

North American Tempest® III



6435 High Velocity Dual-Fuel™ Burners

- Wide stability range
- Useful capacity ranges
- Easy inspection/service

Product Overview | Tempest® III High Velocity

TEMPEST III BURNERS FEATURE:

HIGH VELOCITY—Comparable to North American’s renowned 4442 Tempest I gas burner.

DUAL-FUEL—Natural gas and/or distillate oil only. Not suitable for blends containing residuals such as Indian "LDO" or similar.

WIDE STABILITY RANGE—From 15% excess fuel to 400% excess air.

UNIT CONSTRUCTION—The high temperature tile is secured in the main body section—no extra support is required.

USEFUL CAPACITY RANGES—Ratings from 130 000 to 1 600 000 Btu/h HHV.

EASY INSPECTION/SERVICE—Air and gas piping need not be removed for complete access to internals.

PREHEATED AIR CAPABILITY—To 800°F main air temperature at the burner.

FUEL PRESSURES—Natural gas - 12 osig, #2 oil - 2.5 psig.

TABLE 1. Main and Atomizing Air capacities
scfh*
(for Btu/hr HHV multiply by 100)

Burner	fuel	Main Air					Atomizing Air (with 16 osi Main Air)		Flame lengths 16 osi Main Air
		0.2	1	4	9	16	8 osi (gas)	30 osi (oil)	
6435-1	gas	65	240	545	870	1220	75	180	9"
	oil	85	232	545	865	1200			
6435-2	gas	170	500	1090	1660	2280	30	140	8"
	oil	165	430	1070	1660	2280			
6435-3	gas	235	680	1530	2490	3420	70	180	12"
	oil	300	665	1430	2320	3180			
6435-4	gas	545	1270	2830	4350	6050	160	390	20"
	oil	665	1240	2750	4310	5850			
6435-5	gas	895	2060	4460	6950	9500	400 @ 16 osi	585	22"
	oil	895	2110	4760	7450	10000			
6435-6	gas	1000	3500	7100	11300	15200	380 @ 16 osi	470	38"
	oil	1200	3600	7400	11200	15000			

*burning on stoichiometric ratio

TABLE 2. Main and Atomizing Air
scfh
capacities not burning
(use to size blowers)

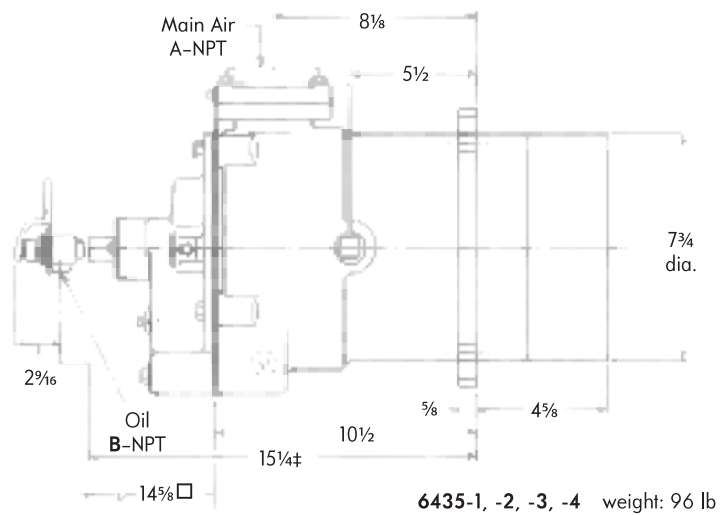
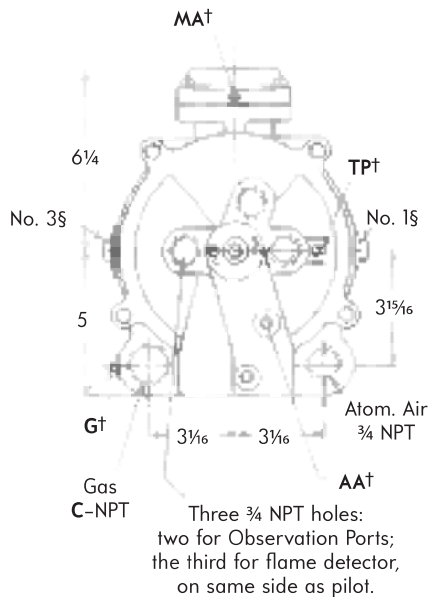
Burner	Main Air at 16 osi	Atomizing Air (with 16 osi Main Air)	
		at 8 osi	at 30 osi
6435-1	1350	90	180
6435-2	3000	90	190
6435-3	4120	100	200
6435-4	7240	240	460
6435-5	12100	430 @ 16 osi	590
6435-6	17500	430 @ 16 osi	590

TABLE 3. Maximum %XSAir
(16 osi Main Air)

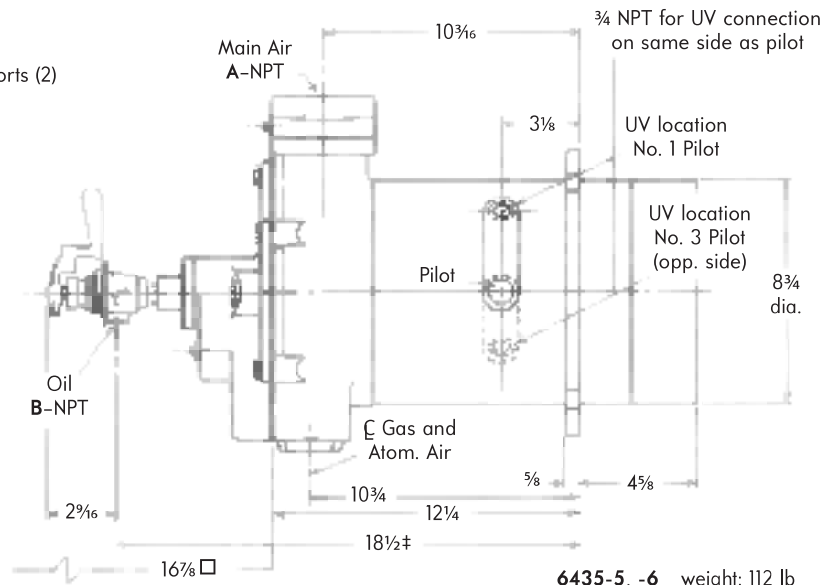
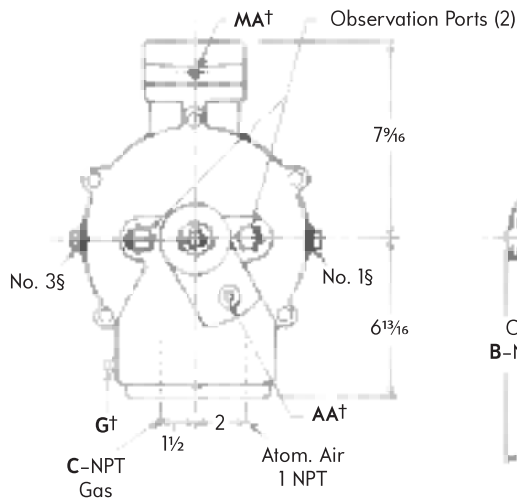
Fuel	Burner size					
	-1	-2	-3	-4	-5	-6
Natural Gas	400	400	400	350	350	600
#2 Oil	200	300	400	300	350	600

Dimensions | Tempest[®] III High Velocity

DIMENSIONS in inches



6435-1, -2, -3, -4 weight: 96 lb



6435-5, -6 weight: 112 lb

Recommended Pilot Tip 4021-12.

‡ Dimension assumes close nipple between burner and Sensitrol™ Oil Valve.

§ Pilot position designation (No. 1 or No. 3) must be specified on order.

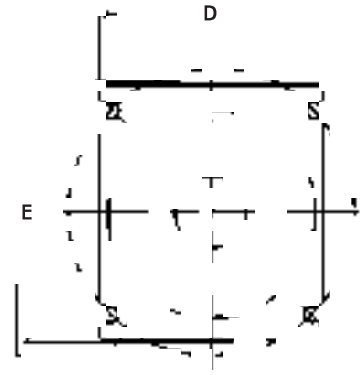
□ Minimum for removal of internals including Sensitrol Valve.

† ½ fpt Pressure Taps: MA—Main Air, G—Gas, AA—Atomizing Air, TP—Tile Pressure.

Tile | Tempest[®] III High Velocity

6435	A	B	C	D	E	tile exit hole diameter	Sensitrol Oil Valve
-1	1	1/4	1	8 3/8	9 1/8	1 5/64	1813-03
-2	1 1/4	1/4	1	8 3/8	9 1/8	1 1/4	1813-03
-3	1 1/2	1/4	1	8 3/8	9 1/8	1 1/2	1813-03
-4	2	3/8	1	8 3/8	9 1/8	1 5/16	1813-02-A
-5	2 1/2	3/8	1 1/4	9 1/2	10 3/4	2 1/2	1813-02-A
-6	3	3/8	1 1/2	9 1/2	10 3/4	3	1813-02-B

(4) 3/8" slots, equally spaced on 10 1/4" BC for -1 thru -4; 12" BC for -5 and -6



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.

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. Components in combustion systems may exceed 160°F (71°C) surface temperatures and present hot surface contact hazard. Fives North American Combustion, Inc. suggests the use of combustion systems that are in compliance with all Safety Codes, Standards, Regulations and Directives; and care in operation.

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fives
Industry can do it

North American 6435 Dual-Fuel Burner Engineering Data

Sheet 6435-2

6435-1
Main Air Pressure, osi

Not Burning	0.2	1	4	9	16	30
Main air, scfh					1350	
Atom. air, scfh at 30 osi					195	
Atom. air, scfh at 8 osi					90	

Burning Natural Gas	0.2	1	4	9	16	30
Main air, scfh, stoich.	65	240	545	870	1220	1690
Atom. air, scfh at 8 osi, stoich.	90	90	90	90	75	50
† Total air, scfh, stoich.	290	465	770	1100	1430	1870
Gas flow, stoich., scfh	29	47	77	110	143	187
Gas pressure, stoich., osi	0.22	0.65	1.8	3.25	5.6	10.0
Flame length, in., stoich.	2	3	6	8	9	10
Flame diameter, in., stoich.	1	1	1	1	1	1
Tile pressure, osi, stoich.	0.15	0.4	1.15	2.1	3.5	6.2
Max. %XSAir						
‡ Stability and flame supervision	20	100	250	400	400	400
Ignition--pilot	20	100	250	400	400	400
Max. %XSFuel	25	25	25	25	25	0

Burning #2 Oil	0.2	1	4	9	16	30
Main air, scfh, stoich.	85	230	545	865	1200	1680
§ Atom. air, scfh at 30 osi, stoich.	195	190	190	185	180	175
† Total air, scfh, stoich.	415	555	870	1180	1520	1990
Oil flow, stoich., gph	0.29	0.39	0.62	0.84	1.08	1.42
Oil pressure, stoich., psi	0.1	0.1	0.1	0.2	0.35	0.69
Flame length, in., stoich.	2	2	4	8	9	11
Flame diameter, in., stoich.	1	1	1	2	2	2
Tile pressure, osi, stoich.	0.08	0.4	1.3	2.4	3.7	6.2
Max. %XSAir						
‡ Stability and flame supervision	20	50	50	110	200	250
• Ignition--pilot	20	50	50	110	200	250
Max. %XSFuel	25	25	25	25	25	0

† Total air is main air plus atomizing air plus 135 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

§ 30 osi is recommended atomizing air pressure for oil, but all burners will operate on oil with 22 osi atomizing air (at the burner) and 10% or more excess air.

• Direct spark ignition on oil is not considered a viable lighting method due to the lack of repeatability.

NOTE: Test results above were obtained with pilot air regulated at 2 osi above tile pressure, resulting in constant flow of 135-140 scfh air. Because of the small size of this burner, pilot air must **not** be run any higher.

Velocity: The distance (in inches) from the tile outlet to the point where the tile velocity pressure is 0.1"wc (1259 fpm) is 40" on gas and 48" on oil (firing stoichiometric with 16 osi main air pressure).

6435-2

Main Air Pressure, osi

Not Burning	0.2	1	4	9	16	30
Main air, scfh					3000	
Atom. air, scfh at 30 osi					150	
Atom. air, scfh at 8 osi					65	

Burning Natural Gas	0.2	1	4	9	16	30
Main air, scfh, stoich.	170	500	1090	1660	2280	3430
Atom. air, scfh at 8 osi, stoich.	65	65	45	45	30	30
† Total air, scfh, stoich.	375	705	1270	1850	2450	3600
Gas flow, stoich., scfh	37	71	127	185	245	360
Gas pressure, stoich., osi	0.1	0.58	2.02	4.62	7.97	11.55
Flame length, in., stoich.	6	4	6	6	6	11
Flame diameter, in., stoich.	2	2	3	2	2	3
Tile pressure, osi, stoich.	0.15	0.6	1.75	4.0	6.7	11.0
Max. %XSAir						
‡ Stability and flame supervision	100	350	400	400	400	200
Ignition--pilot	100	350	400	400	400	200
Max. %XSFuel	25+	25+	25+	25+	25+	0

Burning #2 Oil	0.2	1	4	9	16	30
Main air, scfh, stoich.	165	430	1070	1660	2280	3250
§ Atom. air, scfh at 30 osi, stoich.	150	145	145	140	140	120
† Total air, scfh, stoich.	455	715	1360	1940	2560	3510
Oil flow, stoich., gph	0.32	0.51	0.96	1.39	1.83	2.5
Oil pressure, stoich., psi	0.1	0.2	0.4	0.8	1.4	2.5
Flame length, in., stoich.	5	6	5	9	10	10
Flame diameter, in., stoich.	1.5	1.5	1.5	2	2	2.5
Tile pressure, osi, stoich.	0.1	0.55	1.75	3.9	6.6	12.3
Max. %XSAir						
‡ Stability and flame supervision	25	50	200	300	300	350
• Ignition--pilot	25	50	200	300	300	350
Max. %XSFuel	15+	15+	15+	15+	15+	0

† Total air is main air plus atomizing air plus 140 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

§ 30 osi is recommended atomizing air pressure for oil, but all burners will operate on oil with 22 osi atomizing air (at the burner) and 10% or more excess air.

• Direct spark ignition on oil is not considered a viable lighting method due to the lack of repeatability.

NOTE: Burner is stable on atomizing air only, but should not be operated below 0.2 osi main air to avoid overheating the tile.

Velocity: The distance (in inches) from the tile outlet to the point where the tile velocity pressure is 0.1"wc (1259 fpm) is 56" on gas and 60" on oil (firing stoichiometric with 16 osi main air pressure).

6435-3

Main Air Pressure, osi

Not Burning	0.2	1	4	9	16	30
Main air, scfh					4120	
Atom. air, scfh at 30 osi					210	
Atom. air, scfh at 8 osi					110	

Burning Natural Gas	0.2	1	4	9	16	30
Main air, scfh, stoich.	235	680	1530	2490	3420	4870
Atom. air, scfh at 8 osi, stoich.	110	100	95	85	70	65
† Total air, scfh, stoich.	480	915	1760	2710	3620	5100
Gas flow, stoich., scfh	48	92	176	271	362	510
Gas pressure, stoich., osi	0.2	0.9	2.3	4.2	7.0	12.4
Flame length, in., stoich.	9	9	14	14	12	12
Flame diameter, in., stoich.	2.5	2	2.5	2.5	3	2.5
Tile pressure, osi, stoich.	0.1	0.6	1.6	2.9	5.0	8.8
Max. %XSAir						
‡ Stability and flame supervision	100	400	400	400	400	400
Ignition--pilot	100	400	400	400	400	400
4051-D igniter limits (0.5 osig igniter air pressure)	XSF	80	150			
Max. %XSFuel	15+	15+	15+	15+	15	0

Burning #2 Oil	0.2	1	4	9	16	30
Main air, scfh, stoich.	300	665	1430	2320	3180	4510
§ Atom. air, scfh at 30 osi, stoich.	205	205	200	190	180	170
† Total air, scfh, stoich.	640	1000	1760	2460	3500	4820
Oil flow, stoich., gph	0.46	0.71	1.26	1.9	2.5	3.4
Oil pressure, stoich., psi	0.1	0.5	1.1	0.9	1.2	2.2
Flame length, in., stoich.	7	7	12	14	12	16
Flame diameter, in., stoich.	2	2.5	2.5	2.5	2.5	3
Tile pressure, osi, stoich.	0.15	0.6	1.9	3.6	6.2	11.9
Max. %XSAir						
‡ Stability and flame supervision	25	75	225	400	400	400
• Ignition--pilot	25	75	225	400	400	300
Max. %XSFuel	15+	15+	15+	15+	15+	0

† Total air is main air plus atomizing air plus 135 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

§ 30 osi is recommended atomizing air pressure for oil, but all burners will operate on oil with 22 osi atomizing air (at the burner) and 10% or more excess air.

• Direct spark ignition on oil is not considered a viable lighting method due to the lack of repeatability.

Velocity: The distance (in inches) from the tile outlet to the point where the tile velocity pressure is 0.1wc (1259 fpm) is 67" on gas and 68" on oil (firing stoichiometric with 16 osi main air pressure).

6435-4

Main Air Pressure, osi

Not Burning	0.2	1	4	9	16	20
Main air, scfh					7240	
Atom. air, scfh at 30 osi					460	
Atom. air, scfh at 8 osi					240	

Burning Natural Gas	0.2	1	4	9	16	20
Main air, scfh, stoich.	545	1270	2830	4350	6050	6900
Atom. air, scfh at 8 osi, stoich.	230	230	215	190	160	140
† Total air, scfh, stoich.	905	1630	3170	4670	6350	7150
Gas flow, stoich., scfh	90	163	317	467	635	715
Gas pressure, stoich., osi	0.1	0.7	2.4	5.2	8.7	10.7
Flame length, in., stoich.	11	18	20	20	20	22
Flame diameter, in., stoich.	3	3	3	4	4	5
Tile pressure, osi, stoich.	0.1	0.35	1.3	2.8	4.5	5.5
Max. %XSAir						
‡ Stability and flame supervision	75	300	350	400	350	350
Ignition--pilot	75	300	350	400	350	350
☐ Ignition--direct spark	Stoich	50	200	400	250	250
Max. %XSFuel	30+	30+	30+	30+	30+	0

Burning #2 Oil	0.2	1	4	9	16	20
Main air, scfh, stoich.	665	1240	2750	4310	5850	6590
§ Atom. air, scfh at 30 osi, stoich.	455	440	425	415	390	370
† Total air, scfh, stoich.	1250	1810	3305	4855	6370	7090
Oil flow, stoich., gph	1.0	1.3	2.4	3.5	4.6	5.1
Oil pressure, stoich., psi	0.9	1.0	1.2	1.5	1.8	2.1
Flame length, in., stoich.	10	10	17	19	20	20
Flame diameter, in., stoich.	3	3	3	4	4	4
Tile pressure, osi, stoich.	0.05	0.4	1.5	3.2	5.6	6.8
Max. %XSAir						
‡ Stability and flame supervision	25	50	200	250	300	300
• Ignition--pilot	25	50	200	200	200	200
Max. %XSFuel	10	20	20+	20+	20	0

† Total air is main air plus atomizing air plus 130 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

§ 30 osi is recommended atomizing air pressure for oil, but all burners will operate on oil with 22 osi atomizing air (at the burner) and 10% or more excess air.

☐ Electrode setup used was that shown in drawing B4-7249. Cooling air was shut off for ignition and turned back on afterwards.

• Direct spark ignition on oil is not considered a viable lighting method due to the lack of repeatability.

Velocity: The distance (in inches) from the tile outlet to the point where the tile velocity pressure is 0.1"wc (1259 fpm) is 75" on gas and 85" on oil (firing stoichiometric with 16 osi main air pressure).

6435-5

Not Burning	Main Air Pressure, osi					
	0.2	1	4	9	16	20
Main air, scfh					12 100	
Atom. air, scfh at 30 osi					700 s	
Atom. air, scfh at 16 osi					520 Δ	

Burning Natural Gas	0.2	1	4	9	16	20
Main air, scfh, stoich.	895	2060	4460	6950	9500	
Atom. air, scfh at 16 osi, stoich.	520Δ	510 Δ	485Δ	450Δ	400Δ	
† Total air, scfh, stoich.	1600	2760	5150	7600	10 100	
Gas flow, stoich., scfh	160	276	515	760	1 010	
Gas pressure, stoich., osi	0.1	0.8	2.8	6.3	10.8	
Flame length, in., stoich.	12	18	19	19	19	
Flame diameter, in., stoich.	4	4	5	6	6	
Tile pressure, osi, stoich.	0.1	0.4	1.4	3.5	5.8	
Max. %XSAir						
‡ Stability and flame supervision	20	250	400	350	350	
Ignition--pilot	20	250	400	325	200	
□ Ignition--direct spark	20	65	60	75	100	
Max. %XSFuel	30	30	30	30	10	

Burning #2 Oil	0.2	1	4	9	16	20
Main air, scfh, stoich.	895	2110	4760	7450	10 000	
§ Atom. air, scfh at 30 osi, stoich.	695▲	690▲	670▲	640▲	585▲	
† Total air, scfh, stoich.	1780	2990	5620	8280	10 775	
Oil flow, stoich., gph	1.1	2	3.9	5.8	7.6	
Oil pressure, stoich., psi	1.0	1.2	1.4	1.6	1.8	
Flame length, in., stoich.	10	14	24	24	24	
Flame diameter, in., stoich.	3	4	5	6	6	
Tile pressure, osi, stoich.	0.08	0.5	1.3	2.8	5.2	
Max. %XSAir						
‡ Stability and flame supervision	25	125	275	300	350	
• Ignition--pilot	25	125	275	225	150	
-Max. %XSFuel	20+	20+	20	20	20	

† Total air is main air plus atomizing air plus 190 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

§ 30 osi is recommended atomizing air pressure for oil, but all burners will operate on oil with 22 osi atomizing air (at the burner) and 10% or more excess air.

□ Electrode setup used was that shown in drawing B4-7249. The cooling air was left on for the ignition tests.

• Direct spark ignition on oil is not considered a viable lighting method due to the lack of repeatability.

▲ Figure includes 110 scfh air for cooling on spark for #2 oil.

Δ Figure includes 75 scfh air for cooling on spark for natural gas.

Velocity: The distance (in inches) from the tile outlet to the point where the tile velocity pressure is 0.1"wc (1259 fpm) is 130" on gas and 130" on oil (firing stoichiometric with 16 osi main air pressure).

6435-6

Main Air Pressure, osi

Not Burning	0.2	1	4	9	16	20
Main air, scfh					17 500	
Atom. air, scfh at 30 osi					560	
Atom. air, scfh at 16 osi					400	

Burning Natural Gas	0.1	1	4	9	16	20
Main air, scfh, stoich.	1000	3500	7100	11 300	15 200	16 900
Atom. air, scfh at 16 osi, stoich.	400	400	390	390	380	360
† Total air, scfh, stoich.	1530	4030	7600	11 800	15 700	17 400
Gas flow, stoich., scfh	153	403	760	1 180	1 570	1 740
Gas pressure, stoich., osi	0.1	0.7	2.4	5.2	9.0	11.2
Flame length, in., stoich.	15	27	24	36	36	36
Flame diameter, in., stoich.	4	6	7	7	8	8
Tile pressure, osi, stoich.	0	0.3	1.2	2.15	3.8	5.0
Max. %XSAir						
‡ Stability and flame supervision	5	300	600	600	600	550
Ignition--pilot	5	250	250	250	100	100
Max. %XSFuel	30	30	30	0	30%XSA	30%XSA

Burning #2 Oil	0.1	1	4	9	16	20
Main air, scfh, stoich.	1200	3600	7400	11 200	15 000	17 400
§ Atom. air, scfh at 30 osi, stoich.	560	540	540	500	470	480
† Total air, scfh, stoich.	1890	4270	8050	11 800	15 600	18 010
Oil flow, stoich., gph	1.4	3.1	5.8	8.5	11.1	12.9
Oil pressure, stoich., psi	-	-	-	1.0	2.2	3.5
Flame length, in., stoich.	15	24	31	36	36	40
Flame diameter, in., stoich.	4	5	7	7	7	8
Tile pressure, osi, stoich.	0	0.35	1.1	2.5	4.3	4.5
Max. %XSAir						
‡ Flame supervision	25	200	400	600	600	250
Stability	25	300	600	600	600	250
• Ignition--pilot	25	250	500	500	600	Δ
Max. %XSFuel	30	30	30	30	30	0

† Total air is main air plus atomizing air plus 130 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

§ 30 osi is recommended atomizing air pressure for oil, but all burners will operate on oil with 22 osi atomizing air (at the burner) and 10% or more excess air.

Δ Burner will not light.

- Direct spark ignition on oil is not considered a viable lighting method due to the lack of repeatability.

Velocity: The distance (in inches) from the tile outlet to the point where the tile velocity pressure is 0.1"wc (1259 fpm) is 105" on gas and 105" on oil (firing stoichiometric with 16 osi main air pressure).

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. Components in combustion systems may exceed 160°F (71°C) surface temperatures and present hot surface contact hazard. Fives North American Combustion, Inc. suggests the use of combustion systems that are in compliance with all Safety Codes, Standards, Regulations and Directives; and care in operation.

CONTACT

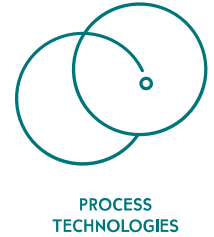
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Industry can do it



North American 6435 Dual-Fuel Burner Engineering Data, 800°F Hot Air

Sheet 6435-3

6435-1 - 800°F Main Air, Cold Atomizing Air

Main Air Pressure, osi

Burning Natural Gas	0.2	1	4	9	16	30
Main air, scfh, stoich.	110	190	410	630	840	1130
Atom. air, scfh at 8 osi, stoich.	50	50	45	45	40	35
†Total air, scfh, stoich.	295	375	590	810	1015	1300
Gas flow, stoich., scfh	29	37	59	81	101	130
Gas pressure, stoich., osi	0.21	0.55	1.2	2.2	3.5	6.0
Flame length, in., stoich.	3	4	6	8	10	10
Flame diameter, in., stoich	2	2	2	2	2	2
Tile pressure, osi, stoich.	0.15	0.37	0.68	1.3	2.1	3.6
Max. %XSAir						
‡Stability and flame supervision	100	150	250	350	350	400
‡Ignition--pilot	100	150	250	350	350	400
Max. %XSFuel	30	30	30	30	30	30

Burning #2 Oil	0.2	1	4	9	16	30
Main air, scfh, stoich.	75	190	410	620	840	1140
Atom. air, scfh at 30 osi, stoich.	110	110	115	115	115	115
†Total air, scfh, stoich.	320	435	650	870	1090	1385
Oil flow, stoich., gph	0.23	0.31	0.46	0.61	0.77	0.98
Oil pressure, stoich., psi	0.1	0.1	0.1	0.1	0.2	0.51
Flame length, in., stoich.	1	3	5	6	9	10
Flame diameter, in., stoich.	1	1	2	2	2	2
Tile pressure, osi, stoich.	0	0.25	0.86	1.4	2.3	3.8
Max. %XSAir						
‡Stability and flame supervision	10	10	10	25	75	100
‡Ignition--pilot	10	10	10	25	75	100
Max. %XSFuel	25	25	25	25	25	25

Because of the small size of the burner, the capacities when run with elevated air temperatures become very small and fuel rates (especially oil) become extremely difficult to set. The burner operating limits become much narrower with hot air.

The external metal temperatures recorded with neutral furnace pressure and in a cold chamber with preheated air were as follows:

Preheat Air temperature, F	Metal temperature, F		
	Body (near flange)	Body (Main Air Inlet Flange)	Backplate
400	325	310	270
600	380	380	350
800	420	430	410

† Total air is main air plus atomizing air plus scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

6435-2 - 800°F Main Air, Cold Atomizing Air

Burning Natural Gas	Main Air Pressure, osi					
	0.2	1	4	9	16	26
Main air, scfh, stoich.	200	510	950	1380	1860	2360
Atom. air, scfh at 8 osi, stoich.	60	60	60	50	40	20
†Total air, scfh, stoich.	390	700	1140	1560	2030	2510
Gas flow, stoich., scfh	39	70	114	156	203	251
Gas pressure, stoich., osi	0.2	0.6	1.6	3.0	5.0	7.7
Flame length, in., stoich.	6	8	10	11	12	14
Flame diameter, in., stoich.	1.5	2	2	2.5	2.5	2.5
Tile pressure, osi, stoich.	0.1	0.5	1.3	2.5	4.1	6.5
Max. %XSAir						
‡Stability and flame supervision	400	400	400	400	400	400
‡Ignition--pilot	400	400	400	400	400	400
Max. %XSFuel	30	30	30	30	30	30

Burning #2 Oil	0.2	1	4	9	16	26
Main air, scfh, stoich.	220	430	900	1390	1850	2320
Atom. air, scfh at 30 osi, stoich.	170	180	200	210	220	220
†Total air, scfh, stoich.	520	740	1230	1730	2200	2670
Oil flow, stoich., gph	0.38	0.53	0.88	1.24	1.57	1.9
Oil pressure, stoich., psi	—	—	0.1	0.5	0.7	1.0
Flame length, in., stoich.	4	8	10	11	12	12
Flame diameter, in., stoich.	2	2	2	2.5	2.5	2.5
Tile pressure, osi, stoich.	0.1	0.5	1.4	2.6	4.4	7.2
Max. %XSAir						
‡Stability and flame supervision	50	50	175	250	400	400
‡Ignition--pilot	50	50	175	250	400	400
Max. %XSFuel	25	25	25	25	20	5

The external metal temperatures recorded with neutral furnace pressure and in a cold chamber with preheated air were as follows:

Preheat Air temperature, F	Metal temperature, F		
	Body (near flange)	Body (Main Air Inlet Flange)	Backplate
400	240	260	240
600	290	330	350
800	305	470	450

† Total air is main air plus atomizing air plus 130 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

6435-3 – 800°F Main Air, Cold Atomizing Air

Burning Natural Gas	Main Air Pressure, osi					
	0.2	1	4	9	16	26
Main air, scfh, stoich.	200	545	1200	1840	2470	3370
Atom. air, scfh at 8 osi, stoich.	120	110	110	100	90	40
†Total air, scfh, stoich.	450	785	1440	2070	2690	3540
Gas flow, stoich., scfh	45	79	144	207	269	354
Gas pressure, stoich., osi	0.1	0.5	1.6	3.2	5.7	10
Flame length, in., stoich.	4	6	8	11	12	13
Flame diameter, in., stoich.	2	2	2	2	2	2.5
Tile pressure, osi, stoich.	0.01	0.35	1.14	2.3	4.15	7.0
Max. %XSAir						
‡Stability and flame supervision	100	300	400	400	400	400
Ignition--pilot	100	300	400	400	400	400
Max. %XSFuel	30	30	30	30	30	30

Burning #2 Oil	0.2	1	4	9	16	26
Main air, scfh, stoich.	210	540	1220	1860	2520	3390
Atom. air, scfh at 30 osi, stoich.	260	270	280	290	280	270
†Total air, scfh, stoich.	600	940	1630	2280	2930	3790
Oil flow, stoich., gph	0.43	0.68	1.16	1.63	2.1	2.7
Oil pressure, stoich., psi	0.6	0.8	1.1	1.4	1.6	1.9
Flame length, in., stoich.	5	7	9	10	12	12
Flame diameter, in., stoich.	2	2.5	2	3	3	3
Tile pressure, osi, stoich.	-0.05	0.3	1.33	2.45	4.05	6.7
Max. %XSAir						
‡Stability and flame supervision	10	75	250	400	400	400
Ignition--pilot	10	75	250	400	400	400
Max. %XSFuel	25	25	25	25	25	25

The external metal temperatures recorded with neutral furnace pressure and in a cold chamber with preheated air were as follows:

Preheat Air temperature, F	Metal temperature, F		
	Body (near flange)	Body (Main Air Inlet Flange)	Backplate
400	260	250	240
600	370	370	350
800	490	410	460

† Total air is main air plus atomizing air plus 130 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

6435-4 - 800°F Main Air, Cold Atomizing Air

Main Air Pressure, osi

Burning Natural Gas	0.2	1	4	9	16	20
Main air, scfh, stoich.	430	1050	2150	3200	4250	4780
Atom. air, scfh at 8 osi, stoich.	215	215	200	180	160	150
†Total air, scfh, stoich.	775	1400	2480	3510	4540	5060
Gas flow, stoich., scfh	78	140	248	351	454	506
Gas pressure, stoich., osi	0.15	0.6	1.9	4.1	6.9	8.5
Flame length, in., stoich.	8	13	16	18	18	18
Flame diameter, in., stoich.	2	3	3	4	4	4
Tile pressure, osi, stoich.	0.05	0.3	0.85	1.9	3.2	3.9
Max. %XSAir						
‡Stability and flame supervision	400	400	400	350	400	400
Ignition--pilot	350	400	400	350	400	400
• Ignition--direct spark	NO	10	150	150	300	300
Max. %XSFuel	30+	30+	30+	30+	30+	30+

Burning #2 Oil	0.2	1	4	9	16	20
Main air, scfh, stoich.	500	1020	2050	3150	4230	4770
Atom. air, scfh at 30 osi, stoich.	430	420	410	400	395	390
†Total air, scfh, stoich	1060	1570	2590	3680	4755	5290
Oil flow, stoich., gph	0.8	1.1	1.9	2.6	3.4	3.8
Oil pressure, stoich., psi	0.9	1.0	1.2	1.3	1.5	1.6
Flame length, in., stoich.	10	11	14	17	17	18
Flame diameter, in., stoich.	2	2	3	3	3	3
Tile pressure, osi, stoich.	0	0.25	1.0	1.9	3.2	4.1
Max. %XSAir						
‡Stability and flame supervision	25	50	125	250	300	300
Ignition--pilot	25	50	125	250	250	150
Max. %XSFuel	20+	20+	20+	20+	20+	20+

† Total air is main air plus atomizing air plus 130 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

- The electrode setup used was that shown in drawing B4-7249. The cooling air was shut off for ignition and turned back on afterwards.

Maximum body temperature 510°F.

6435-5 - 800°F Main Air, Cold Atomizing Air

Burning Natural Gas	Main Air Pressure, osi				
	0.2	1	4	9	16
Main air, scfh, stoich.	790	1580	3270	5050	7200
Atom. air, scfh at 16 osi, stoich.	480	460	430	410	380
†Total air, scfh, stoich.	1460	2230	3890	5650	7770
Gas flow, stoich., scfh	146	223	389	565	777
Gas pressure, stoich., osi	0.15	0.8	2.5	5.3	9.2
Flame length, in., stoich.	12	19	19	19	22
Flame diameter, in., stoich.	4	5	5	5	5
Tile pressure, osi, stoich.	—	0.35	1.1	2.3	3.9
Max. %XSAir					
‡Stability and flame supervision	75	200	400	400	350
Ignition--pilot	75	200	400	400	350
•Ignition--direct spark	5XSF	30XSF	50	40	50
Max. %XSFuel	30+	30+	30+	30+	30+

Burning #2 Oil	0.2	1	4	9	16
Main air, scfh, stoich.	790	1710	3580	5280	7300
Atom. air, scfh at 30 osi, stoich.	660	620	600	580	560
†Total air, scfh, stoich.	1640	2520	4370	6050	8050
Oil flow, stoich., gph	1.04	1.66	3.0	4.2	5.6
Oil pressure, stoich., psi	1.05	1.1	1.25	1.35	1.5
Flame length, in., stoich.	10	11	19	21	22
Flame diameter, in., stoich.	3	4	5	5	5.5
Tile pressure, osi, stoich.	—	0.3	0.95	1.95	3.4
Max. %XSAir					
‡Stability and flame supervision	30	125	275	300	350
Ignition--pilot	30	125	275	300	350
Max. %XSFuel	20+	20+	20+	20+	20

† Total air is main air plus atomizing air plus 130 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

- The electrode setup used was that shown in drawing B4-7249. The cooling air was shut off for ignition and turned back on afterwards.

Maximum body temperature 550°F.

6435-6 - 800°F Main Air, Cold Atomizing Air

Main Air Pressure, osi

Burning Natural Gas	0.1	1	4	9	16	20
Main air, scfh, stoich.	1200	2600	5200	7900	10 700	12 400
Atom. air, scfh at 20 osi, stoich.	410	410	400	400	400	380
†Total air, scfh, stoich.	1750	3150	5750	8450	11 200	12 900
Gas flow, stoich., scfh	175	315	575	845	1 120	1 300
Gas pressure, stoich., osi	0.1	0.6	2.2	4.6	7.8	9.5
Flame length, in., stoich.	15	21	24	24	24	24
Flame diameter, in., stoich.	4	4	5	6	6	7
Tile pressure, osi, stoich.	0	0.3	1.0	2.0	3.7	4.2
Max. %XSAir						
‡Flame supervision	25	200	400	500	550	650
Stability	125	300	750	750	750	650
Ignition--pilot	100	250	500	500	400	250
Max. %XSFuel	30	30	30	30	30	30

Burning #2 Oil	0.1	1	4	9	16	20
Main air, scfh, stoich.	1400	2650	5350	8100	10 800	12 400
Atom. air, scfh at 30 osi, stoich.	510	510	500	500	510	460
†Total air, scfh, stoich.	2050	3300	6000	8750	11 500	13 000
Oil flow, stoich., gph	1.5	2.4	4.3	6.3	8.2	9.3
Oil pressure, stoich., psi	1.4	1.5	1.7	1.8	2.0	2.1
Flame length, in., stoich.	12	24	24	24	24	24
Flame diameter, in., stoich.	6	7	8	8	8	9
Tile pressure, osi, stoich	0.04	0.15	0.9	1.9	3.4	4.4
Max. %XSAir						
‡Flame supervision	25	125	250	400	675	500
Stability	50	200	400	600	700	800
Ignition--pilot	25	125	250	400	675	500
Max. %XSFuel	30	30	30	20	20	20

The external metal temperatures recorded with neutral furnace pressure and in a cold chamber with preheated air were as follows:

Preheat Air temperature, F	Metal temperature, F	
	Body (near flange)	Body (Main Air Inlet Flange)
400	410	310
600	560	440
800	720	570

† Total air is main air plus atomizing air plus 140 scfh for pilot air.

‡ Honeywell Ultravision Flame Detector C7027A and Honeywell Flame Supervision Protectorelay RA890G yielded 1.5 micro amps or greater for all above rates.

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. Components in combustion systems may exceed 160°F (71°C) surface temperatures and present hot surface contact hazard. Fives North American Combustion, Inc. suggests the use of combustion systems that are in compliance with all Safety Codes, Standards, Regulations and Directives; and care in operation.

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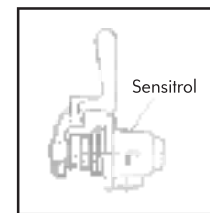
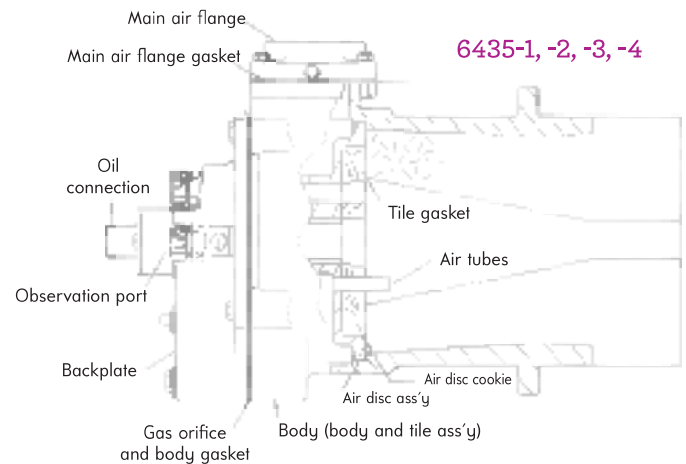
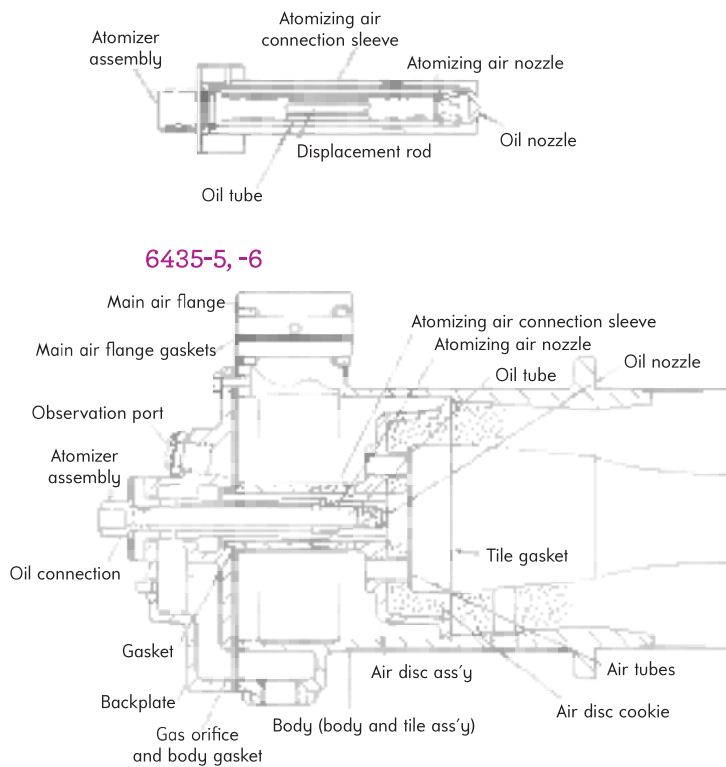
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North American 6435 Tempest[®] III High Velocity Dual-Fuel Burner

Parts List 6435-5

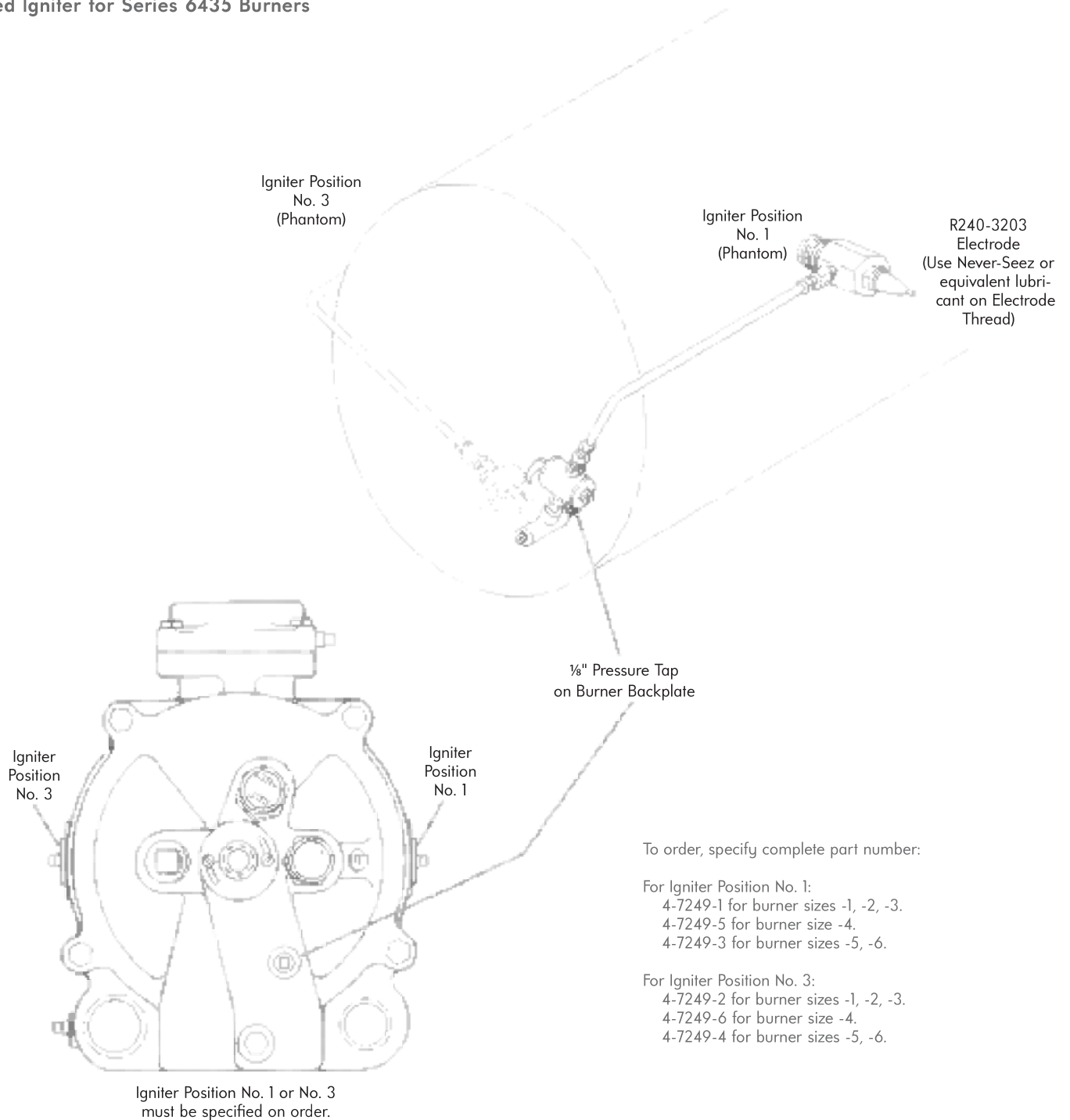


Ordered separately

Part name	Burner designation					
	6435-1	6435-2	6435-3	6435-4	6435-5	6435-6
Air Tubes	3-5925-3 (6)	3-5925-3 (6)	3-5925-4 (6)	3-6004-2 (6)	3-5435-2 (8)	3-5435-3 (8)
Air Disc Assembly (incl. cookie and tubes)	3-6008-1	3-6008-1	3-6008-2	3-6008-3	3-5434-2	3-5434-4
Air Disc Cookie	3-5726-1	3-5726-1	3-5726-1	3-5726-2	3-5411-1	3-5411-1
Atomizer Assembly	3-6007-1	3-6007-1	3-6007-2	3-6007-3	3-6045-1	3-6045-2
Backplate	3-5587-2	3-5587-2	3-5587-4	3-5587-5	3-5448-1	3-5448-1
Body and Tile Assembly	3-5964-1	3-5964-2	3-5964-3	3-5964-4	3-6215-1	3-6044-1
Displacement Rod	3-5725-1	3-5725-1	3-5725-1	—	—	—
Gasket	—	—	—	—	4-3438-2	4-3438-2
Gas Orifice and Body Gasket	3-5028-2	3-5028-1	3-5028-1	3-5001-5	3-5428-1	3-5428-1
Main Air Flange	3-6013-1	3-2544-2	3-2544-1	4-1695-2	4-1695-3	4-1695-9
Main Air Flange Gasket	4-5371-2 (2)	4-5371-2	4-5371-2	4-5371-2	4-5371-2	4-5371-2 (2)
Observation Port	8790-0 (2)	8790-0 (2)	8790-0 (2)	8790-0 (2)	8790-0 (2)	8790-0 (2)
Oil Nozzle	3-5965-1	3-5965-1	3-5965-1	3-5965-1	3-2541-1	3-2541-1
Oirifice Plate	3-5966-1	—	—	—	—	3-6128-1
Sensitrol Oil Valve*	1813-03	1813-03	1813-03	1813-02-A	1813-02-A	1813-02-B
Tile Gasket	3-5718-1 (2)	3-5718-1 (2)	3-5718-1 (2)	3-5718-1 (2)	3-5841-2 (2)	3-5841-2 (2)

*Not supplied with burner--order separately.

Air Cooled Igniter for Series 6435 Burners



Direct spark ignition on oil is not considered a viable lighting method due to the lack of repeatability.

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. Components in combustion systems may exceed 160°F (71°C) surface temperatures and present hot surface contact hazard. Fives North American Combustion, Inc. suggests the use of combustion systems that are in compliance with all Safety Codes, Standards, Regulations and Directives; and care in operation.

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