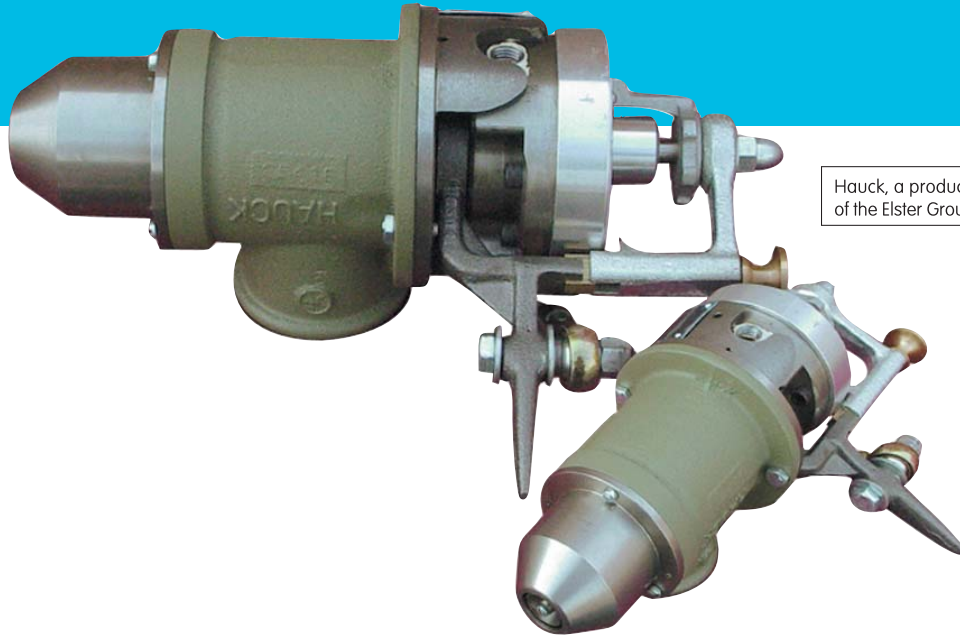




780 SERIES

Self-Proportioning Oil Burners

780P-1
Edition 07-08



Hauck, a product brand
of the Elster Group



- Burns all grades of fuel oil
- Accurately proportions oil and air
- Highly reliable and efficient using low pressure atomizing air
- Single lever control
- Simplified installation and operation
- Worldwide industry standard for oil burner applications
- Integrated oil flow control valve

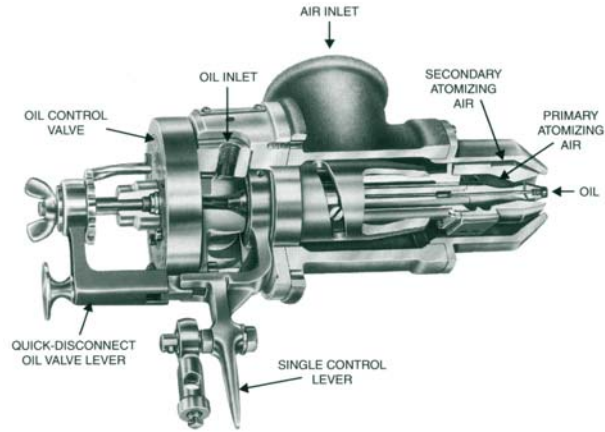


The 780 Series burners are self-proportioning, oil-fired burners designed for highly efficient operation using low pressure atomizing air. This results in lowered operating costs due to the reduced power consumption of a low pressure blower compared to an air compressor. The 780 Series also eliminates the need for costly high pressure steam for atomization and the need for an atomizing air blower. The burner will operate with air pressures ranging from 16 to 32 osig (6,900 to 13,800 Pa).

The 780 series can be fired on No. 2 through No. 6 fuel oil with capacities ranging from 200,000 to 14,000,000 Btu/hr (59 to 4,100 kW). Higher capacities are available with induced air.

The 780 burner is not designed for sealed-in ratio firing in a cold furnace. Special mounting brackets with induced air ports are used to mount the burner to a furnace wall.

All grades of fuel oil, even the heaviest, are completely atomized to provide the most efficient combustion. Superb atomization is achieved by controlling the air flow at the nozzle outlet. Constant full primary and secondary atomizing air pressure are maintained at the point of atomization. This unique characteristic of the 780 Series ensures complete atomization over the entire burner capacity range.



780 Series Burner Cutaway View

Heavy and reclaimed oils must be heated to a viscosity of 90 SSU ($1.8 \times 10^{-5} \text{m}^2 \text{sec}$). The oil temperature should be held constant to avoid variation in the burner firing rates. By piping an oil return line to the oil recirculation connection provided, hot oil can be circulated up to and through the oil control valve at each burner. Heat tracing and insulation of piping is recommended for hot oil installations to minimize the exposed cold piping in the system and improve heavy or reclaimed oil atomization.

780 Series burners are suitable for installations requiring highly reliable, efficient oil-only operation. The burner is suited for a wide variety of applications including kilns, furnaces and dryers.

Accessories available for the 780 Series include:

- burner mounting brackets
- furnace mounting plates
- ignition tiles
- ignition chambers
- low fire switches
- oil manifolds
- gas pilots

Though designed to use oil, the burner can be easily retrofitted for operation on any clean industrial fuel gas - consult Hauck.

For additional information on this product, visit our website at:

www.hauckburner.com

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Hauck, a product brand of the Elster Group



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780 SERIES SELF-PROPORTIONING OIL BURNERS

BURNER CAPACITIES

Operating With Air Shutters Closed (Sealed-in)

Burner Size	779	780	781	782	783	784	785	786
Air Inlet	1"	1 1/2 "	2"	3"	4"	6"	6"	8"
Oil Inlet Size	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	1/2"	1/2"
16 osi Air Pressure								
Air Max. (CFM)	34	66	123	210	298	660	910	1620
Oil Max. (GPH)	1.5	2.9	5.4	9.2	13	29	40	71
Oil Min. (GPH)	0.75	1	1.1	1.1	3.1	6.2	11.1	16.7
20 osi Air Pressure								
Air Max. (CFM)	38	74	138	235	334	739	1019	1814
Oil Max. (GPH)	1.7	3.3	6	10.3	14.7	32.5	44.8	79.7
Oil Min. (GPH)	0.75	1	1.2	1.3	3.5	6.9	12.4	18.7
24 osi Air Pressure								
Air Max. (CFM)	42	81	151	257	365	809	1115	1985
Oil Max. (GPH)	1.8	3.6	6.6	11.3	16	35.6	49	87.3
Oil Min. (GPH)	0.75	1	1.3	1.4	3.9	7.6	13.6	20.5
32 osi Air Pressure								
Air Max. (CFM)	48	93	173	296	420	931	1283	2284
Oil Max. (GPH)	2.1	4.1	7.6	13	18.5	40.9	56.4	100.4
Oil Min. (GPH)	0.75	1.1	1.5	1.6	4.4	8.7	15.6	23.6

Operating With Air Shutters Open (Induced air firing)

Burner Size	779	780	781	782	783	784	785	786
16 osi Air Pressure								
Air Max. (CFM)	34	66	123	210	298	660	910	1620
Oil Max. (GPH)	2.5	4.9	9.2	15.6	22	49.2	67.8	120.3
Oil Min. (GPH)	1.3	1.7	1.9	1.9	5.3	10.5	18.8	28.3
20 osi Air Pressure								
Air Max. (CFM)	38	74	138	235	334	739	1019	1814
Oil Max. (GPH)	3.1	6	10.9	18.7	26.7	59	81.5	145
Oil Min. (GPH)	1.4	1.8	2.2	2.4	6.4	12.5	22.5	34
24 osi Air Pressure								
Air Max. (CFM)	42	81	151	257	365	809	1115	1985
Oil Max. (GPH)	3.4	6.9	12.6	21.5	30.5	67.8	93.3	166.3
Oil Min. (GPH)	1.4	1.9	2.5	2.6	7.4	14.5	25.9	39
32 osi Air Pressure								
Air Max. (CFM)	48	93	173	296	420	931	1283	2284
Oil Max. (GPH)	4.2	8.2	15.2	26	37	81.8	112.8	200.8
Oil Min. (GPH)	1.5	2.2	3	3.2	8.8	17.4	31.2	47.2

The table above gives approximate burner capacities for combustion chambers with drafts from 0.05" wc to 0.1" wc and 41% induced secondary air at 16 osi pressure, 45% at 20 osi pressure, 47.5% at 24 osi pressure and 50% at 32 osi pressure. If more draft is available, maximum burner capacity can be increased.

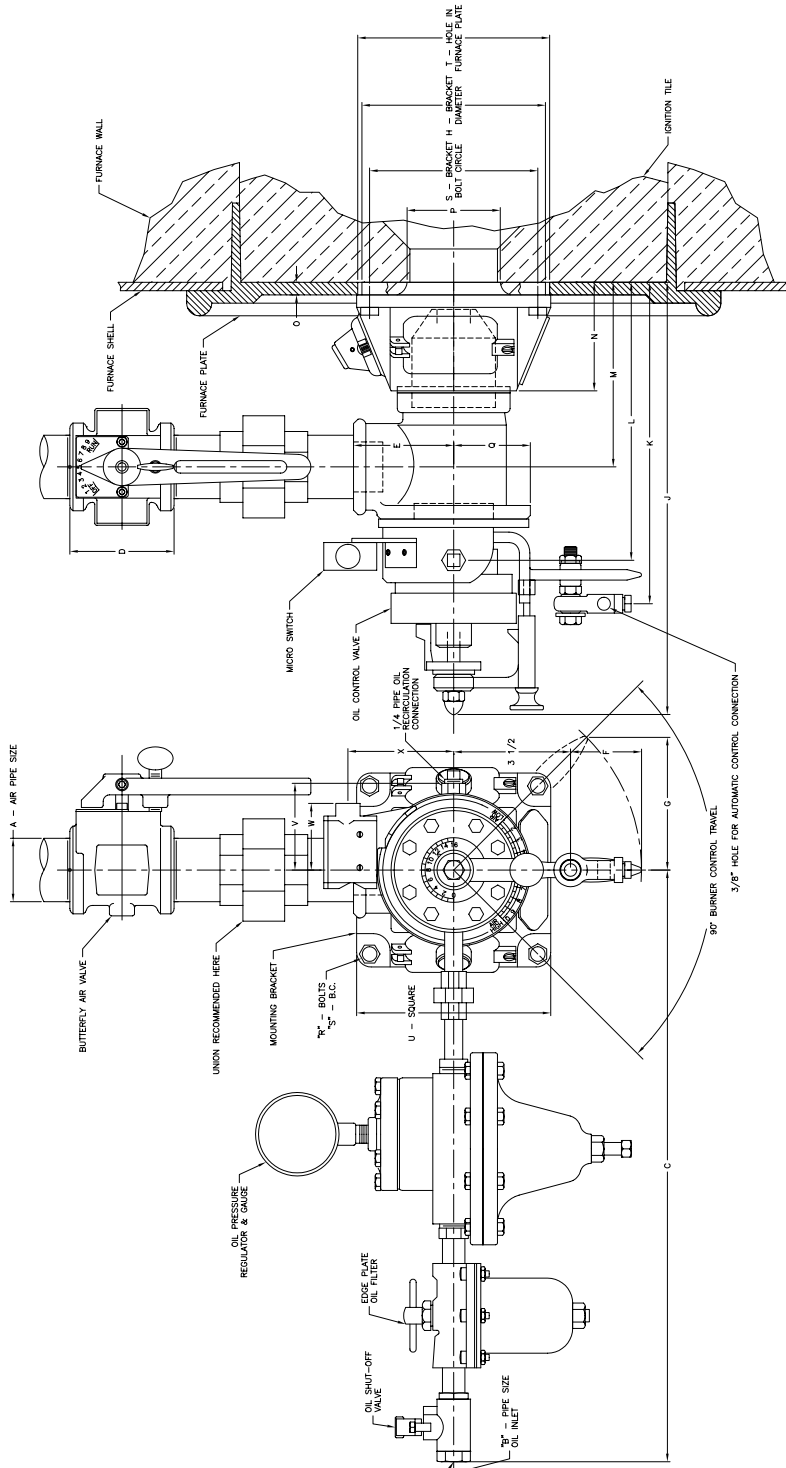
Note: Capacities in these tables are based on No. 2 fuel oil with a gross heating value of 138,000 Btu/gallon. Capacities for other grade fuel oils will vary based on their gross heating value.



DIMENSIONS

780 SERIES SELF-PROPORTIONING OIL BURNERS

Dimensions: 779 – 786 Burner With Pyramid Mounting Bracket



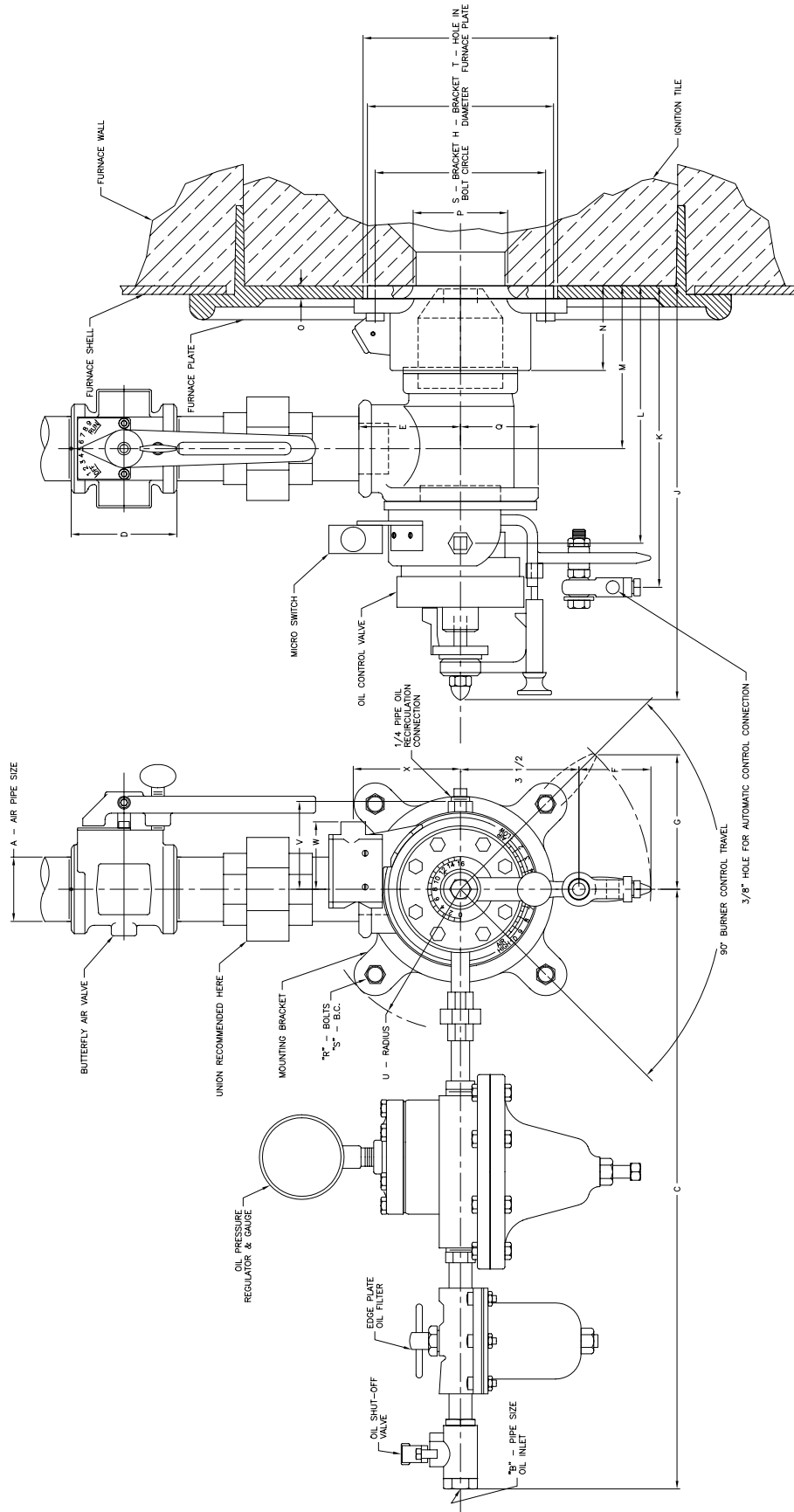
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BURNER NUMBER	DIMENSIONS IN INCHES																										
	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	R	S	T	U	V	W	X					
779	1	3/8	18 1/2	3	2 3/8	---	3	4 1/4	8 7/8	6 3/16	5 3/4	3 3/4	2 9/16	1/4	2	1 5/8	5/16	5 1/4	4 7/16	4 3/8	2 5/8	3 1/4	3/8				
780	1 1/2	3/8	19	3 1/8	3	2 1/8	4	5 1/2	12 1/8	9 1/2	8 5/16	5 1/2	3 1/4	3/8	2 5/8	2 3/16	3/8	7 1/8	5 11/16	5 3/4	2 5/8	2	2 3/4				
781	2	3/8	19	3 1/4	3 1/2	2 1/8	4	7	13 1/2	11	9 3/4	6 7/8	4	3/8	3 5/8	2 11/16	3/8	8 11/16	7 1/4	7 1/4	2 5/8	2	2 3/4				
782	3	3/8	23	4 13/16	3 7/8	2 1/8	4	8	15 7/8	13 1/2	12	8 1/2	5 1/16	7/16	4 1/2	3 1/8	1/2	9 3/4	8 1/4	8 3/8	3	2	3 1/8				
783	4	3/8	23	5	4 1/4	2 1/8	4	9	17 1/2	15 1/8	13 9/16	9 1/2	5 5/16	1/2	4 7/8	3 1/8	1/2	10 7/8	9 1/4	9	3	2	3 1/8				
784	6	1/2	23	6 1/2	6 3/8	2 3/8	4 1/4	11	20 1/4	18 1/8	16 7/16	11 1/4	5 7/8	5/8	6 1/4	4 1/8	1/2	13	11 1/4	11	3	2	3 1/8				
785	6	1/2	23	6 1/2	6 3/8	2 3/8	4 1/4	11	20 1/4	18 1/8	16 7/16	11 1/4	5 7/8	5/8	6 1/4	4 1/8	1/2	13	11 1/4	11	3	2	3 1/8				
786	*8	1/2	27	5 1/2	7 7/8	2 3/8	4 1/4	12	27	24 1/2	22 1/2	15 3/4	7 1/4	5/8	8	4 1/8	1/2	14 3/4	12 1/4	12	3	2	3 1/8				

*Flanged Type Butterfly Valve On No. 786 Burner



Dimensions: 780-785 Combination Mounting Bracket



BURNER NUMBER	DIMENSIONS IN INCHES																						
	A	B	C	D	E	F	G	H	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
780	1 1/2	3/8	19	3 1/8	3	2 1/8	4	5 1/2	11 15/16	9 5/16	8 1/8	5 5/16	3 1/16	3/8	2 3/4	2 3/16	3/8	7 1/8	5 11/16	4 3/16	2 5/8	2	2 3/4
781	2	3/8	19	3 1/4	3 1/2	2 1/8	4	7	13 3/16	10 11/16	9 7/16	6 9/16	3 11/16	3/8	3 5/8	2 11/16	3/8	8 11/16	7 1/4	4 31/32	2 5/8	2	2 3/4
782	3	3/8	23	4 13/16	3 7/8	2 1/8	4	8	14 3/8	12	10 1/2	7	3 9/16	7/16	4 3/8	3 1/8	1/2	9 3/4	8 1/4	5 5/8	3	2	3 1/8
783	4	3/8	23	5	4 1/4	2 1/8	4	9	15 7/8	13 1/2	11 15/16	7 7/8	3 11/16	1/2	4 7/8	3 1/8	1/2	10 7/8	9 1/4	6 3/16	3	2	3 1/8
784	6	1/2	23	6 1/2	6 3/8	2 3/8	4 1/4	11	18 1/2	16 3/8	14 11/16	9 1/2	4 1/8	5/8	6 3/8	4 1/8	1/2	13	11 1/4	7 3/8	3	2	3 1/8
785	6	1/2	23	6 1/2	6 3/8	2 3/8	4 1/4	11	18 1/2	16 3/8	14 11/16	9 1/2	4 1/8	5/8	6 3/8	4 1/8	1/2	13	11 1/4	7 3/8	3	2	3 1/8

CY6623



780 SERIES SELF-PROPORTIONING OIL BURNERS GENERAL INFORMATION

AIR SUPPLY

The required atomizing air pressure at the burner for most applications is 16 psi for light distillate oils and from 24 to 32 psi for heavy residual oils. The higher air pressure range may be required for high furnace temperatures or higher oil firing capacities for maximum heat liberation in a specific combustion space. It is recommended that air supply piping enter from above the burner (12 o'clock). The air supply piping can enter from either side of the burner body (3 or 9 o'clock position) if necessitated by the installation.

OIL SUPPLY

Oil should be supplied to the burner oil pressure regulator at 25 psig or more for light oils not requiring heating, and at 35 psig or more for heated heavy residual oils. The oil pressure regulator reduces and maintains constant oil pressure at the required operating pressure, usually 2 to 10 psig at the burner.

Heavy residual oils must be heated to a viscosity of 80-90 SSU. The oil temperature should be held constant to avoid variation in burner firing rates. By piping an oil return line to the oil recirculation connection provided, hot oil can be circulated up to and through the oil control valve in each burner. Consequently, the temperature of the oil at the burner can be easily maintained. The oil does not cool off to cause unequal distribution, poor regulation, or atomization problems. At start-up, the hot oil can even be circulated up to and through the valve with no oil entering the burner. When the oil in the valve reaches the required temperature, the oil valve can be opened to easily light the burner.

ACCESSORY COMPONENTS

BURNER MOUNTING BRACKETS

Two standard burner mounting brackets are available: the Combination Accessory Mounting Bracket and the Pyramid Bracket. The Combination Accessory Mounting Bracket is recommended for installations that do not have induced air around the burner. The Combination Accessory Mounting Bracket can easily convert to natural gas firing and accommodates a spark ignited gas pilot and UV flame supervision. The Pyramid Bracket is recommended for installations that have induced combustion air around the burner. The Pyramid Bracket allows for a spark-ignited gas pilot and UV flame supervision.

FURNACE MOUNTING PLATE AND IGNITION TILE

A furnace mounting plate and refractory tile are essential to optimum burner performance. The furnace mounting plate holds the burner and tile in proper alignment position on the furnace. The furnace mounting plate prevents the furnace shell from buckling. Failure to use a mounting plate greatly increases the likelihood of heat forcing the burner and tile out of proper alignment with the furnace, thus reducing burner efficiency. Refractory tiles are designed for the burner operating with air shutters open (open or induced secondary air firing). Consult Hauck on applications requiring the air shutters to be closed (sealed-in or no induced air firing). Some heavy oil applications may require tile extensions beyond the dimensions listed; consult Hauck for assistance. The refractory tile and mounting plate can be quickly and easily removed from the furnace for maintenance or replacement.



ACCESSORY COMPONENTS

IGNITION CHAMBER UNITS AND BRACKETS

Hauck Ignition Chamber Units (ICU) are specially designed for applications where an extended tile is required to prevent quenching of the burner flame: 1. When furnace conditions are comparable to open firing; 2. With low furnace temperatures; 3. With considerable air turbulence in the furnace; 4. When cold air is forced or drawn into the furnace. To counteract these conditions, the normal burner tile is extended by the addition of refractory and then the entire chamber is encased in a steel jacket. For normal applications, the refractory is entirely encased in a mild steel jacket. In installations where the chamber is directly exposed to the furnace atmosphere, the last six inches is made of stainless steel. The use of an ICU is most critical on applications using a 784, 785 or 786 since they are normally supplied with a “half-tile” only nine inches long. Hauck Ignition Chamber Brackets (ICB) are used externally to support the ICU. The series chosen will depend on the specifics of the application, e.g., space, furnace wall thickness, burner mounting arrangement, etc.

LOW FIRE MICRO SWITCH

The burner can be equipped with a low fire micro switch that indicates when the burner is at low fire. The switch is wired into the burner control system and will not allow the burner to be ignited unless the burner is at low fire. All burners are equipped with mounting holes for field installation of the switch.

OIL REGULATOR SET-UP ASSEMBLY

The regulator oil set-up assembly consists of a PRO oil pressure regulator, edge plate filter and a manual shutoff valve. All of the components are prepiped into a single unit. Each unit is pre-sized to efficiently handle the oil supply requirements of the burner. The PRO is designed to function as a rugged, self-contained pressure-reducing regulator. Its self-contained design eliminates the need for external actuators or control lines. The PRO maintains fuel pressure within close limits. The edge plate filter removes particulate from the oil and aids in prevention of nozzle blockage.

GAS PILOT ASSEMBLIES

Hauck IPG blast-type gas pilots are recommended for ignition of 780P series burners. Each pilot is designed to provide flame stability, reliable ignition and long life even under the most severe operating conditions.

The pilot is factory assembled and consists of a flame retaining nozzle, air-gas mixer, air cock, gas cock, gas pressure regulator and an 18” length of flexible pipe. Series 1400 pilots (slip-fit, spark- ignited) are designed for the 780P Series burner. The pilot requires 8-32 osi of air pressure and 1 psi or less of gas pressure. A standard coil transformer or spark generator can be used for ignition.

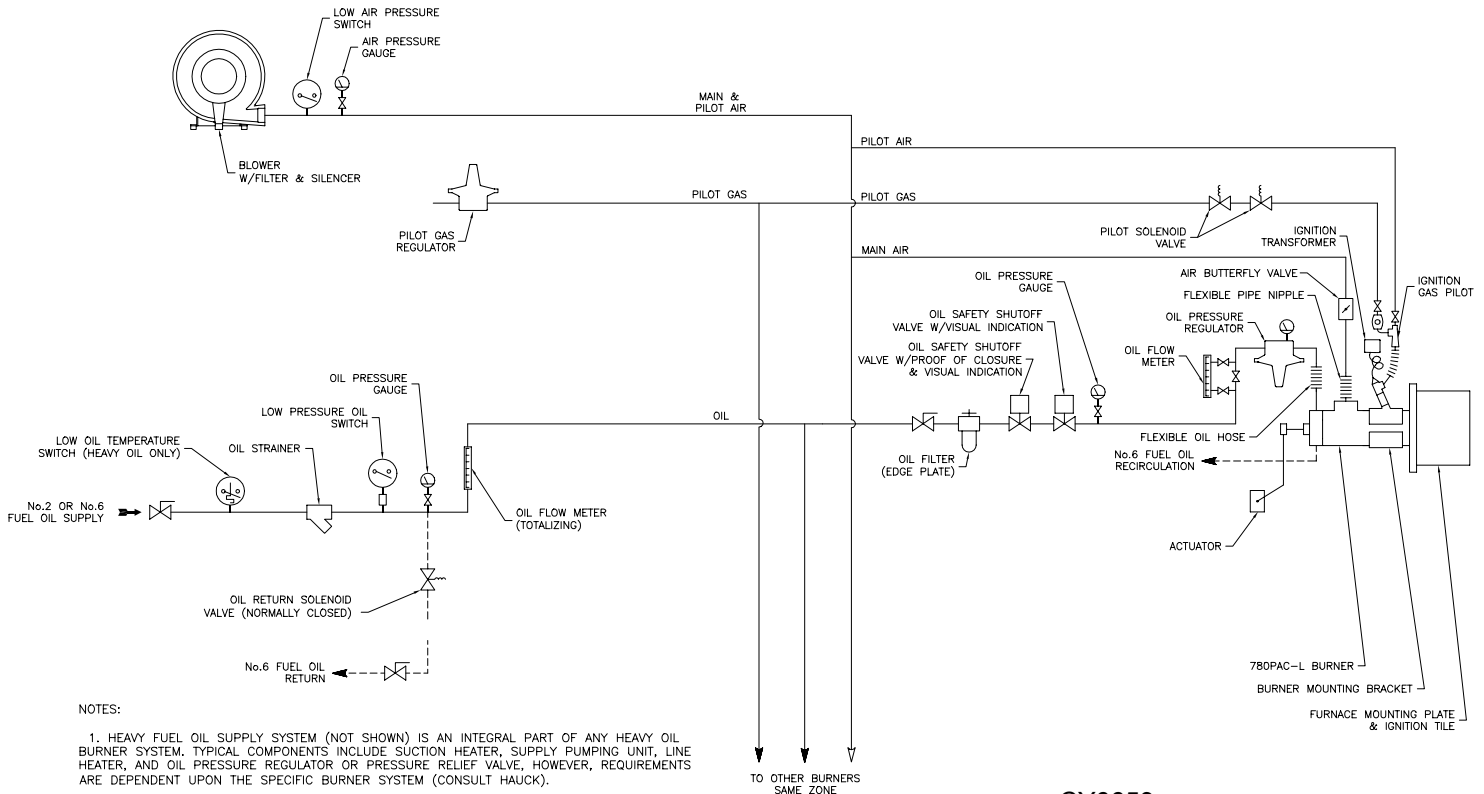
AUTOMATIC CONTROL

For automatic burner operation, the lever on the oil control valve is connected to an electric control motor, which is driven via a furnace temperature controller. The levers of all burners on a furnace or temperature control zone can be easily linked together and operated by one control motor and temperature controller. Specifics regarding automatic burner operation are as follows:

Oil Control Valve	Lever Angular Travel (Lo – Hi Fire)	90°	
	Lever Stroke Length (Lo – Hi Fire)	5”	
	Lever Operating Radius Clearance	3 1/2”	
Electric Control Motor	Operating Torque Requirement	779P-785P	200 lb-in
		786P	300 lb-in



780 SERIES SELF-PROPORTIONING OIL BURNERS TYPICAL PIPING SCHEMATIC



NOTES:

1. HEAVY FUEL OIL SUPPLY SYSTEM (NOT SHOWN) IS AN INTEGRAL PART OF ANY HEAVY OIL BURNER SYSTEM. TYPICAL COMPONENTS INCLUDE SUCTION HEATER, SUPPLY PUMPING UNIT, LINE HEATER, AND OIL PRESSURE REGULATOR OR PRESSURE RELIEF VALVE, HOWEVER, REQUIREMENTS ARE DEPENDENT UPON THE SPECIFIC BURNER SYSTEM (CONSULT HAUCK).
2. ALL HEAVY FUEL OIL PIPING MUST BE TRACED (ELECTRIC OR STEAM) AND INSULATED. SELF-REGULATING HEAT TRACING IS RECOMMENDED TO MAINTAIN THE DESIRED TEMPERATURE OF A GIVEN FUEL OIL; NO. 4 FUEL OIL @ 160°F (71°C), NO. 6 OIL @ 250°F (121°C). ELECTRICAL HEAT TRACING WITH A NOMINAL RATING OF 12 W/FT (34W/M) COVERED WITH A NOMINAL 2" (51MM) FIBERGLASS TYPE INSULATION IS SUFFICIENT FOR MOST APPLICATIONS.
3. WHEN THE OIL SUPPLY PRESSURE CAN EXCEED THE OPERATING LIMITS OF THE SYSTEM, A HIGH PRESSURE OIL SWITCH (NOT SHOWN) MUST BE USED TO ENSURE COMPLIANCE TO NFPA 86 1999 EDITION REQUIREMENTS.

CY6659

ORDERING INFORMATION

To order a basic 780 Series burner, the following items must be specified:

1. Burner Size
2. Mounting Bracket Type
3. Butterfly Air Valve
4. Oil Regulator Set-Up Assembly
 - Manual Shutoff Valve
 - Edge Plate Filter (FEP)
 - Oil Pressure Regulator
 - Pressure Gauge
5. Furnace Mounting Plate
6. Refractory Ignition Tile
7. Ignition Pilot Gas Unit (IPG)

Accessory items:

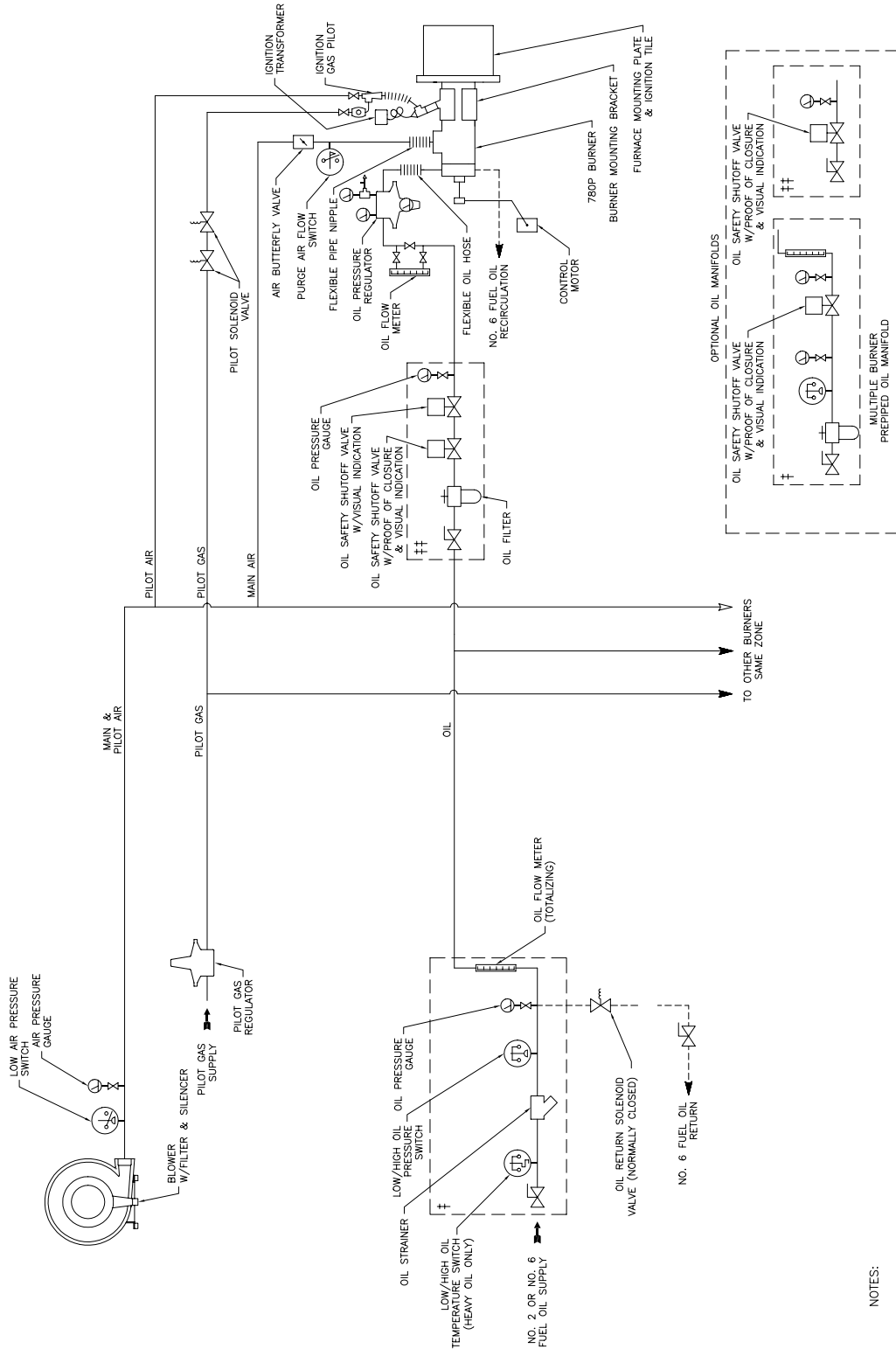
1. Low Fire Limit Switch
2. Ignition Chamber Unit (ICU)
3. Bracket, Ignition Chamber (ICB)

NOTE: In addition to the standard observation port located at 3 o'clock, extra observation ports are available in either the furnace mounting plate or refractory tile. The extra observation port for 779 through 783 burners can be located at 6, 9 or 12 o'clock. For 784 through 786 burners, an extra observation port can be located 180° from the standard observation port. Observation port brackets (1 1/2" FNPT or 2" MNPT) for scanner or observation port are also available.



780 SERIES SELF-PROPORTIONING OIL BURNERS

TYPICAL MULTIPLE BURNER SYSTEM SELF-PROPORTIONING CONTROL



Y6659
(NOT TO SCALE)

- NOTES:
1. HEAVY FUEL OIL SUPPLY SYSTEM (NOT SHOWN) IS AN INTEGRAL PART OF ANY HEAVY OIL BURNER SYSTEM. TYPICAL COMPONENTS INCLUDE SUCTION HEATER, SUPPLY PUMPING UNIT, LINE HEATER, AND OIL PRESSURE REGULATOR OR PRESSURE RELIEF VALVE. HOWEVER, REQUIREMENTS ARE DEPENDENT UPON THE SPECIFIC BURNER SYSTEM (CONSULT HAUCK).
 2. ALL HEAVY FUEL OIL PIPING MUST BE TRACED (ELECTRIC OR STEAM) AND INSULATED. SELF-REGULATING HEAT TRACING IS RECOMMENDED TO MAINTAIN THE DESIRED TEMPERATURE OF A GIVEN FUEL OIL TO ACHIEVE 90 SSU (1.8 X 10⁻⁵ M²/SEC) AT THE BURNER. ELECTRICAL HEAT TRACING WITH A NOMINAL RATING OF 12 W/FT (34W/M) COVERED WITH A NOMINAL 2" (51MM) FIBERGLASS TYPE INSULATION IS SUFFICIENT FOR MOST APPLICATIONS.
 3. OPTIONAL OIL MANIFOLDS ARE PERMITTED AS AN EXCEPTION PER NFPA 86 2003 EDITION REQUIREMENTS FOR MULTIPLE BURNERS FIRING INTO A COMMON HEATING CHAMBER. HOWEVER, SPECIAL FEATURES ARE REQUIRED IN THE ASSOCIATED CONTROL SYSTEM (SEE HAUCK APPLICATION SHEET G377).



ORDERING INFORMATION

To order a basic 780 Series burner, the following items must be specified:

1. Burner Size
2. Mounting Bracket Type
3. Butterfly Air Valve
4. Oil Regulator Set-Up Assembly
 - Manual Shutoff Valve
 - Edge Plate Filter (FEP)
 - Oil Pressure Regulator
 - Pressure Gauge
5. Furnace Mounting Plate
6. Refractory Ignition Tile
7. Ignition Pilot Gas Unit (IPG)

Accessory items:

1. Low Fire Limit Switch
2. Ignition Chamber Unit (ICU)
3. Bracket, Ignition Chamber (ICB)

NOTE: In addition to the standard observation port located at 3 o'clock, extra observation ports are available in either the furnace mounting plate or refractory tile. The extra observation port for 779 through 783 burners can be located at 6, 9 or 12 o'clock. For 784 through 786 burners, an extra observation port can be located 180° from the standard observation port. Observation port brackets (1 1/2" FNPT or 2" MNPT) for scanner or observation port are also available.



MODIFYING FLAME CHARACTERISTICS

The Hauck 780P Series burner has been designed to operate efficiently with the oil flame characteristics required on the majority of normal applications. In circumstances and furnace environments where other than normal flame characteristics are desired, slight modifications can be made to the standard burner nozzle prior to shipment. Counter rotary air holes, deflector vane and air straightener assemblies are engineered to shorten, lengthen, or otherwise modify the 780P flame. The nature of these changes requires close coordination between the user and the factory. Hauck Application Engineers will gladly discuss your particular requirements and coordinate the burner nozzle modifications needed to meet your specific requirements.

FLAME SUPERVISION

All 780P Series burners accommodate flame supervision. Hauck strongly recommends the use of flame supervision on 780P series burners. Consult Hauck for recommendations on properly outfitting the 780P burner for flame supervision. In addition to flame supervision, Hauck recommends the use of spark ignited gas pilots for main burner ignition. A complete line of gas pilots, gas pilot accessories and flame supervision equipment is available from Hauck. The Combination Accessory Mounting Bracket provides the most flexibility for flame supervision, pilot ignition and future natural gas conversions.

Approximate Weights – In Pounds

Burner Model	Burner	Furnace Mounting Plate	Pyramid Mounting Bracket	Combination Accessory Mounting Bracket	Ignition Tile	ICU
779	8	17	6	5 – Pyramid Type	34	280
780	16	40	10	6	88	350
781	22	50	15	8	126	520
782	33	74	21	16	218	685
783	41	74	21	16	214	730
784	75	92	30	25	150	945
785	75	92	30	25	150	1050
786	109	92	45	40 – Pyramid Type	150	1200