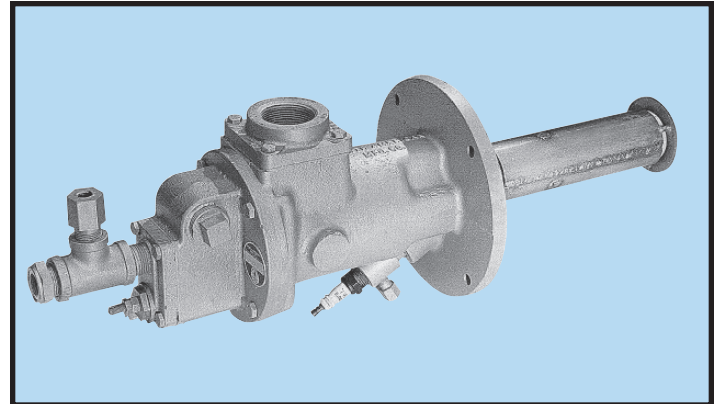


**HIGH HEAT RELEASE**

**EVEN HEAT RELEASE**

**LOW TUBE MAINTENANCE**

**COLD OR PREHEATED  
(TO 1000 F) COMBUSTION AIR**



- Uses every square inch of available tube surface for heat transfer
- Avoids hot spots and burn-outs--more uniform product and longer tube life
- Provides an engineered combination of diffusion flame and adjustable primary air:
  - a) Controlled mixing gives highly radiant flame, distributing heat release along entire length of the tube.
  - b) Primary air adjustment allows matching flame characteristics to tube configuration.
  - c) Optional air jet permits high turndown, using ambient or preheated air, without sooting or smoke.

**LOW BURNER MAINTENANCE**

**EASY LIGHTING**

- Alloy non-sooting flame holder eliminates overheating
- Unique lighting arrangement avoids high-maintenance bayonet pilot or long electrode:
  - a) Electrode is in cool zone near tube entrance.
  - b) Safe, reliable ignition carried to flame holder on first wave of partial pre-mixture.

**Air Capacity.** Capacities in Table 1 are for burners with 30% primary air, which is how burners should be set for initial adjustment.

Wide open adjustment of primary air screw increases primary air to about 40% and total air capacity to about 117% of Table 1 figures. Table 2 shows approximate number of turns of air adjusting screw for 30% and full open primary air. Installations using greater than 30% primary air must have blower capacity increased accordingly.

Primary air also can be adjusted for smoother operation (dependent on tube configuration).

**Mounting and Installation.** Each burner is flanged for easy mounting on a radiant tube. See Table 1 for suggested tube diameters. Using cold air, distance from burner flange to in-side of furnace wall should not exceed 18" to avoid overheating tube inside the wall. If combustion air is hotter than 400 F, maximum wall thickness is 12" (a thicker wall must be "notched" around tube beyond 12". Consult Cleveland for walls thicker than 18".

**Burners include:** built-in primary air adjustment, observation port, and electrode ignition.

**Flame Supervision.** Flame supervision is available. Refer to Bulletin 8832 for available options.

**TABLE 1.**

Capacities and Tube Sizes

Capacities shown are with 30% primary air. For Btu/hr, multiply scfh air by 100.

Apply correction factor from Table 2 for 20% or 40% primary air operation.

Burner designation	scfh air with pressure drop across the burner of						radiant tube inside diameter	
	1 osi	5 osi	6 osi	8 osi	12 osi	16 osi	minimum	maximum
4724-2-E	585	1 300	1 430	1 650	2 010	2 330	3¾"	4½"
4724-3-E	885	1 980	2 160	2 500	3 050	3 540	3¾"	5¾"
4724-4-E	1450	3 240	3 540	4 100	5 000	5 800	4¾"	6½"
4724-5-E	2370	5 300	5 800	6 700	8 150	9 500	5¾"	6½"
4724-6-E	3710	8 300	9 100	10 500	12 800	14 800	5¾"	8¼"
4724-7-E	6100	13 600	15 000	17 200	21 000	24 400	6½"	10"

**TABLE 2**

Primary Air Screw adjustments for 20%, 30%, and 40% primary air.

adjusting screw turns closing (from full open)	Burner designation					
	4724-2-E	4724-3-E	4724-4-E	4724-5-E	4724-6-E	4724-7-E
20% primary air 87.5% capacity	6	5½	9	8	8	6
30% primary air 100% capacity	4½	3½	7	5½	4	0
40% primary air 117% capacity	3½	1½	5½	0	†	†

† 30% Primary air is maximum capacity of burner.

**TABLE 3**

Capacities (scfh) with 800 F preheated air  
30% primary air setting.

Burner designation	pressure, osi				
	0.6	1	4	9	16
4724-2-E	—	410	805	1 200	1 610
4724-3-E	480	590	1190	1 760	2 400
4724-4-E	760	990	2040	3 130	4 190
4724-5-E	1260	1530	3060	4 660	6 300
4724-6-E	1960	2410	4820	7 350	9 800
4724-7-E	3000	4000	8000	11 900	15 700

**TABLE 4.** Minimum Natural Gas Pressure Factors.

Burner size	Factor
-2	0.01
-3	0.01
-4	0.02
-5	0.04
-6	0.07
-7	0.09

To find approximate minimum natural gas pressure required at burner for Table 1 capacity ratings, multiply high fire air pressure by factor shown.

Do not use this table to set air/gas ratios.

(Consult Fives North American for factors for other gases. See Lighting and Operating Instructions for burners with gas pilots.)

Capacity Tables do not include electrode air (30 scfh), UV cooling air, or mixing air jet.

**Selection example.** Select burners for installation requiring 350 000 Btu/hr gross heat release in each tube, with 8 osi air pressure drop across the burners.

To allow for possible adjustment of primary air to 20% for best heat-distribution in tubes, divide required capacity by 87.5% (from Table 2).

Capacity to use for burner selection = 350 000 ÷ 0.875 = 400 000 Btu/hr.

From Table 1, select 4724-4-E Burner (rated at 410 000 Btu/hr with 8 osi air).

Because primary air adjustment might be opened to 40%, consider blower with 117% of rated burner capacity: 4100 cfh (per burner) × number of burners × 1.17.

## LIGHTING and OPERATING INSTRUCTIONS

Main flame is lighted by an electrode igniter, which is positioned behind the flame front to prevent being overheated.

Because the electrode is located in a fuel-rich environment inside the burner, it must be powered with 6000-volt transformer before burner gas valve is opened. A small quantity of ignition air must be supplied to the 1/8" tap on the electrode adapter. Set this air at 5.5"wc (about 30 cfh); it may be left on or turned off after ignition.

**Spark must be turned off after ignition.** Spark distributor systems cannot be used.

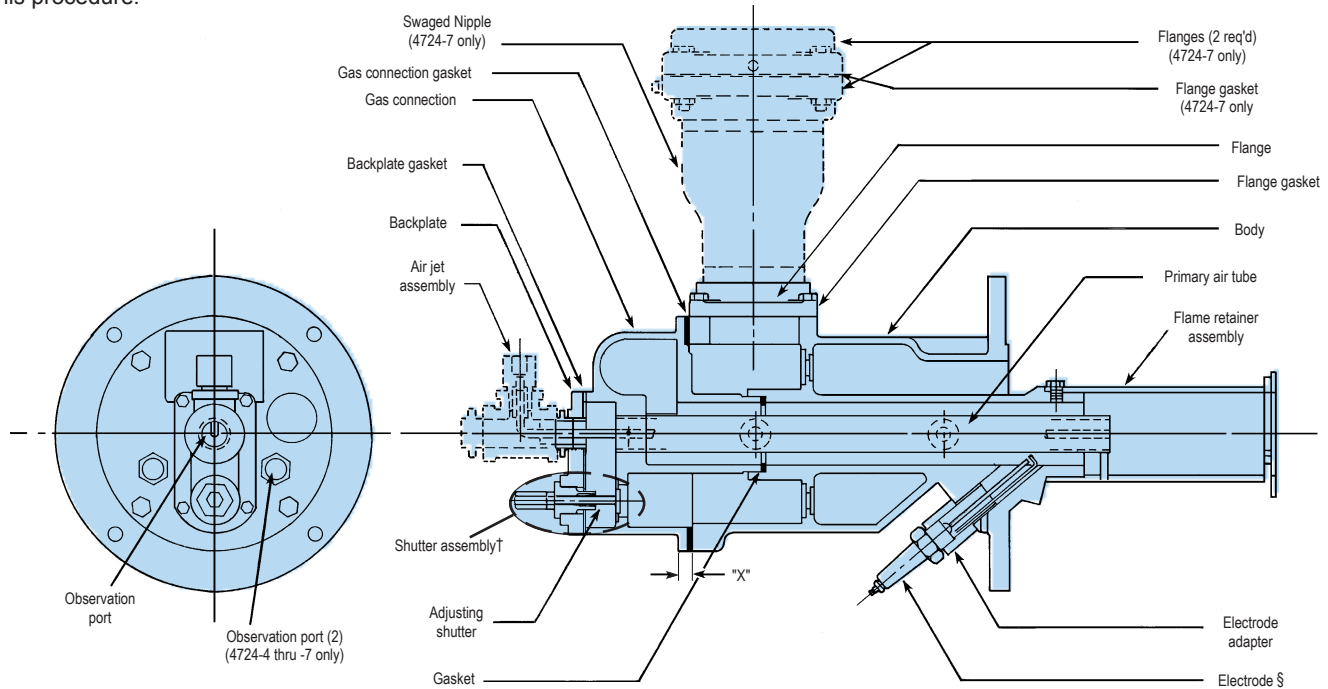
In some installations, it is desirable to have a pilot-like low fire setting of the burner. This can be realized by piping a rich premix instead of ignition air to the 1/8" electrode adapter tap, following this procedure:

Using a 4031 Mixer, turn on 30 cfh air, then spark, then gas per Table 5. After ignition, turn off spark.

If preheated main air is used, also turn off ignition air to mixer but leave on low flow gas (Table 5) as a low fire "pilot".

**Jet Capacities.** The optional Air Jet Assembly (permitting high turndown on modulating control) is designed for 90 scfh air at 16 psi for -2 through -5 size burners (minimum pressure is 12 psi). The -6 and -7 burners require a minimum of 180 scfh air at 16 psi. Specify "J" suffix in burner designation.

**Natural Gas** is standard. Burners are suitable for propane gas with primary air setting increased to avoid soot formation. For other gases, consult Fives North American.

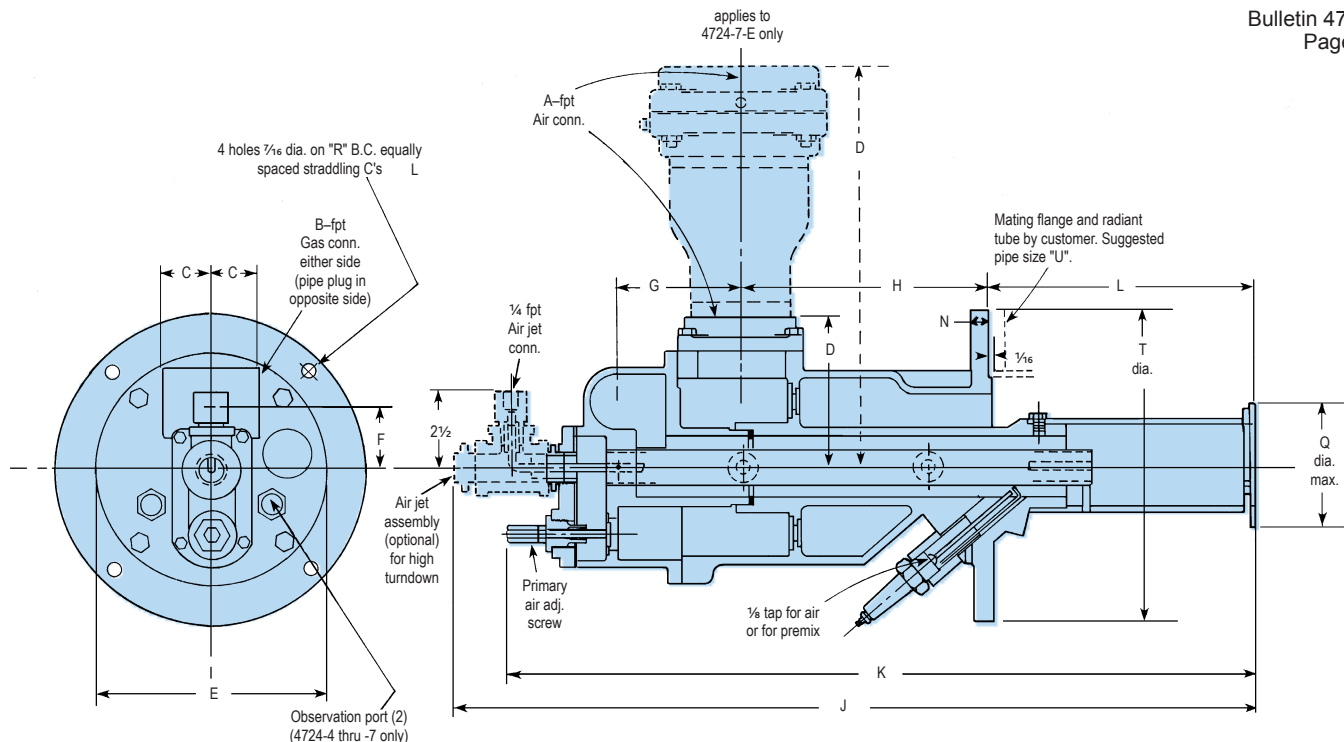


Part Name	Burner designation					
	4724-2-E	4724-3-E	4724-4-E	4724-5-E	4724-6-E	4724-7-E
Adjusting Shutter	4-7913-1	4-7913-2	4-7913-3	4-7913-4	4-7913-6	4-7913-5
Backplate	4-7944-1	4-7944-1	4-7935-1	4-7935-1	4-7935-1	4-7935-1
Backplate Gasket	4-7945-1	4-7945-1	4-7946-1	4-7946-1	4-7946-1	4-7946-1
Body	4-7903-1	4-7903-2	4-7923-1	4-7923-2	4-7923-3	4-7923-4
Electrode§	R240-3203	R240-3203	R240-3203	R240-3203	R240-3203	R240-3203
Electrode Adapter	4-7915-1	4-7915-1	4-7915-2	4-7915-2	4-7915-2	4-7915-2
Flame Retainer Assembly	4-7906-1	4-7906-1	4-7916-1	4-7916-1	4-7926-1	4-7926-1
Flange	8765-2-B	8765-3-B	8765-4-C	8765-5-C	8765-6-C	8765-6-C
Flanges (-7 only) (2 req'd)	—	—	—	—	—	4-1695-5
Flange Gasket	4-5371-1	4-5371-1	4-5371-2	4-5371-2	4-5371-2	4-5371-2
Flange Gasket (-7 only)	—	—	—	—	—	4-5371-3
Gas Connection Gasket*	4-22039-1	4-22039-1	4-22039-2	4-22039-2	4-22039-2	4-22039-2
Gas Connection	4-7943-1	4-7943-1	4-7937-1	4-7937-3	4-7937-2	4-7937-2
Gasket	R289-8730	R289-8730	R289-8731	R289-8731	R289-8731	R289-8731
Air Jet Assembly	4-7938-1	4-7938-2	4-7938-3	4-7938-3	4-7938-4	4-7938-4
Observation Port (2 req'd)	—	—	8790-01	8790-01	8790-01	8790-01
Observation Port	8790-0	8790-0	8790-0	8790-0	8790-0	8790-0
Primary Air Tube	4-8307-1	4-8307-1	4-8308-1	4-8308-1	4-8309-1	4-8309-1
Shutter Assembly†	4-11148-1	4-11148-2	4-11148-3	4-11148-4	4-11148-5	4-11148-6
Swaged Nipple (4 x 3) -7 only)	—	—	—	—	—	R590-7397

§ Electrode must be rotated as shown and not touching Primary Air Tube.

\* Should minor air leakage occur between the body and gas connection castings on burners manufactured prior to September 1996, it will be necessary to install this new gasket. At the same time, it will be necessary to replace the copper-clad "gasket" and install a new gas connection. All three parts are to be ordered from the factory. Part numbers are listed in the above chart. To verify that you have received the proper gas connection, the "X" dimension of 25/64" should be checked.

† Shutter Assembly includes Adjusting Shutter, Body Plug, Nut, and Locking Nut assembled and pinned.



Burner designation	dimensions in inches																wt, lb
	A	B	C	D	E	F	G	H	J	K	L	N	Q	R	T	U	
4724-2-E	1 1/4	1	1 1/8	4	5 7/8	1 5/16	3 3/8	6 3/16	23 5/8	22	9	1/2	2 15/16	7	8	4	30
4724-3-E	1 1/2	1	1 1/8	4	5 7/8	1 5/16	3 3/8	6 3/16	23 5/8	22	9	1/2	2 15/16	7	8	4	30
4724-4-E	2	1 1/4	1 9/16	4 15/16	7 1/2	2 1/8	4 1/16	8 1/16	26	24 3/8	8 5/8	9/16	4	9	10	6	60
4724-5-E	2 1/2	1 1/4	1 9/16	4 15/16	7 1/2	2 1/8	4 1/16	8 1/16	26	24 3/8	8 5/8	9/16	4	9	10	6	60
4724-6-E	3	1 1/2	1 9/16	5 5/16	7 1/2	2 1/8	4 1/16	8 1/16	26 1/4	24 5/8	8 7/8	9/16	5 1/4	9	10	8	60
4724-7-E	4	1 1/2	1 9/16	15 5/16	7 1/2	2 1/8	4 1/16	8 1/16	26 1/4	24 5/8	8 7/8	9/16	5 1/4	9	10	8	60

DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM FIVES NORTH AMERICAN COMBUSTION, INC. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

**TABLE 5**

Low Fire Gas Flows, scfh.

4724-2	15
4724-3	15
4724-4	10
4724-5	12
4724-6	30

Note: For 4724-7, consult factory.

To Order, specify: 4724-(code for air pipe size)-E, (or EJ for optional jet for high turndown) Burner complete.

**Examples:** 4724-4-EJ Burner complete with optional air jet  
4724-7-E Burner complete

"Burner complete" includes burner with primary air adjustment, observation port, and electrode ignition.

**WARNING:** Situations dangerous to personnel and property may exist with the operation and maintenance of any combustion equipment. The presence of fuels, oxidants, hot and cold combustion products, hot surfaces, electrical power in control and ignition circuits, etc., are inherent with any combustion application. Parts of this product may exceed 160F in operation and present a contact hazard. Fives North American Combustion, Inc. urges compliance with National Safety Standards and insurance Underwriters recommendations, and care in operation.