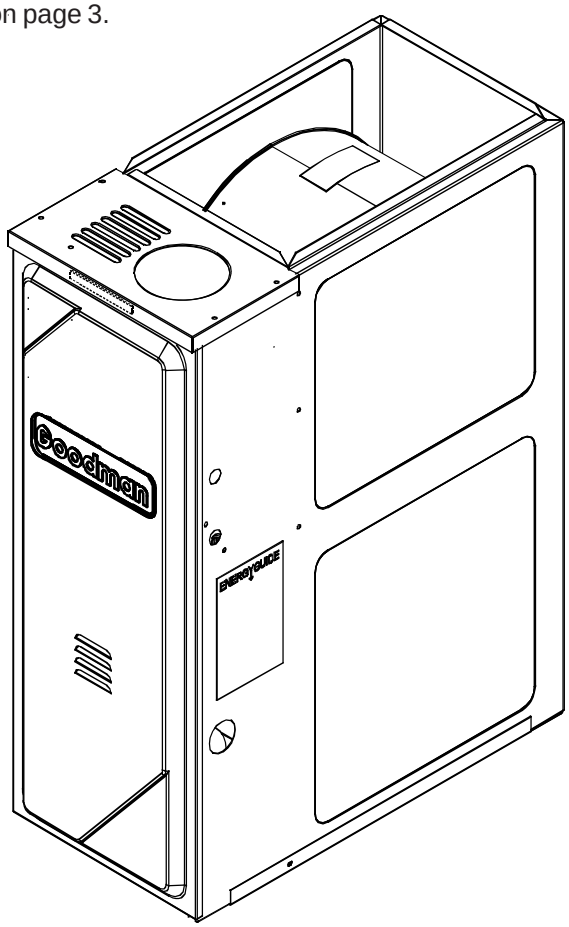
Goodman® TECHNICAL MANUAL

GDH8 39" 80% Gas Furnace
80% AFUE, 2-Stage (Convertible), Multi-Speed, Dedicated Downflow

- 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.



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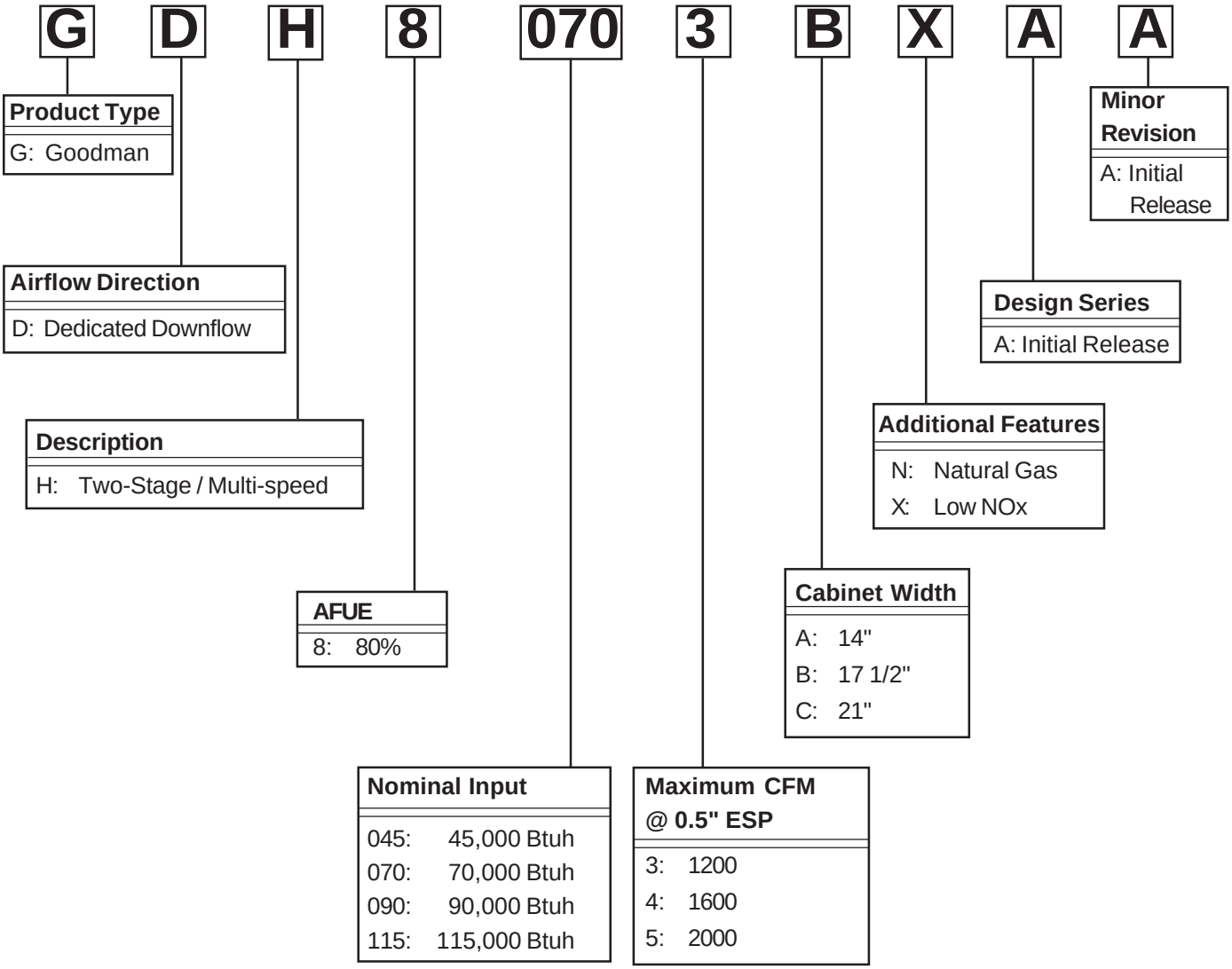
This manual is to be used by qualified, professionally trained HVAC technicians only. Goodman does not assume any responsibility for property damage or personal injury due to improper service procedures or services performed by an unqualified person.

RT6621012 Rev. 3
July 2009

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" 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.

GDH80453AX*
GDH80703AX*
GDH80904BX*
GDH81155CX*

⚠ 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 GDH8 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 inner blower door is not in place. Keep the blower access door in place except for inspection and maintenance. *(See illustration on page 5.)*

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 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:

⚠ WARNING

TO PREVENT POSSIBLE PERSONAL INJURY OR DEATH DUE TO ASPHYXIATION, THIS FURNACE MUST BE CATEGORY I VENTED. DO NOT VENT USING CATEGORY III VENTING.

Category I Venting is venting at a non-positive pressure. A furnace vented as Category I is considered a fan-assisted appliance and the vent system does not have to be "gas tight." **NOTE:** Single stage gas furnaces with induced draft blowers draw products of combustion through a heat exchanger allowing, in some instances, common venting with natural draft appliances (i.e. water heaters). All installations must be vented in accordance with National Fuel Gas Code NFPA 54/ANSI Z223.1 - latest edition. In Canada, the furnaces must be vented in accordance with the National Standard of Canada, CAN/CSA B149.1 and CAN/CSA B149.2 - latest editions and amendments.

NOTE: The vertical height of the Category I venting system must be at least as great as the horizontal length of the venting system.

Accessibility Clearances (Minimum)

Unobstructed front clearanace of 24" **for servicing** is recommended.

MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS - INCHES

Sides	Rear	Front*	Vent		Top
			SW	B	
1	0	3	6	1	1

* 24" clearnace for serviceability recommended.
** Single Wall Vent (SW) to be used only as a conncetor.
Refer to the venting tables outlined in the Installation Manual for additional venting requirements.

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.

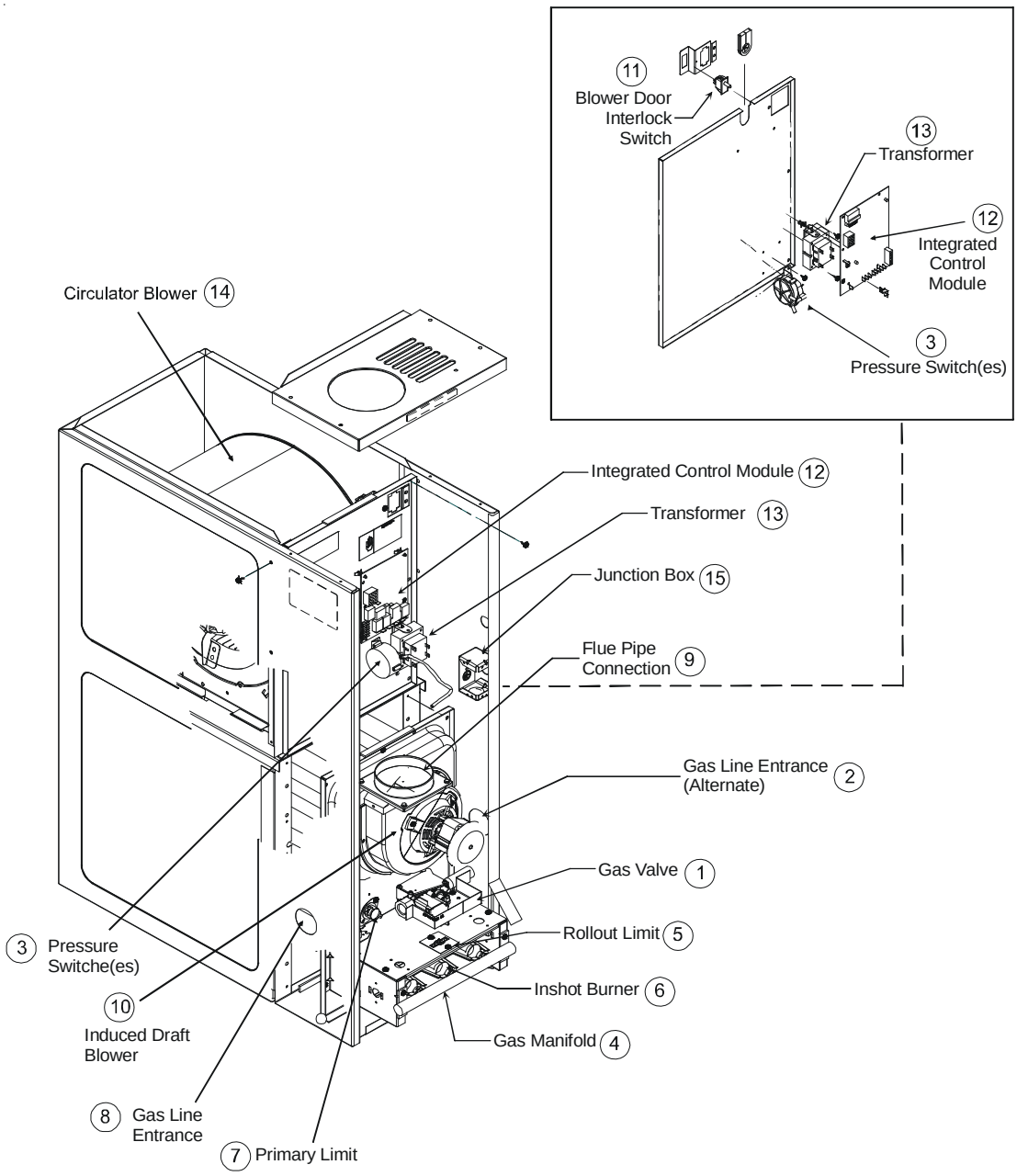
INPUT PER BURNER - 22,500 BTUH NATURAL GAS / 20,000 BTUH L.P.								
	ELEVATION ABOVE SEA-LEVEL (FEET)							
	2000	3000	4000	4500	5000	6000	7000	8000
US BURNER ORIFICE	44/55	44/55	45/56		45/56	46/57	47/58	47/58
CANADA BURNER ORIFICE	44/55			47/57				

HA-02 HIGH ALTITUDE CONVERSION KIT REQUIRED

Tabled data is based upon the furnace input being reduced for altitudes above sea level. U.S. 4% per 1,000 feet. Canada 10% derate for 2,000-4,000 feet.

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

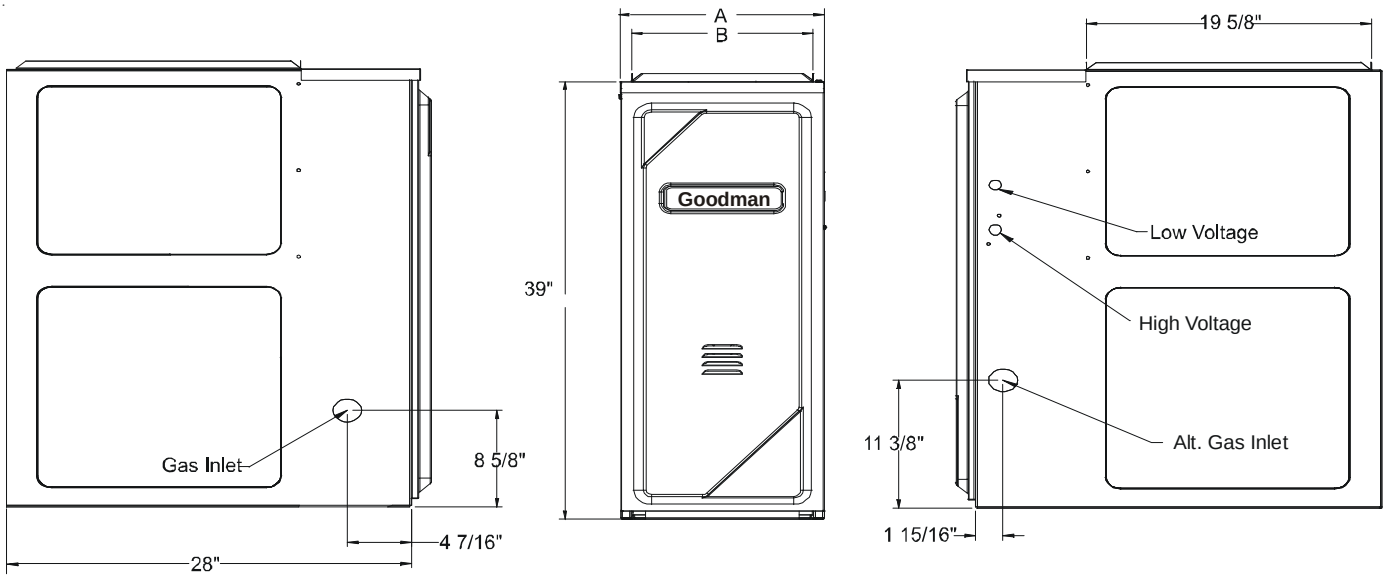


Downflow Models

1 Gas Valve
2 Gas Line Entrance (Alternate)
3 Pressure Switch(es)
4 Gas Manifold
5 Rollout Limit
6 Inshot Burners
7 Primary Limit
8 Gas Line Entrance
9 Flue Pipe Connection (Alternate)
10 Induced Draft Blower
11 Blower Door Interlock Switch
12 Integrated Control Module
(with fuse and diagnostic LED)
13 Transformer (40 VA)
14 Circulator Blower
15 Junction Box

PRODUCT DIMENSIONS

GDH8_____XA



MODEL	A	B	NON-COMBUSTIBLE FLOOR BASE
GDH80453AX GDH80703AX	14	12 1/2	SBT14
GDH80904BX	17 1/2	16	SBT17
GDH81155CX	21	19 1/2	SBT21

All dimensions are in inches.

PRODUCT DESIGN

PRESSURE SWITCH		
MODEL	**PART NO.**	**OPENS***
GDH80453AX	**B1370142**	-0.60
GDH80703AX	**B1370142**	-0.60
GDH80904BX	**B1370142**	-0.60
GDH81155CX	**B137158**	-0.70

*Negative pressure readings are in inches of water column (in *w.c.)

PRIMARY LIMIT		
Part Number	**B1370194**	**0130F00015**
Open Setting (°F)	250	280
GDH80453AX*	1	
GDH80703AX*	1	
GDH80904BX*		1
GDH81155CX*	1	

ROLLOUT LIMIT SWITCHES	
Part Number	**B1370145**
Open Setting (°F)	300
GDH80453AX*	1
GDH80703AX*	1
GDH80904BX*	1
GDH81155CX*	1

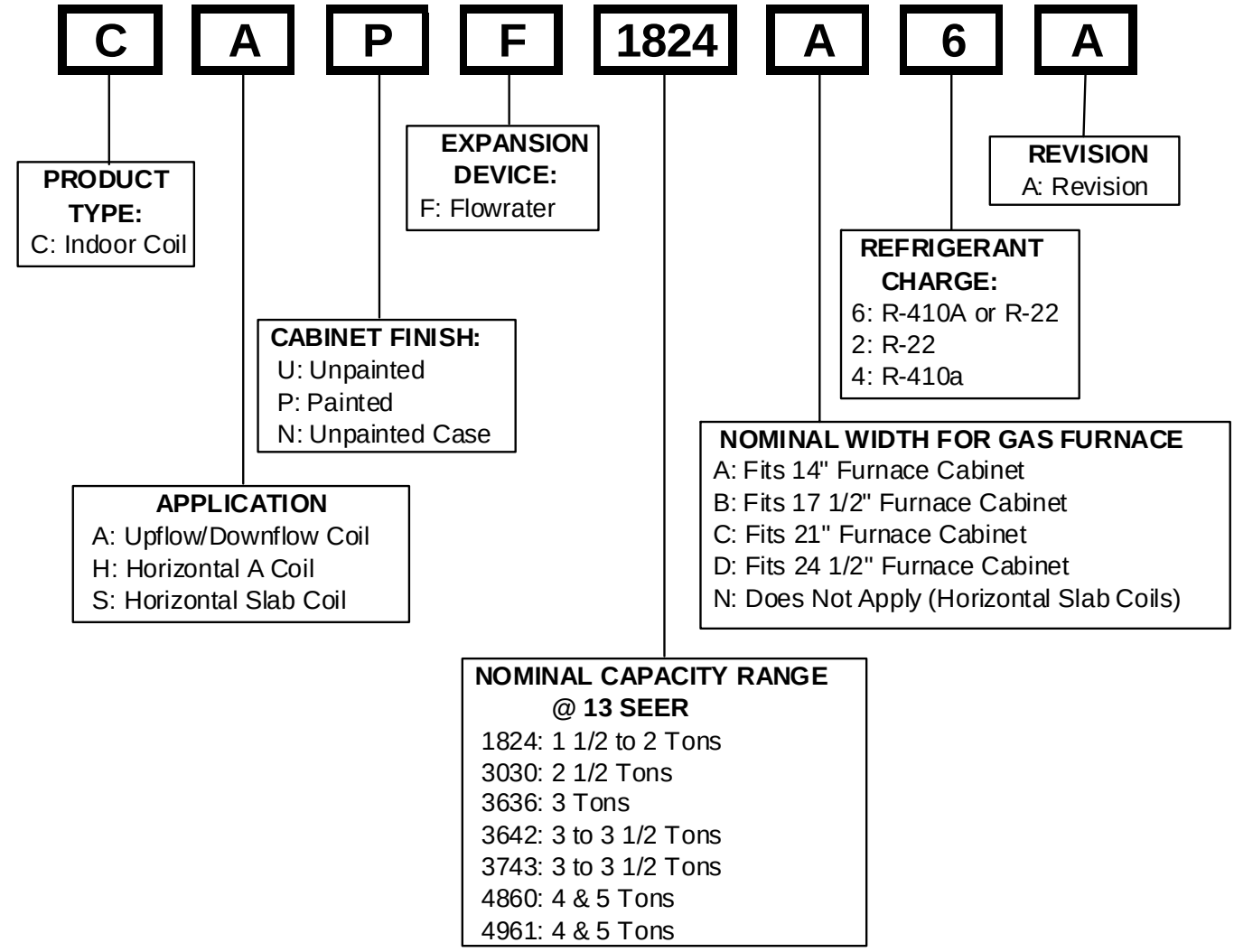
AUXILIARY LIMIT SWITCHES	
Part Number	**B1370155**
Open Setting (°F)	120
GDH80453AX*	1
GDH80703AX*	1
GDH80904BX*	1
GDH81155CX*	1

PRODUCT DESIGN

Coil Matches:

A large array of Goodman® brand coils are available for use with the GDH8 furnaces, in dedicated downflow applications. These coils are available in both cased and uncased models (with the option of a field installed TXV expansion device). These 80% furnaces match up with the existing Goodman® 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 AHRI 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

MINIMUM FILTER SIZES		
FURNACE INPUT	**FILTER SIZE**	**TYPE**
45M	160 in^2	permanent
70M	241 in^2	permanent
90M	320 in^2	permanent
115M	400 in^2	permanent
140M	370 in^2	permanent
45M	320 in^2	disposable
70M	483 in^2	disposable
90M	640 in^2	disposable
115M	800 in^2	disposable
140M	738 in^2	disposable

PERMANENT NOMINAL 600 F.M. FACE VELOCITY
DISPOSABLE NOMINAL 300 F.M. FACE VELOCITY

PRODUCT DESIGN

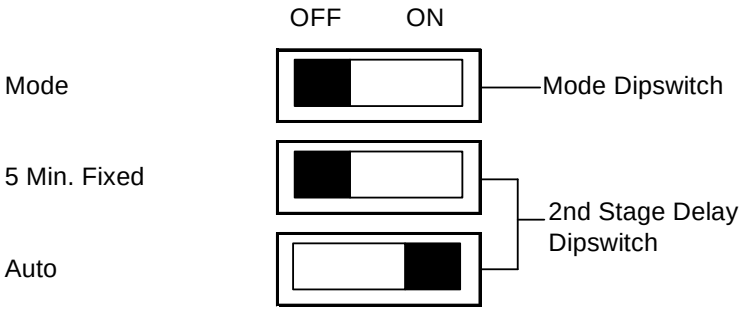
Dual $aver Configuration & Operation

Dual $aver

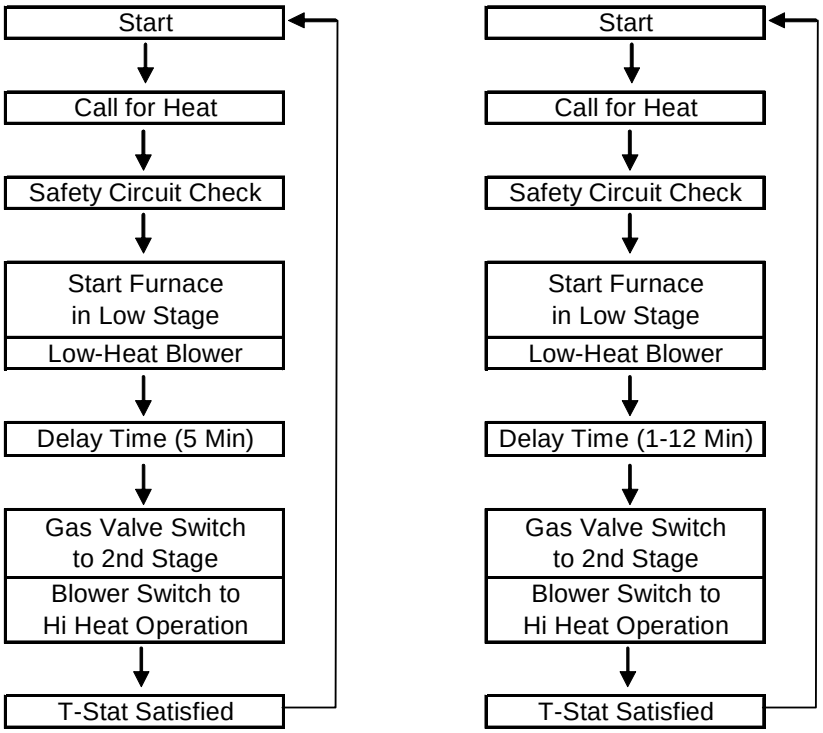
This furnace is capable fo the following heating modes:

- 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 thermosat.



FURNACE SPECIFICATIONS GDH8

MODEL	GDH80453AX*	GDH80703AX*	GDH80904BX*	GDH81155CX*
Btuh Input (US) High Fire	45,000	70,000	90,000	115,000
Output (US) High Fire	36,000	56,000	72,000	92,000
A.F.U.E.	80%	80%	80%	80%
Rated External Static (" w.c.)	.20 - .50	.20 - .50	.20 - .50	.20 - .50
Temperature Rise (°F)	25 - 55	25 - 55	30 - 60	40 - 70
High Stage Pressure Switch Trip Point (" w.c.)	-0.60	-0.60	-0.60	-0.70
Blower Wheel (D" x W")	10 X 6	10 x 6	10 x 8	10 x 10
Blower Horsepower	1/3	1/3	1/2	1/2
Blower Speeds	4	4	4	4
Max CFM @ 0.5 E.S.P.				
Power Supply	115-60-1	115-60-1	115-60-1	115-60-1
Minimum Circuit Ampacity (MCA)	8.5	8.5	12.9	12.9
Maximum Overcurrent Device	15	15	15	15
Transformer (VA)	40	40	40	40
Heat Anticipator (Amps)	0.7	0.7	0.7	0.7
Primary Limit Setting (°F)	250	250	250	250
Auxiliary Limit Setting (°F)	120	120	120	120
Rollout Limit Setting (°F)	300	300	300	300
Gas Supply Pressure (Natural/Propane) (" w.c.)	7 / 11	7 / 11	7 / 11	7 / 11
Manifold Pressure (Natural/Propane) High Stage (" w.c.)	3.5 / 10	3.5 / 10	3.5 /10	3.5 /10
Orifice Size (Natural/Propane)	#43 / #55	#43 / #55	#43 / #55	#43 / #55
Number of Burners	2	3	4	5
Vent Connector Diameter (inches)	4	4	4	4
Shipping Weight (lbs.)	120	130	153	175

1. These furnaces are manufactured for natural gas operation. Optional Kits are available for conversion to propane gas operation.
2. For elevations above 2000 ft. the rating should be reduced by 4% for each 1000 ft. 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 manufactures method 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, steady state efficiency times output.
4. Minimum Circuit Ampacity calculated as: (1.25 x Circulator Blower Amps) + I.D. Blower Amps.

BLOWER PERFORMANCE SPECIFICATIONS

BLOWER PERFORMANCE

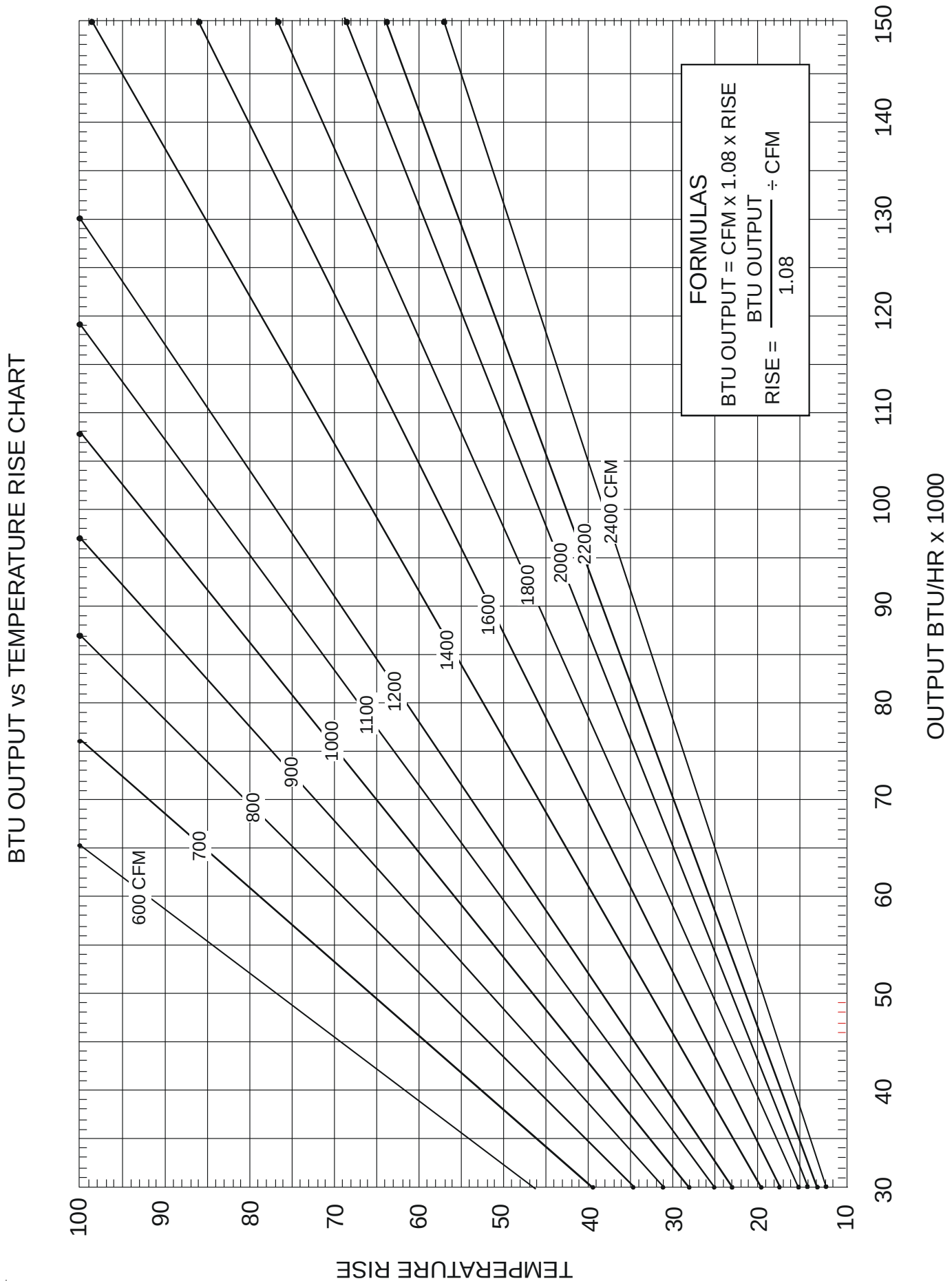
(CFM & Temperature Rise vs. External Static Pressure)

(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
	HIGH	3.0	1435	---	1421	---	1380	---	1322	25	1262	26	1200	1144	1064
GDH80453AX*	MED	2.5	1140	29	1114	30	1084	31	1063	31	1039	32	1002	943	897
(MEDIUM)	MED-LO	2.0	899	37	889	37	875	38	871	38	857	39	821	780	745
	LOW	1.5	691	48	674	49	665	50	651	51	637	52	618	562	525
	HIGH	3.0	1406	37	1393	37	1379	37	1307	39	1262	41	1208	1145	1070
GDH80703AX*	MED	2.5	1153	45	1101	347	1077	48	1039	50	1028	50	987	947	885
(MEDIUM)	MED-LO	2.0	890	58	896	58	873	59	862	60	834	---	798	771	727
	LOW	1.5	690	---	682	---	664	---	631	---	616	---	583	549	509+
	HIGH	4.0	2007	---	1993	---	1975	---	1940	---	1844	36	1770	1668	1559
GDH80904BX*	MED	3.5	1612	41	1606	41	1570	42	1533	43	1501	44	1448	1373	1301
(MEDIUM)	MED-LO	3.0	1325	50	1299	51	1280	52	1244	53	1222	54	1186	1140	1079
	LOW	2.5	1043	64	1040	64	1032	64	1002	---	981	---	955	915	869
	HIGH	5.0	2381	---	2312	---	2312	---	2219	---	2134	40	2024	1930	1839
GDH81155CX*	MED	4.0	1801	47	1801	51	1667	51	1638	52	1613	53	1513	1441	1369
(MEDIUM)	MED-LO	3.5	969	---	969	---	1140	---	1223	69	1269	67	1292	1322	1358
	LOW	3.0	1100	---	1100	---	1060	---	1031	---	1001	---	953	937	874

NOTES:

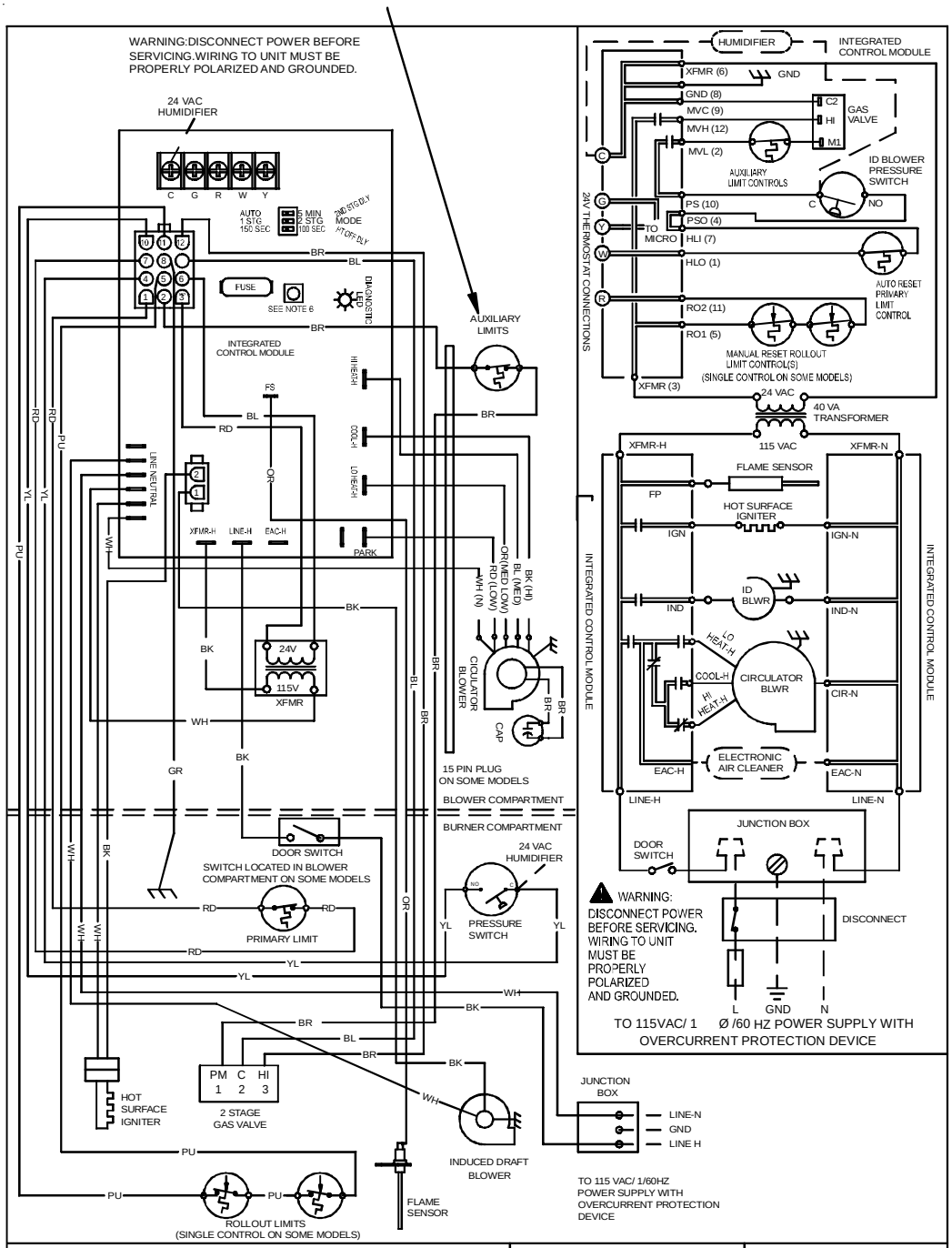
- CFM in chart is without filter(s). Filters do not ship with this furnace, but must be provided by the installer.
- All furnaces ship as high-speed cooling. Installer must adjust blower cooling speed as needed.
- For most jobs, about 400 CFM per ton when cooling is desirable
- INSTALLATION IS TO BE ADJUSTED TO OBTAIN TEMPERATURE RISE WITHIN THE RANGE SPECIFIED ON THE RATING PLATE.
- The chart is for information only. For satisfactory operation, external static pressure must not exceed values shown on the rating plate. The shaded area indicates ranges in excess of maximum static pressure allowed when heating.
- The dashed (- - -) areas indicate a temperature rise not recommended for this model.
- The above chart is for U.S. furnaces installed at 0' - 2,000'. At higher altitudes, a properly de-rated unit will have approximately the same temperature rise at a particular CFM, while ESP at the CFM will be lower.

BLOWER PERFORMANCE SPECIFICATIONS



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



- STEADY ON = NORMAL OPERATION
- OFF = CONTROL FAILURE
- 1 FLASH = SYSTEM LOCKOUT (RETRIES/RECYCLES EXCEEDED)
- 2 FLASHES = PRESSURE SWITCH STUCK CLOSED
- 3 FLASHES = PRESSURE SWITCH STUCK OPEN
- 4 FLASHES = OPEN HIGH LIMIT
- 5 FLASHES = FLAME SENSE WITHOUT GAS VALVE
- 6 FLASHES = OPEN ROLLOUT OR OPEN FUSE
- 7 FLASHES = LOW FLAME SIGNAL
- RAPID FLASHES = REVERSED 115 VAC POLARITY/VERIFY GND

- LOW VOLTAGE (24V)
- LOW VOLTAGE FIELD
- HI VOLTAGE (115V)
- HI VOLTAGE FIELD
- JUNCTION
- TERMINAL
- INTERNAL TO INTEGRATED CONTROL
- PLUG CONNECTION

- EQUIPMENT GND
- FIELD GND
- FIELD SPLICE
- SWITCH (TEMP.)
- IGNITER
- SWITCH (PRESS.)
- OVERCURRENT PROT. DEVICE

COLOR CODES:

YL YELLOW	PK PINK
OR ORANGE	BR BROWN
PU PURPLE	WH WHITE
GR GREEN	BL BLUE
BK BLACK	GY GRAY
	RD RED

0140F00581 REV. B

NOTES:
1. SET HEAT ANTICIPATOR ON ROOM THERMOSTAT AT 0.7 AMPS.
2. MANUFACTURER'S SPECIFIED REPLACEMENT PARTS MUST BE USED WHEN SERVICING.
3. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE FURNACE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 105 °C. USE COPPER CONDUCTORS ONLY.
4. BLOWER SPEEDS SHOULD BE ADJUSTED BY INSTALLER TO MATCH THE INSTALLATION REQUIREMENTS SO AS TO PROVIDE THE CORRECT HEATING TEMPERATURE RISE AND THE CORRECT COOLING CFM. (SEE SPEC SHEET FOR AIR FLOW CHART)
5. UNIT MUST BE PERMANENTLY GROUNDED AND CONFORM TO N.E.C. AND LOCAL CODES.
6. TO RECALL THE LAST 5 FAULTS, MOST RECENT TO LEAST RECENT, DEPRESS SWITCH FOR MORE THAN 2 SECONDS WHILE IN STANDBY(NO THERMOSTAT INPUTS).

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

SCHEMATICS

WARNING

HIGH VOLTAGE!
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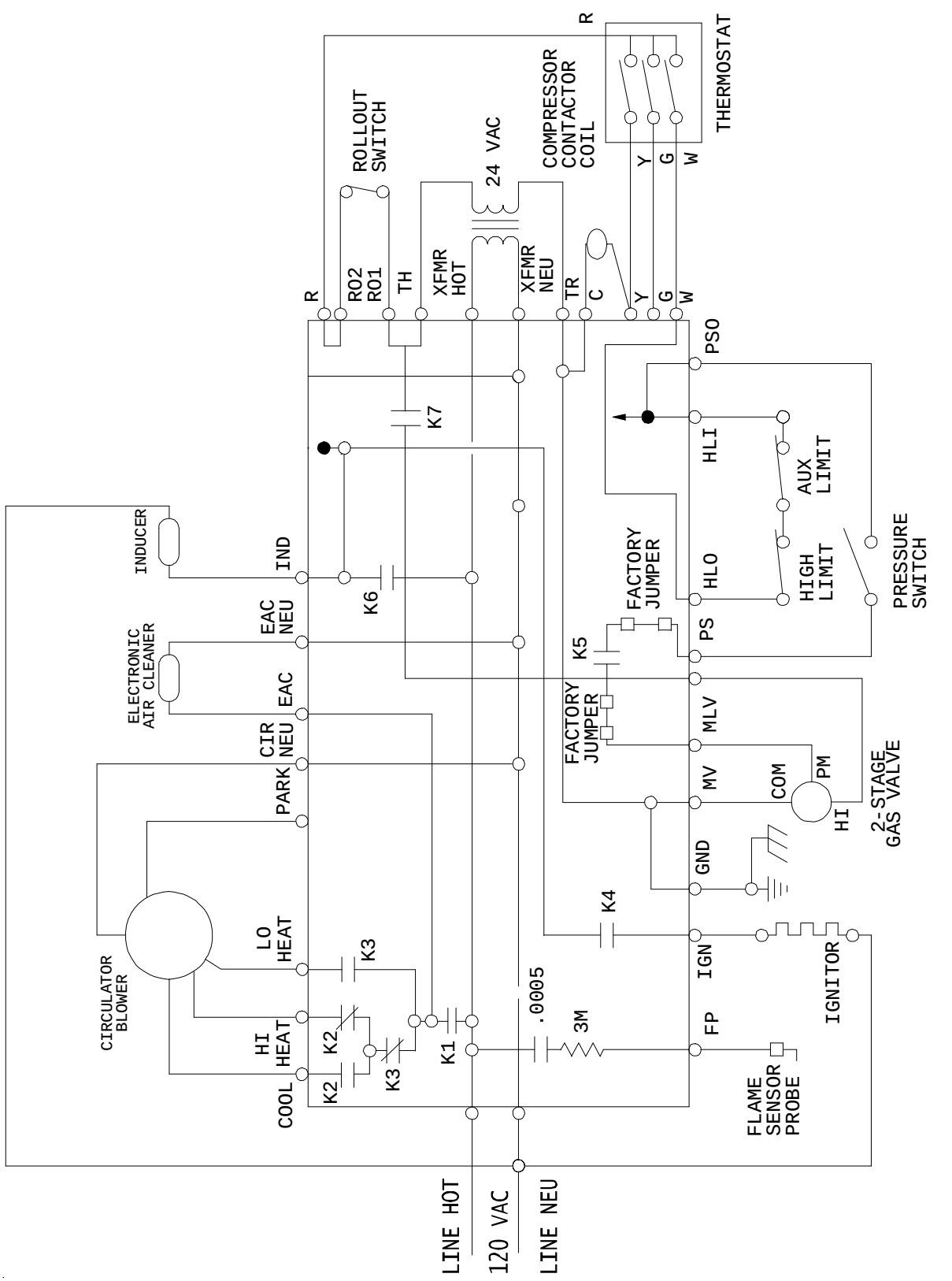

TYPICAL SCHEMATIC
GDH8 ___XA MODEL FURNACES
WR 50M56-289 INTEGRATED IGNITION CONTROL

This schematic is for reference only. Not all wiring is as shown above. Refer to the appropriate wiring diagram for the unit being serviced.

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