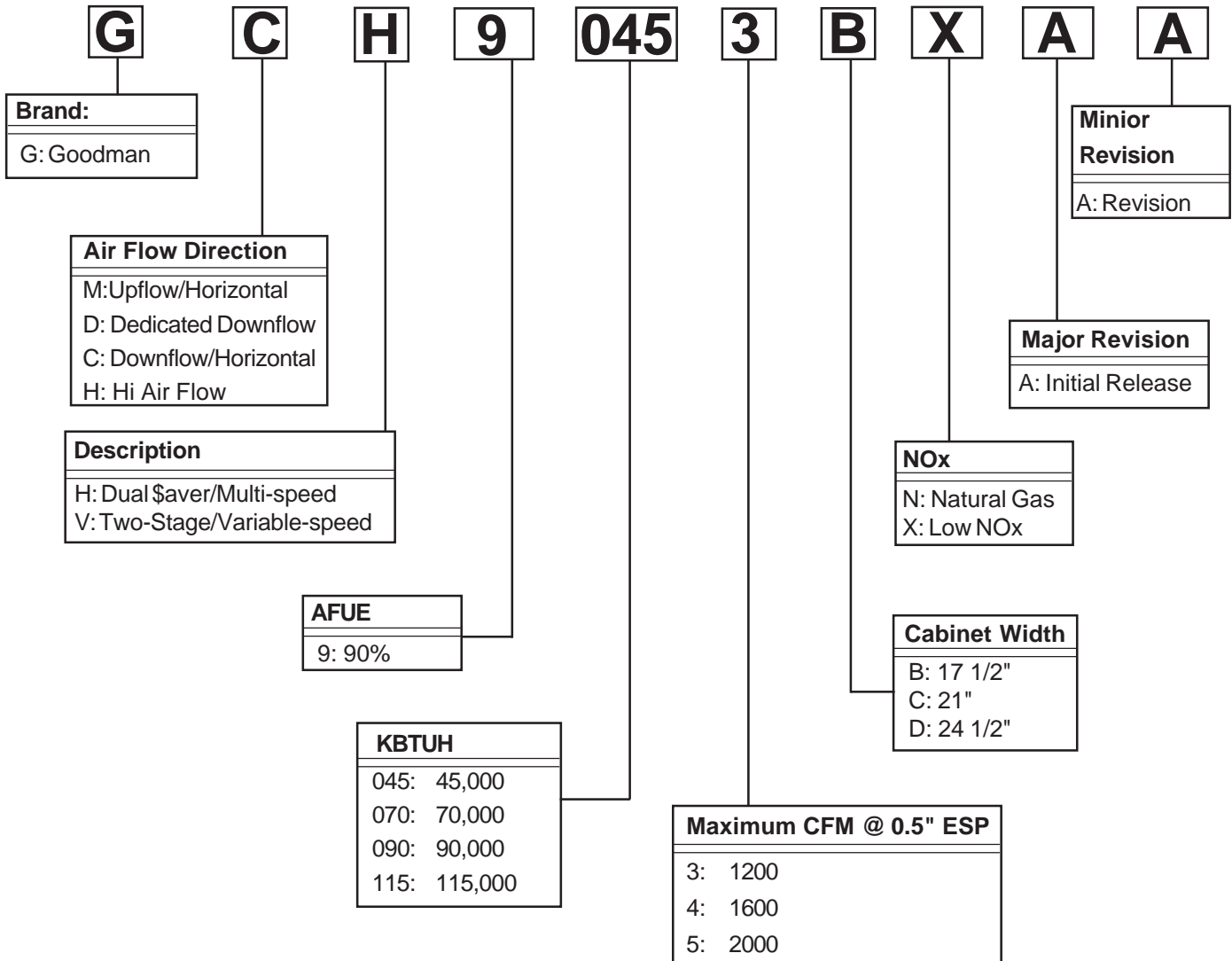
This manual is to be used by qualified, professionally trained HVAC technicians only. Goodman does not assume any responsibility for property damage or personal injury due to improper service procedures or services performed by an unqualified person.

RT6612019 Rev. 2  
April 2010

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# PRODUCT IDENTIFICATION

The model and manufacturing number are used for positive identification of component parts used in manufacturing. Please use these numbers when requesting service or parts information.



**WARNING**

**HIGH VOLTAGE!**

Disconnect ALL power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury or death.

**WARNING**

Goodman will not be responsible for any injury or property damage arising from improper service or service procedures. If you install or perform service on this unit, you assume responsibility for any personal injury or property damage which may result. Many jurisdictions require a license to install or service heating and air conditioning equipment.

**WARNING**

Installation and repair of this unit should be performed ONLY by individuals meeting the requirements of an "entry level technician", at a minimum, as specified by the Air-Conditioning, Heating, and Refrigeration Institute (AHRI). Attempting to install or repair this unit without such background may result in product damage, personal injury or death.

# PRODUCT IDENTIFICATION

The model and manufacturing number are used for positive identification of component parts used in manufacturing. Please use these numbers when requesting service or parts information.

GCH90453BXA\*  
GCH90703BXA\*  
GCH90704CXA\*  
GCH90904CXA\*  
GCH90905DXA\*  
GCH91155DXA\*

*These models are Low NOx.*

 **WARNING**

The United States Environmental Protection Agency (“EPA”) has issued various regulations regarding the introduction and disposal of refrigerants introduced into this unit. Failure to follow these regulations may harm the environment and can lead to the imposition of substantial fines. These regulations may vary by jurisdiction. Should questions arise, contact your local EPA office.

 **WARNING**

Do not connect or use any device that is not design certified by Goodman for use with this unit. Serious property damage, personal injury, reduced unit performance and/or hazardous conditions may result from the use of such non-approved devices.

 **WARNING**

To prevent the risk of property damage, personal injury, or death, do not store combustible materials or use gasoline or other flammable liquids or vapors in the vicinity of this appliance.

# PRODUCT DESIGN

## General Operation

The GCH9 furnaces are equipped with an electronic ignition device used to light the burners and an induced draft blower to exhaust combustion products.

An interlock switch prevents furnace operation if the blower door is not in place. Keep the blower access door in place except for inspection and maintenance.

This furnace is also equipped with a self-diagnosing electronic control module. In the event a furnace component is not operating properly, the control module LED will flash on and off in a factory-programmed sequence, depending on the problem encountered. This light can be viewed through the observation window in the blower access door. Refer to the *Troubleshooting Chart* for further explanation of the LED codes and *Abnormal Operation - Integrated Ignition Control* section in the Service Instructions for an explanation of the possible problem.

The rated heating capacity of the furnace should be greater than or equal to the total heat loss of the area to be heated. The total heat loss should be calculated by an approved method or in accordance with "ASHRAE Guide" or "Manual J-Load Calculations" published by the Air Conditioning Contractors of America.

\*Obtain from: American National Standards Institute 1430 Broadway New York, NY 10018

## Location Considerations

- The furnace should be as centralized as is practical with respect to the air distribution system.
- Do not install the furnace directly on carpeting, tile, or combustible material other than wood flooring.
- When suspending the furnace from rafters or joists, use 3/8" threaded rod and 2" x 2" x 3/8" angle as shown in the Installation and Service Instructions. The length of the rod will depend on the application and clearance necessary.
- When installed in a residential garage, the furnace must be positioned so the burners and ignition source are located not less than 18 inches (457 mm) above the floor and protected from physical damage by vehicles.

## Notes:

1. Installer must supply one or two PVC pipes: one for combustion air (optional) and one for the flue outlet (required). Vent pipe must be either 2" or 3" in diameter, depending upon furnace input, number of elbows, length of run and installation (1 or 2 pipes). The optional Combustion Air Pipe is dependent on installation/code requirements and must be 2" or 3" diameter PVC.
2. Line voltage wiring can enter through the right or left side of the furnace. Low voltage wiring can enter through the right or left side of furnace.

3. Conversion kits for high altitude natural or propane gas operation are available. See High Altitude Derate chart for details.

4. Installer must supply the following gas line fittings, depending on which entrance is used:

**Left** -- Two 90° Elbows, one close nipple, straight pipe.

**Right** -- Straight pipe to reach gas valve.

## Accessibility Clearances (Minimum)

MINIMUM CLEARANCES TO COMBUSTIBLE MATERIALS (INCHES)						
POSITION*	FRONT	SIDES	REAR	TOP	FLUE	FLOOR
Upflow	3	0	0	1	0	C
Horizontal	3	6	0	6	0	C

\*= All positioning is determined as installed unit is viewed from the front.

C= If placed on combustible floor, floor MUST be wood only.

NC= For installation on non-combustible floors only. A non-combustible subbase must be used for installations on combustible flooring.

24" at front is required for servicing or cleaning.

**Note:** In all cases accessibility clearance shall take precedence over clearances from the enclosure where accessibility clearances are greater. All dimensions are given in inches.

## High Altitude Derate

When this furnace is installed at high altitude, the appropriate High Altitude orifice kit must be installed. This is required due to the natural reduction in the density of both the gas fuel and combustion air as altitude increases. The kit will provide the proper design certified input rate within the specified altitude range.

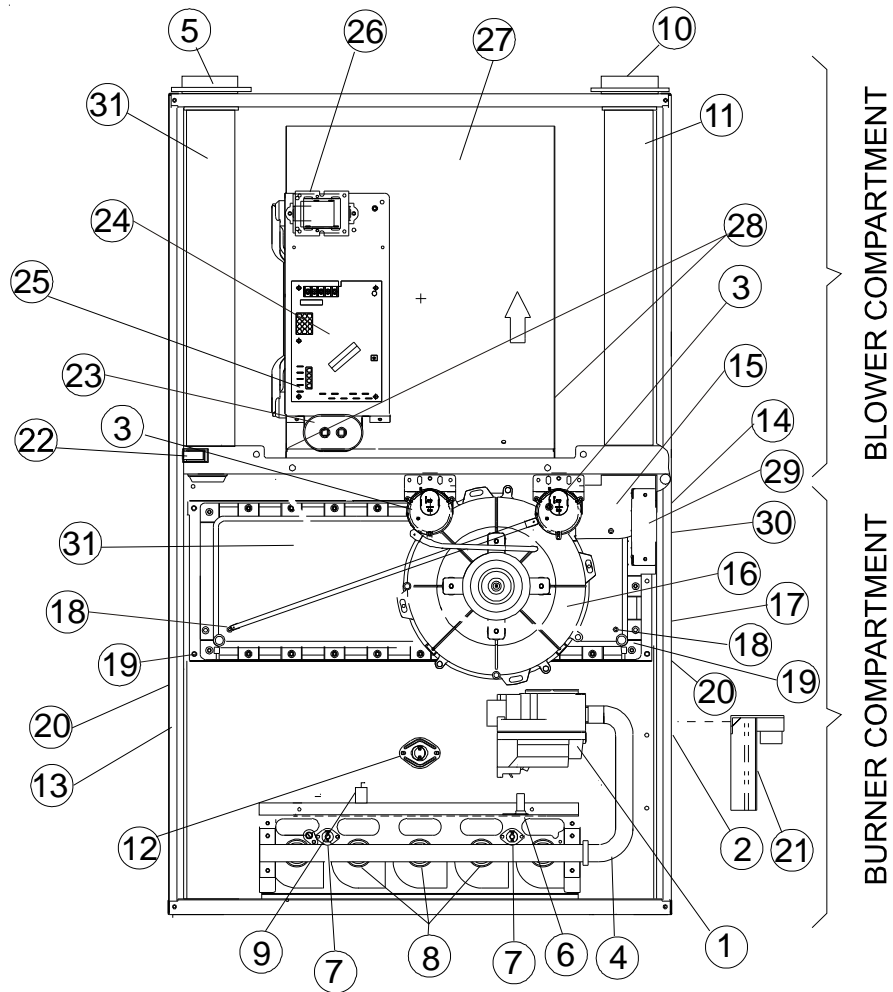
PROPANE AND HIGH ALTITUDE KITS					
MODEL NUMBER	0 to 7,000 ft.	7,001 to 9,000 ft.	9,001 to 11,000 ft.	7,001 to 11,000 ft.	7,001 to 11,000 ft.
GCH9*****XA*	LPM-03 <sup>1</sup> LPM-05 <sup>1</sup> LPM-06 <sup>2</sup> Propane Conversion Kit (#55 Orifices)	HANG11 High Altitude Natural Gas Kit (#44 Orifices)	HANG12 High Altitude Natural Gas Kit (#45 Orifices)	HALP 10 High Altitude LP Gas Kit (#56 Orifices)	TBD

<sup>1</sup> LPM-03 / LPM-05 supports White-Rodgers 2-stage valves only

<sup>2</sup> LPM-06 supports Honeywell and White-Rodgers 2 stage valves

High altitude kits are purchased according to the installation altitude and usage of either natural or propane gas. Refer to the chart above for a tabular listing of appropriate altitude ranges and corresponding manufacturer's high altitude Natural Gas and Propane Gas kits. For a tabular listing of appropriate altitude ranges and corresponding manufacturer's High Altitude Pressure Switch kits, refer to either the *Pressure Switch Trip Points & Usage Chart* in this manual or the *Accessory Charts* in Service Instructions.

# COMPONENT IDENTIFICATION

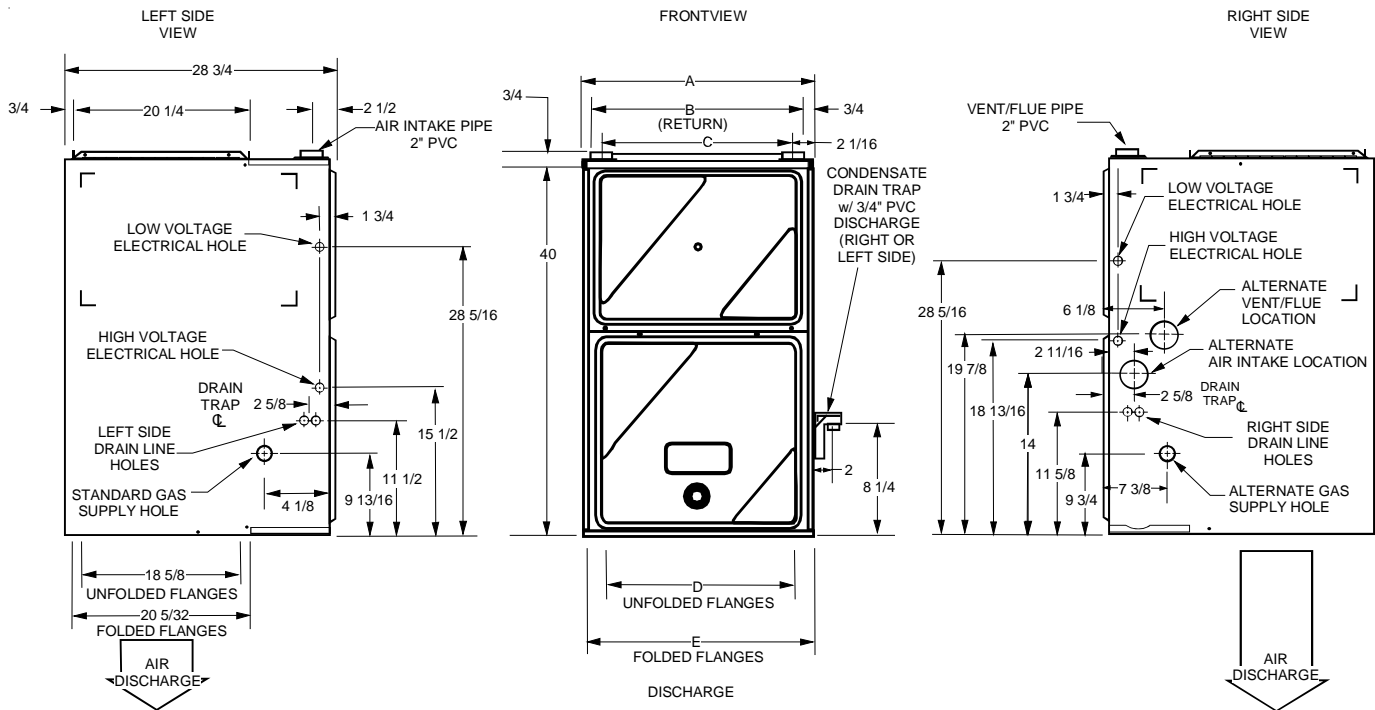


Downflow /Horizontal

- |   |  |
|---|--|
| 1 Two-Stage Gas Valve                       | 19 Coil Front Cover Drain Port                                 |
| 2 Gas Line Entrance (Alternate)             | 20 Drain Line Penetrations                                     |
| 3 Pressure Switch(es)                       | 21 Drain Trap  |
| 4 Gas Manifold                              | 22 Blower Door Interlock Switch                                |
| 5 Combustion Air Intake Connection          | 23 Capacitor   |
| 6 Hot Surface Igniter                       | 24 Integrated Control Module<br>(with fuse and diagnostic LED) |
| 7 Rollout Limit                             | 25 24 Volt Thermostat Connections                              |
| 8 Burners                                   | 26 Transformer (40 VA)   |
| 9 Flame Sensor                              | 27 Circulator Blower   |
| 10 Flue Pipe Connection                     | 28 Auxiliary Limits  |
| 11 Flue Pipe                                | 29 Junction Box  |
| 12 Primary Limit                            | 30 Electrical Connection Inlet                                 |
| 13 Gas Line Entrance                        | 31 Coil Front Cover  |
| 14 Flue Pipe Connection (Alternate)         |  |
| 15 Rubber Elbow                             |  |
| 16 Induced Draft Blower                     |  |
| 17 Electrical Connection Inlets (Alternate) |  |
| 18 Coil Front Cover Pressure Tap            |  |

# COMPONENT IDENTIFICATION

## GCH9\*\*\*\*\*XA\*



Cabinet Size	A	B	C	D	E
GCH90453BX** GCH90703BX**	17-1/2	16	12-15/16	12-1/8	13-5/8
GCH90704CXA* GCH90904CXA*	21	19-1/2	15-15/16	16	17-1/2
GCH90905DXA* GCH91155DXA*	24-1/2	23	20-7/16	19-3/8	20-7/8

All dimensions are in inches.

# PRODUCT DESIGN

PRESSURE SWITCH TRIP POINTS AND USAGE CHART				
MODEL	0 to 7,000 ft.			
	TRIP POINT COIL COVER PRESSURE SWITCH	PRESSURE SWITCH PART #	TRIP POINT ID BLOWER PRESSURE SWITCH	ID BLOWER PRESSURE SWITCH PART #
GCH90453BX	-60	20197311	-60	20197311
GCH90703BX	-60	20197311	-60	20197311
GCH90704CX	-37	20197313	-37	20197313
GCH90904CX	-60	20197311	-60	20197311
GCH90905CX	-37	20197313	-37	20197313
GCH91155DX	-60	20197311	-60	20197311

**Note:** Replacement pressure switch number is listed below high altitude kit number.

**Note:** All negative pressure readings are in inches of water column (" w.c.).

T.O.D. PRIMARY LIMIT			
Part Number	20162906	20162904	20162907
Open Setting (°F)	170	150	155
GCH90453BX	1		
GCH90703BX	1		
GCH90704CX	1		
GCH90904CX		1	
GCH90905DX	1		
GCH91155DX			1

# PRODUCT DESIGN

ROLLOUT LIMIT SWITCHES		
Part Number	10123517	10123534
Open Setting (°F)	210	220
GCH90453BX	1	
GCH90703BX	2	
GCH90704CX	2	
GCH90904CX		2
GCH90905DX		2
GCH91155DX	2	

AUXILIARY LIMIT SWITCHES		
Part Number	10123518	10123519
Open Setting (°F)	170	160
GCH90453BX		2
GCH90703BX		2
GCH90704CX	2	
GCH90904CX		2
GCH90905DX	2	
GCH91155DX		2

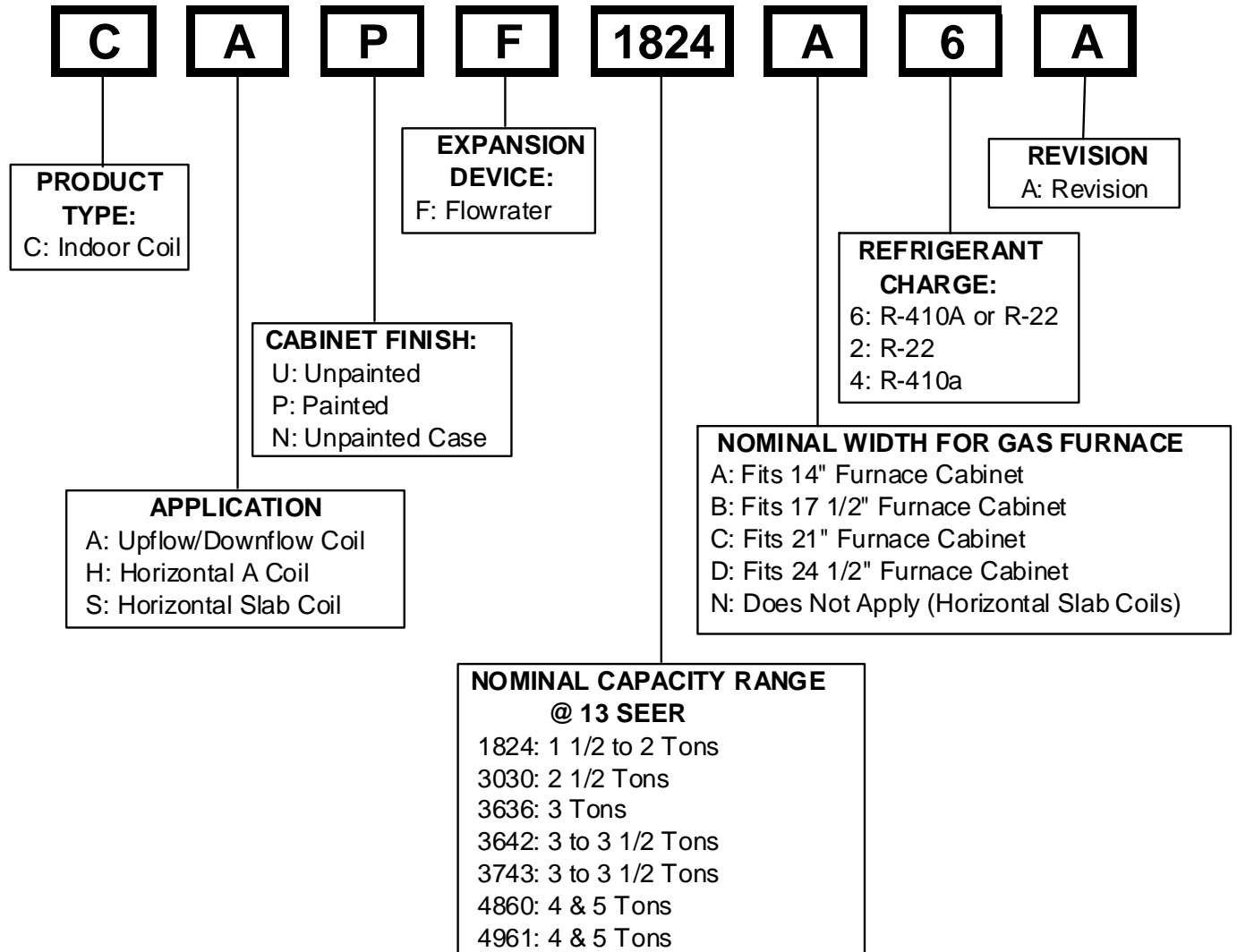


# PRODUCT DESIGN

## Coil Matches:

A large array of Amana® brand coils are available for use with the GCH9 furnaces, in either counterflow or horizontal applications. These coils are available in both cased and uncased models (with the option of a field installed TXV expansion device). These 90%+ furnaces match up with the existing Amana® brand coils as shown in the chart below.

## Coil Matches (Goodman® units using R22 and R-410A):



- All CAPF coils in B, C, & D widths have insulated blank off plates for use with one size smaller furnaces.
- All CAPF coils have a CAUF equivalent.
- All CHPF coils in B, C & D heights have an insulated Z bracket for use with one size smaller furnace.
- All proper coil combinations are subject to being ARI rated with a matched outdoor unit.

# PRODUCT DESIGN

## Thermostats:

**NOTE:** Complete lineup of thermostats can be found in the Thermostat Specification Sheets.

## Filters:

Filters are required with this furnace and must be provided by the installer. The filters used must comply with UL900 or CAN/ULCS111 standards. Installing this furnace without filters will void the unit warranty.

### Upflow Filters

This furnace has provisions for the installation of return air filters at the side and/or bottom return. The furnace will accommodate the following filter sizes depending on cabinet size:

Side Return(s)		
Cabinet Width (in.)	Nominal Filter Size (in.)	Approx. Flow Area (in <sup>2</sup> )
All	16 x 25 x 1	400

Bottom Return		
Cabinet Width (in.)	Nominal Filter Size (in.)	Approx. Flow Area (in <sup>2</sup> )
17-1/2	14 x 25 x 1	350
21	16 x 25 x 1	400
24-1/2	20 x 25 x 1	500

Refer to Minimum Filter Area tables to determine filter area requirement. **NOTE:** Filters can also be installed elsewhere in the duct system such as a central return.

		COOLING AIRFLOW REQUIREMENT (CFM)						
		600	800	1000	1200	1400	1600	2000
Input_Airflow	0453BXA*	388*	388*	480	576	---	---	---
	0703BXA*	---	647*	647*	647*	672	---	---
	0704CXA*	---	---	583*	583*	672	768	---
	0904CXA*	---	---	863*	863*	863*	863*	---
	0905DXA*	---	---	---	777*	777*	777*	960
	1155DXA*	---	---	---	971*	971*	971*	971*

		COOLING AIRFLOW REQUIREMENT (CFM)						
		600	800	1000	1200	1400	1600	2000
Input_Airflow	0453BXA*	194*	194*	240	288	---	---	---
	0703BXA*	---	324*	324*	324*	336	---	---
	0704CXA*	---	---	291*	291*	336	384	---
	0904CXA*	---	---	432*	432*	432*	432*	---
	0905DXA*	---	---	---	388*	388*	388*	480
	1155DXA*	---	---	---	486*	486*	486*	486*

\*Minimum filter area dictated by heating airflow requirement.

**Disposable Minimum Filter Area (in<sup>2</sup>)**  
 [Based on a 300 ft/min filter face velocity]

\*Minimum filter area dictated by heating airflow requirement.

**Permanent Minimum Filter Area (in<sup>2</sup>)**  
 [Based on 600 ft/min filter face velocity]

# PRODUCT DESIGN

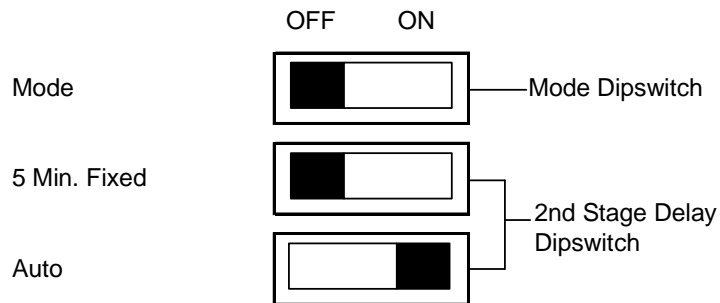
## Dual \$aver Configuration & Operation

### Dual \$aver

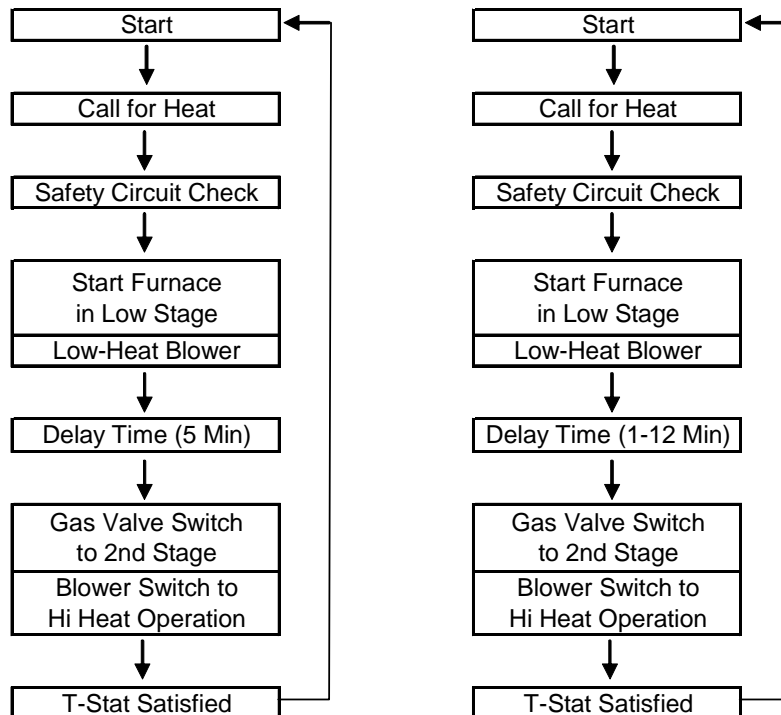
This furnace is capable for the following heating modes:

- Single Stage (Factory Setting)
- Modified Two-Stage
  - > Fixed 5-Min. Low Stage
  - > Auto Time (1-12 Min.) Low Stage

To change from the factory single-stage operation, adjust the dipswitches on the ignition control as follows:



Note: This furnace is designed to be used with a single-stage room thermostat.



# FURNACE SPECIFICATIONS

# GCH9

MODEL	GCH90453BX	GCH90703BX	GCH90704BX	GCH90904CX	GCH90905CX	GCH91155DX
Btuh Input (US)	46,000	69,000	69,000	92,000	92,000	115,000
Output (US)	42,800	64,400	64,400	86,000	86,000	106,500
BTUH Output (US) LP	38,502	57,753	57,753	77,004	77,004	96,255
A.F.U.E.	93	93	93	93	93	93
Rated External Static (" w.c.)	.20" - .50"	.20" - .50"	.20" - .50"	.20" - .50"	.20" - .50"	.20" - .50"
Temperature Rise (°F)	35-65	35-65	35-65	35-65	35-65	35-65
Pressure Switch Trip Point (" w.c.)	-0.60	-0.60	-0.37	-0.60	-0.37	-0.60
Front Cover Pressure Switch Trip Point (" w.c)	-0.60	-0.60	-0.37	-0.60	-0.37	-0.60
Blower Wheel (D" x W")	10 X 8	10 X 8	10 X 10	10 X 10	11 X 10	11 x 10
Blower Horsepower	1/3	1/3	1/2	1/2	3/4	3/4
Blower Speeds	4	4	4	4	4	4
Max CFM @ 0.5 E.S.P.	1,200	1,200	1,600	1600	2000	2000
Power Supply	115-60-1	115-60-1	115-60-1	115-60-1	115-60-1	115-60-1
Minimum Circuit Ampacity (MCA) <sup>(1)</sup>	9.40	9.40	13.80	13.80	13.20	13.20
Maximum Overcurrent Device <sup>(2)</sup>	15	15	15	15	15	15
Transformer (VA)	40	40	40	40	40	40
Primary Limit Setting (°F)	170	170	170	150	170	155
Auxiliary Limit Setting (°F)	160	160	170	160	170	160
Rollout Limit Setting (°F)	210	210	210	220	220	210
Fan Delay On Heating	30	30	30	30	30	30
Off Heating <sup>(3)</sup>	150	150	150	150	150	150
Fan Delay On Cooling	5	5	5	5	5	5
Off Cooling	45	45	45	45	45	45
Fan Delay On - Fan Only	0	0	0	0	0	0
Gas Supply Pressure (Natural/Propane) (" w.c.)	7/11	7/11	7/11	7/11	7/11	7/11
Manifold Pressure (Natural/Propane)	3.5/10	3.5/10	3.5/10	3.5/10	3.5/10	3.5/10
Orifice Size (Natural/Propane)	43/55	43/55	43/55	43/55	43/55	43/55
Number of Burners	2	3	3	4	4	5
Vent Connector Diameter (inches) <sup>(4)</sup>	2	2	2	2	2	2
Shipping Weight (lbs.)	132	135	136	158	172	178

<sup>(1)</sup> Wire size should be determined in accordance with National Electrical Codes. Extensive wire runs will require larger wire sizes.

<sup>(2)</sup> Maximum Overcurrent Protection Device: May use Time Delay Fuse or HACR type Circuit Breaker of the same size as noted.

<sup>(3)</sup> Off Heating - this fan delay timing is adjustable (100 or 150 seconds), 150 seconds as shipped.

<sup>(4)</sup> See Installation Instructions for appropriate vent diameter, length and number of elbows.

NOTE: This data is provided as a guide, it is important to electrically connect the unit and properly size fuses/circuit breakers and wires in accordance with all national and/or local electrical codes. Use copper wire only.

1. These furnaces are manufactured for natural gas operation. Optional kits are available for conversion to propane operation.
2. For elevations above 2000 feet the rating should be reduced by 4% for each 1000 feet above sea level. The furnace must not be derated, orifice changes should only be made if necessary for altitude.
3. The total heat loss from the structure as expressed in TOTAL BTU/HR must be calculated by the manufacturers method or in accordance with the "A.S.H.R.A.E. GUIDE" or "MANUAL J-LOAD CALCULATIONS" published by the AIR CONDITIONING CONTRACTORS OF AMERICA. The total heat loss calculated should be equal to or less than the heating capacity. Output based on D.O.E. test procedures.
4. Minimum Circuit Ampacity calculated as: (1.25 x Circulator Blower Amps) + I.D. Blower Amps.

Unit specifications are subject to change without notice. **ALWAYS** refer to the units serial plate for the most up-to-date general and electrical information.

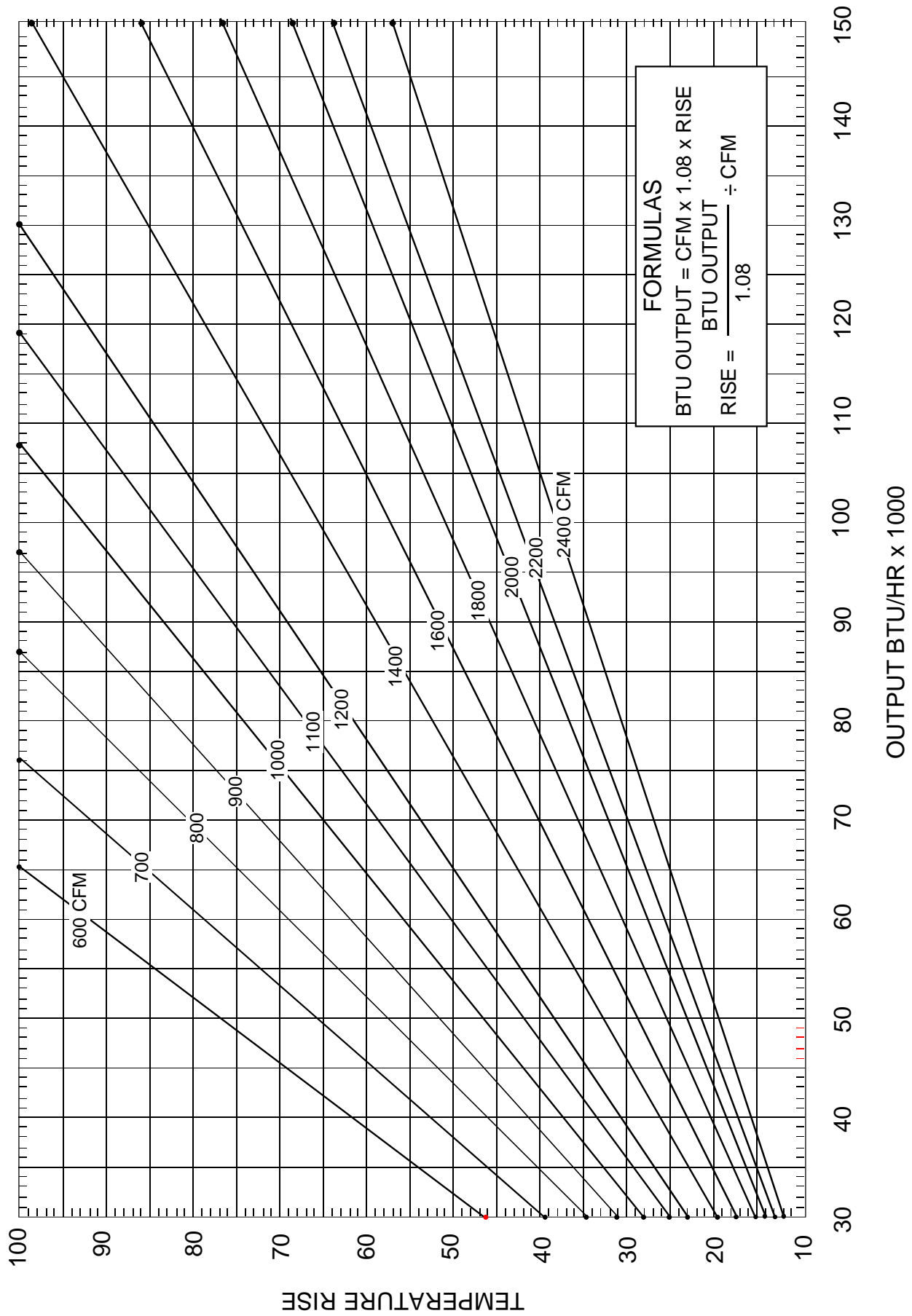
# BLOWER PERFORMANCE SPECIFICATIONS

BLOWER PERFORMANCE (CFM & Temperature Rise vs. External Static Pressure)															
Model (Heating Speed As Shipped)	Motor Speed	Tons AC at 0.5" ESP	EXTERNAL STATIC PRESSURE (Inches Water Column)												
			0.1		0.2		0.3		0.4		0.5		0.6	0.7	0.8
			CFM	RISE	CFM	RISE	CFM	RISE	CFM	RISE	CFM	RISE	CFM	CFM	CFM
GCH90453BXA* (MED-HI)	HIGH	3.0	1352	29	1318	30	1260	31	1202	33	1128	35	1044	955	853
	MED	2.5	1214	32	1172	34	1123	35	1064	37	1012	39	938	859	741
	MED-LO	2.0	997	40	994	40	960	41	923	43	884	45	817	741	611
	LOW	1.5	757	52	753	52	734	54	704	56	674	59	620	524	438
GCH90703BXA* (MED-HI)	HIGH	3.0	1449	41	1409	42	1326	45	1273	47	1201	49	1194	1136	1018
	MED	2.5	1192	50	1172	51	1141	52	1094	54	1046	57	973	904	793
	MED-LO	2.0	981	61	962	62	943	63	917	65	888	67	830	764	665
	LOW	1.5	750	79	730	81	714	83	692	86	657	90	620	570	502
GCH90704CXA* (MED-HI)	HIGH	4.0	2069	29	1965	30	1871	32	1756	34	1661	36	1549	1415	1275
	MED	3.5	1752	34	1724	34	1667	36	1603	37	1488	40	1402	1290	1082
	MED-LO	3.0	1437	41	1437	41	1417	42	1369	43	1320	45	1256	1140	984
	LOW	2.5	1184	50	1177	50	1161	51	1132	52	1095	54	1047	928	837
GCH90904CXA* (MED-HI)	HIGH	4.0	1970	40	1874	42	1757	45	1667	48	1566	51	1431	1334	1182
	MED	3.5	1713	46	1650	48	1572	50	1510	52	1418	56	1313	1211	1079
	MED-LO	3.0	1439	55	1412	56	1370	58	1327	60	1260	63	1166	1078	956
	LOW	2.5	1183	67	1155	69	1122	71	1108	72	1062	75	1011	931	816
GCH90905DXA* (MED-HI)	HIGH	5.0	2147	37	2114	37	2057	39	2030	39	1978	40	1889	1784	1713
	MED	4.0	1675	47	1686	47	1640	48	1623	49	1557	51	1501	1455	1360
	MED-LO	3.5	1489	53	1470	54	1436	55	1409	56	1361	58	1318	1243	1130
	LOW	3.0	1307	61	1265	63	1234	64	1203	66	1168	68	1096	1053	991
GCH91155DXA* (MED-HI)	HIGH	5.0	2134	46	2103	47	2029	48	1941	51	1906	51	1818	1733	1625
	MED	4.0	1678	58	1643	60	1643	60	1577	62	1527	64	1489	1423	1339
	MED-LO	3.5	1453	68	1440	68	1426	69	1363	72	1349	73	1314	1253	1205
	LOW	3.0	1259	78	1239	79	1220	80	1181	83	1159	85	1118	1082	1015

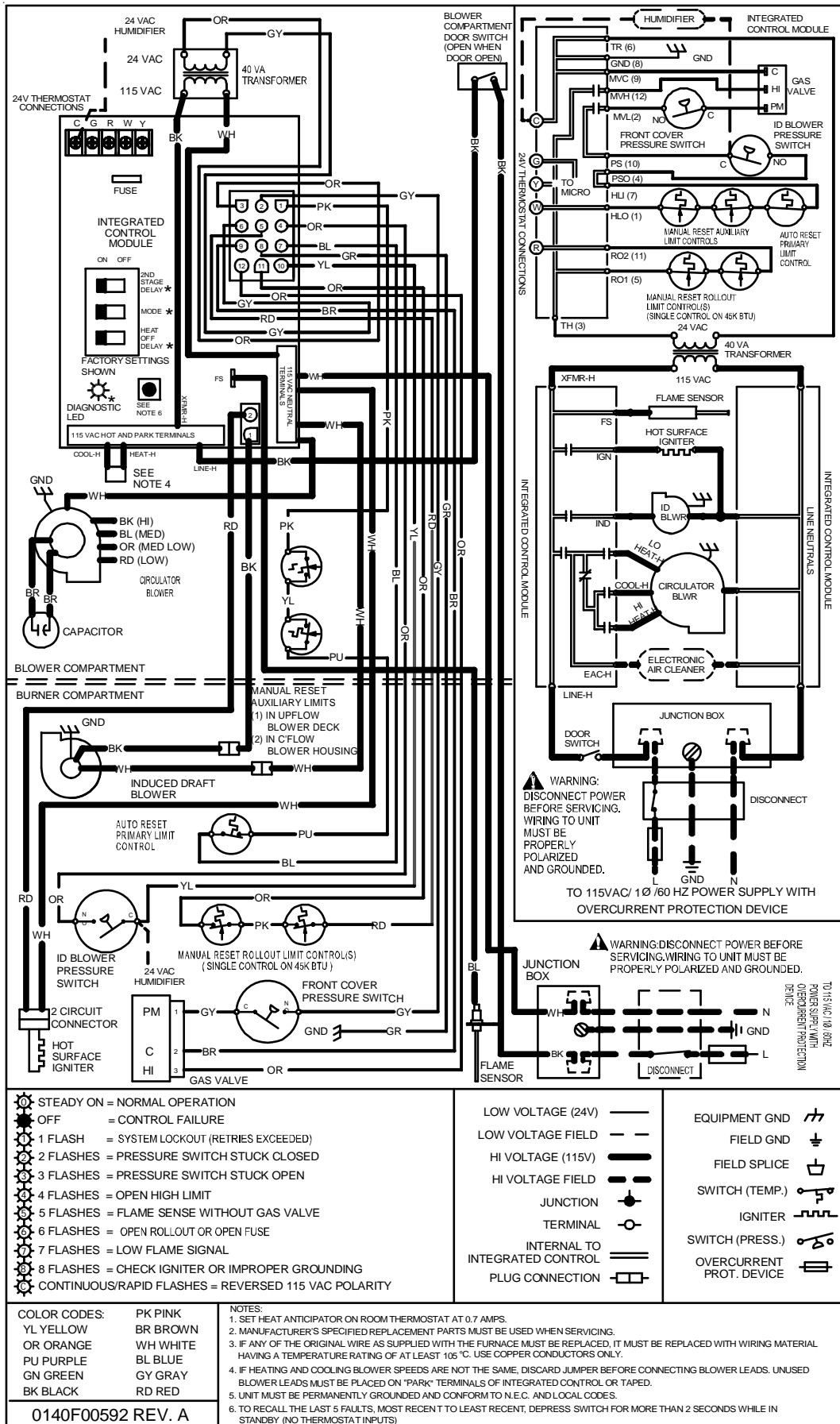
1. CFM in chart is without filters(s). Filters do not ship with this furnace, but must be provided by the installer.
2. All furnaces ship as high speed cooling. Installer must adjust blower cooling speed as needed.
3. For most jobs, about 400 CFM per ton when cooling is desirable.
4. INSTALLATION IS TO BE ADJUSTED TO OBTAIN TEMPERATURE RISE WITHIN THE RANGE SPECIFIED ON THE RATING PLATE.
5. The chart is for information only. For satisfactory operation, external static pressure must not exceed value shown on rating plate. The shaded area indicates ranges in excess of maximum external static pressure allowed when heating. The data for 0.6" w.c. to 0.8" w.c. is shown for air conditioning purposes only.
6. The dashed (---) areas indicate a temperature rise not recommended for this model.
7. The above chart is for U.S. furnaces installed at 0-4000 feet. At higher altitudes, a properly derated unit will have approximately the same temperature rise at a particular CFM, while the ESP at that CFM will be lower.

# BLOWER PERFORMANCE SPECIFICATIONS

BTU OUTPUT vs TEMPERATURE RISE CHART



**WARNING**  
 HIGH VOLTAGE!  
 DISCONNECT ALL POWER BEFORE SERVICING OR INSTALLING THIS UNIT. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



Wiring is subject to change. Always refer to the wiring diagram on the unit for the most up-to-date wiring.





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