



TriOx TRIPLE AIR STAGED ULTRA LOW NOx BURNER



WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel. Adjustment of this equipment and its components, by unqualified personnel, can result in fire, explosion, severe personal injury, or even death.

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Attachments: IPG-9
ZMI Ionization Pilot

These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of Hauck equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, and variations may preclude covering every possible contingency. **WARNING: TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY, DO NOT USE OR OPERATE ANY EQUIPMENT OR COMPONENT WITH ANY PARTS REMOVED OR ANY PARTS NOT APPROVED BY THE MANUFACTURER.** Should further information be required or desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, contact Hauck Mfg. Co.



WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

The TriOx burner utilizes an air-staged design for ultra low NOx emissions when firing with low excess air in furnace environments with temperatures up to 2700°F (1480°C). The burner has two modes of operation, '60/40' mode required for low temperature startup or operation below 1600°F (870°C), and '90/10' or Invisiflame™ mode for ultra low NOx operation above 1600°F (870°C). Transitioning between modes is accomplished via a switching valve which is sold separately. Offered in two different series, the 1000 Series is for ambient air, and the 2000 Series incorporates insulation inserts for preheated air to 900°F (482°C). For higher temperature preheated air versions, consult Hauck.

The TriOx burners fire any clean industrial fuel gas. Capacities range from 2.5 to more than 21 MMBtu/Hr (773 - 6155 kW) at 8"wc (1990 Pa) static air pressure. Higher capacity models are available upon request. The TriOx flame shape is well-defined throughout the burners 60/40 operating mode up to 1600°F (870°C) chamber temperature. In the '90/10' Invisiflame™ mode for operation above 1600°F (870°C), the burner still produces a visible, UV scannable pilot flame.

Turndown is approximately 10:1 on natural gas. If operating with excess air, thermal turndown is greater; however, NOx emissions will increase. Consult Hauck for mounting options and field installation recommendations.

B. RECEIVING & INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. A careful examination of all parts should be made to ascertain if there has been any damage in shipment.

IMPORTANT

If the installation is delayed and the equipment is stored outside, provide adequate protection as dictated by climate and period of exposure. Special care should be given to all motors and bearings, if applicable, to protect them from rain or excessive moisture.

C. CAPACITIES

	BURNER MODEL							
	1006		2006		1008		2008	
BURNER SPECIFICATIONS – HIGH FIRE	BURNER STATIC INLET AIR PRESSURE OF 8"WC							
Combustion Air Temp. (°F)	60		900		60		900	
Operating Mode	60/40	90/10	60/40	90/10	60/40	90/10	60/40	90/10
Max. Input @ 5% Excess Air (MMBtu/hr)	3.2	3.0	2.0	1.9	6.1	5.5	3.9	3.4
Max. Air Flow @ 8"wc (scfh)	31,800	29,300	19,700	18,100	60,000	53,900	38,400	33,200
Min. Input @ Max. Air Flow (Btu/hr)	190,000	190,000			250,000	250,000		
Max. Excess Air (%)	1,680	1,530			2,450	2,180		
Air Press. @ Switching Valve ("wc)	11.7	10.1	11.7	10.9	8.4	9.9	9	10.1
Burner Gas Inlet Press. ("wc)	15.8	13.9	7.9	7.4	7	5.2	3.7	3
Flame Length @ Max. Input (ft)	8.5	N/A	8.5	N/A	12	N/A	10	N/A
Flame Dia. @ Max. Input (ft)	3	N/A	3	N/A	2.5	N/A	2.5	N/A
Stage 1 & 2 Air Static Press. ("wc)	8	0.3	8	0.3	8	0.5	8	0.4
Stage 3 Air Static Press. ("wc)	4.4	8	3.9	8	6.4	8	6	8
BURNER SPECIFICATIONS – LOW FIRE								
Input @ 5% Excess Air (Btu/hr)	407,000	407,000			730,000	730,000		
Air Flow (scfh)	4,030	4,030			7,250	7,250		
Min Input @ Air flow (Btu/hr)	70,000	70,000			175,000	175,000		
Max. Excess Air (%)	510	510			340	340		
Min Gas for Ignition (scfh)	70	70			170	250		
Min Gas for UV Signal (scfh)	70	70			170	250		

Notes:

1. Operating Mode is approximate percentage of Stage 3 Air to Stage 1 & 2 Air through the burner body.
2. 60/40 operating mode is required for furnace temperatures below 1600°F; 90/10 (termed Invisiflame™) operating mode is suitable for furnace temperatures above 1600°F.
3. Capacities based on natural gas with HHV of 1034 Btu/ft³, 0.59 S.G., and stoichiometric air:gas ratio of 9.74:1 with burner firing into chamber under no pressure @ 5% excess air.
4. Air and gas flows based on 60°F @ sea level.
5. Static air pressure measured at designated locations.
6. Flame lengths measured from the end of the burner tile.
7. Flame length and diameter is not applicable in Invisiflame™ operating mode.
8. All data based on industry standard air and gas piping practices.
9. Flame detection via UV scanner.
10. Burners can be operated up to a static inlet air pressure of 8 osig; consult Hauck.

Table 1. 1006 through 2008 Series Capacities

	BURNER MODEL							
	1006		2006		1008		2008	
BURNER SPECIFICATIONS – HIGH FIRE	BURNER STATIC INLET AIR PRESSURE OF 1990 Pa							
Combustion Air Temp. (°C)	15.5°C		482°C		15.5°C		482°C	
Operating Mode	60/40	90/10	60/40	90/10	60/40	90/10	60/40	90/10
Max. Input @ 5% Excess Air (kW)	850	780	530	490	1,610	1,440	1,030	890
Max. Air Flow @ 1990 Pa (nm ³ /hr)	850	780	530	490	1,610	1,440	1,030	890
Min. Input @ Max. Air Flow (kW)	50	50			66	66		
Max. Excess Air (%)	1,680	1,530			2,450	2,180		
Air Press. @ Switching Valve (Pa)	2,910	2,510	2,910	2,710	2,090	2,460	2,240	2,510
Burner Gas Inlet Press. (Pa)	3,930	3,460	1,970	1,840	1,740	1,290	920	750
Flame Length @ Max. Input (mm)	2,590	N/A	2,590	N/A	3,660	N/A	3,050	N/A
Flame Dia. @ Max. Input (mm)	910	N/A	910	N/A	760	N/A	760	N/A
Stage 1 & 2 Air Static Press. (Pa)	1,990	75	1,990	75	1,990	124	1,990	100
Stage 3 Air Static Press. (Pa)	1,100	1,990	970	1,990	1,590	1,990	1,490	1,990
BURNER SPECIFICATIONS – LOW FIRE								
Input @ 5% Excess Air (kW)	108	108			194	194		
Air Flow (nm ³ /hr)	108	108			194	194		
Min Input @ Air flow (kW)	19	19			46	46		
Max. Excess Air (%)	510	510			340	340		
Min Gas for Ignition (nm ³ /hr)	1.9	1.9			4.6	6.7		
Min Gas for UV Signal (nm ³ /hr)	1.9	1.9			4.6	6.7		

Notes:

1. Operating Mode is approximate percentage of Stage 3 Air to Stage 1 & 2 Air through the burner body.
2. 60/40 operating mode is required for furnace temperatures below 870°C; 90/10 (termed Invisiflame™) operating mode is suitable for furnace temperatures above 870°C.
3. Capacities based on natural gas with LHV of 36.74 MJ/nm³, 0.59 S.G., and stoichiometric air:gas ratio of 9.74:1 with burner firing into chamber under no pressure @ 5% excess air.
4. Air and gas flows based on 0°C @ sea level.
5. Static air pressure measured at designated locations.
6. Flame lengths measured from the end of the burner tile.
7. Flame length and diameter is not applicable in Invisiflame™ operating mode.
8. All data based on industry standard air and gas piping practices.
9. Flame detection via UV scanner.
10. Burners can be operated up to a static inlet air pressure of 3450 Pa; consult Hauck.

Table 2. 1006 through 2008 Series Metric Capacities

	BURNER MODEL							
	1012		2012		1014		2014	
BURNER SPECIFICATIONS – HIGH FIRE	BURNER STATIC INLET AIR PRESSURE OF 8"WC							
Combustion Air Temp. (°F)	60		900		60		900	
Operating Mode	60/40	90/10	60/40	90/10	60/40	90/10	60/40	90/10
Max. Input @ 5% Excess Air (MMBtu/hr)	11.3	10.9	7	6.8	15.9	15.1	9.8	9.3
Max. Air Flow @ 8"wc (scfh)	112,000	108,000	69,300	66,800	157,000	149,000	97,200	92,300
Min. Input @ Max. Air Flow (Btu/hr)	500,000	500,000			500,000	500,000		
Max. Excess Air (%)	2,280	2,190			3,240	3,070		
Air Press. @ Switching Valve ("wc)	8.6	9.3	9	10.2	8.2	8.3	8.8	9.1
Burner Gas Inlet Press. ("wc)	12	12	5	4.4	14.7	13.5	6	5.3
Flame Length @ Max. Input (ft)	16	N/A	13	N/A	15	N/A	12.5	N/A
Flame Dia. @ Max. Input (ft)	4.5	N/A	3.5	N/A	5.5	N/A	4.5	N/A
Stage 1 & 2 Air Static Press. ("wc)	8	0.3	8	0.3	8	0.2	8	0.2
Stage 3 Air Static Press. ("wc)	6.2	8	6.2	8	5.5	8	5.5	8
BURNER SPECIFICATIONS – LOW FIRE								
Input @ 5% Excess Air (MMBtu/hr))	1.6	1.5			2	2		
Air Flow (scfh)	15,700	14,600			19,800	19,800		
Min. Input @ Air Flow (Btu/hr)	207,000	207,000			415,000	415,000		
Max. Excess Air (%)	700	650			380	380		
Min Gas for Ignition (scfh)	200	390			400	400		
Min Gas for UV Signal (scfh)	200	390			350	350		

Notes:

1. Operating Mode is approximate percentage of Stage 3 Air to Stage 1 & 2 Air through the burner body.
2. 60/40 operating mode is required for furnace temperatures below 1600°F; 90/10 (termed Invisiflame™) operating mode is suitable for furnace temperatures above 1600°F.
3. Capacities based on natural gas with HHV of 1034 Btu/ft³, 0.59 S.G., and stoichiometric air:gas ratio of 9.74:1 with burner firing into chamber under no pressure @ 5% excess air.
4. Air and gas flows based on 60°F @ sea level.
5. Static air pressure measured at designated locations.
6. Flame lengths measured from the end of the burner tile.
7. Flame length and diameter is not applicable in Invisiflame™ operating mode.
8. All data based on industry standard air and gas piping practices.
9. Flame detection via UV scanner.
10. Burners can be operated up to a static inlet air pressure of 8 osig; consult Hauck.

Table 3. 1012 through 2014 Series Capacities

	BURNER MODEL							
	1012		2012		1014		2014	
BURNER SPECIFICATIONS – HIGH FIRE	BURNER STATIC INLET AIR PRESSURE OF 1990 Pa							
Combustion Air Temp. (°C)	15.5°C		482°C		15.5°C		482°C	
Operating Mode	60/40	90/10	60/40	90/10	60/40	90/10	60/40	90/10
Max. Input @ 5% Excess Air (kW)	3,000	2,890	1,860	1,790	4,220	4,010	2,600	2,470
Max. Air Flow @ 1990 Pa (nm ³ /hr)	3,000	2,890	1,860	1,790	4,220	4,010	2,600	2,470
Min. Input @ Max. Air Flow (kW)	132	132			132	132		
Max. Excess Air (%)	2,280	2,190			3,240	3,070		
Air Press. @ Switching Valve (Pa)	2,140	2,310	2,240	2,540	2,040	2,070	2,190	2,260
Burner Gas Inlet Press. (Pa)	2,990	2,990	1,240	1,100	3,660	3,360	1,490	1,320
Flame Length @ Max. Input (mm)	4,880	N/A	3,960	N/A	4,570	N/A	3,810	N/A
Flame Dia. @ Max. Input (mm)	1,370	N/A	1,070	N/A	1,680	N/A	1,370	N/A
Stage 1 & 2 Air Static Press. (Pa)	1,990	75	1,990	75	1,990	50	1,990	50
Stage 3 Air Static Press. (Pa)	1,540	1,990	1,540	1,990	1,370	1,990	1,370	1,990
BURNER SPECIFICATIONS – LOW FIRE								
Input @ 5% Excess Air (kW)	420	390			530	530		
Air Flow (nm ³ /hr)	420	390			530	530		
Min Input @ Air flow (kW)	55	55			110	110		
Max. Excess Air (%)	700	650			380	380		
Min Gas for Ignition (nm ³ /hr)	5.4	10.4			10.7	10.7		
Min Gas for UV Signal (nm ³ /hr)	5.4	10.4			9.4	9.4		

Notes:

1. Operating Mode is approximate percentage of Stage 3 Air to Stage 1 & 2 Air through the burner body.
2. 60/40 operating mode is required for furnace temperatures below 870°C; 90/10 (termed Invisiflame™) operating mode is suitable for furnace temperatures above 870°C.
3. Capacities based on natural gas with LHV of 36.74 MJ/nm³, 0.59 S.G., and stoichiometric air:gas ratio of 9.74:1 with burner firing into chamber under no pressure @ 5% excess air.
4. Air and gas flows based on 0°C @ sea level.
5. Static air pressure measured at designated locations.
6. Flame lengths measured from the end of the burner tile.
7. Flame length and diameter is not applicable in Invisiflame™ operating mode.
8. All data based on industry standard air and gas piping practices.
9. Flame detection via UV scanner.
10. Burners can be operated up to a static inlet air pressure of 3450 Pa; consult Hauck.

Table 4. 1012 through 2014 Series Metric Capacities

	BURNER MODEL			
	1016		2016	
BURNER SPECIFICATIONS – HIGH FIRE	BURNER STATIC INLET AIR PRESSURE OF 8"WC			
Combustion Air Temp. (°F)	60		900	
Operating Mode	60/40	90/10	60/40	90/10
Max. Input @ 5% Excess Air (MMBtu/hr)	21	21	13	13
Max. Air Flow @ 8"wc (scfh)	207,000	207,000	128,000	128,000
Min. Input @ Max Air Flow (Btu/hr)	900,000	900,000		
Max. Excess Air (%)	2,340	2,340		
Air Press. @ Switching Valve ("wc)	8.2	9.7	8.8	10.5
Burner Gas Inlet Press. ("wc)	8.1	7.2	4	3.1
Flame Length @ Max. Input (ft)	18	N/A	15	N/A
Flame Dia. @ Max. Input (ft)	6	N/A	5	N/A
Stage 1 & 2 Air Static Press. ("wc)	8	0.1	8	0.1
Stage 3 Air Static Press. ("wc)	5	8	5	8
BURNER SPECIFICATIONS – LOW FIRE				
Input @ 5% Excess Air (MMBtu/hr)	2.5	2.5		
Air Flow (scfh)	24,700	24,700		
Min. Input @ Air Flow (Btu/hr)	800,000	800,000		
Max. Excess Air (%)	230	230		
Min Gas for Ignition (scfh)	775	775		
Min Gas for UV Signal (scfh)	775	775		

Notes:

1. Operating Mode is approximate percentage of Stage 3 Air to Stage 1 & 2 Air through the burner body.
2. 60/40 operating mode is required for furnace temperatures below 1600°F; 90/10 (termed Invisiflame™) operating mode is suitable for furnace temperatures above 1600°F.
3. Capacities based on natural gas with HHV of 1034 Btu/ft³, 0.59 S.G., and stoichiometric air:gas ratio of 9.74:1 with burner firing into chamber under no pressure @ 5% excess air.
4. Air and Gas flows based on 60°F @ sea level.
5. Static air pressure measured at designated locations.
6. Flame lengths measured from the end of the burner tile.
7. Flame length and diameter is not applicable in Invisiflame™ operating mode.
8. All data based on industry standard air and gas piping practices.
9. Flame detection via UV scanner.
10. Burners can be operated up to a static inlet air pressure of 8 osig; consult Hauck.

Table 5. 1016 through 2016 Series Capacities

	BURNER MODEL			
	1016		2016	
BURNER SPECIFICATIONS – HIGH FIRE	BURNER STATIC INLET AIR PRESSURE OF 1990 Pa			
Combustion Air Temp. (°C)	15.5		482	
Operating Mode	60/40	90/10	60/40	90/10
Max. Input @ 5% Excess Air (kW)	5,570	5,570	3,450	3,450
Max. Air Flow @ 1990 Pa (nm ³ /hr)	5,570	5,570	3,450	3,450
Min. Input @ Max. Air Flow (kW)	240	240		
Max. Excess Air (%)	2,340	2,340		
Air Press. @ Switching Valve (Pa)	2,040	2,410	2,190	2,610
Burner Gas Inlet Press. (Pa)	2,015	1,790	995	770
Flame Length @ Max. Input (mm)	5,490	N/A	4,570	N/A
Flame Dia. @ Max. Input (mm)	1,830	N/A	1,530	N/A
Stage 1 & 2 Air Static Press. (Pa)	1,990	25	1,990	25
Stage 3 Air Static Press. (Pa)	1,240	1,990	1,240	1,990
BURNER SPECIFICATIONS – LOW FIRE				
Input @ 5% Excess Air (kW)	660	660		
Air Flow (nm ³ /hr)	660	660		
Min. Input @ Air Flow (kW)	210	210		
Max. Excess Air (%)	230	230		
Min Gas for Ignition (nm ³ /hr)	21	21		
Min Gas for UV Signal (nm ³ /hr)	21	21		

Notes:

1. Operating Mode is approximate percentage of Stage 3 Air to Stage 1 & 2 Air through the burner body.
2. 60/40 operating mode is required for furnace temperatures below 870°C; 90/10 (termed Invisiflame™) operating mode is suitable for furnace temperatures above 870°C.
3. Capacities based on natural gas with LHV of 36.74 MJ/nm³, 0.59 S.G., and stoichiometric air:gas ratio of 9.74:1 with burner firing into chamber under no pressure @ 5% excess air.
4. Air and Gas flows based on 0°C @ sea level.
5. Static air pressure measured at designated locations.
6. Flame lengths measured from the end of the burner tile.
7. Flame length and diameter is not applicable in Invisiflame™ operating mode.
8. All data based on industry standard air and gas piping practices.
9. Flame detection via UV scanner.
10. Burners can be operated up to a static inlet pressure of 3450 Pa; consult Hauck.

Table 6. 1016 through 2016 Series Metric Capacities

D. DIMENSIONS

See appropriate Dimension sheet for detailed dimensional information.

E. INSTALLATION

Burner Mounting

1. The furnace shell plate must be provided with studs to match the tile mounting plate as shown on Hauck's dimension sheet TriOx-3. Hauck TriOx burners must be mounted on properly braced, rigid furnace structures capable of supporting the burner and tile weight (see Table 7).

Burner Model	Approx. Burner Net Wt.	Approx. Tile Net Wt.
TriOx-_006	450 lb (204 kg)	(Not Applicable)
TriOx-_008	500 lb (218 kg)	280 lb (127 kg)
TriOx-_012	610 lb (268 kg)	410 lb (186 kg)
TriOx-_014	920 lb (385 kg)	580 lb (255 kg)
TriOx-_016	960 lb (435 kg)	670 lb (305 kg)

Table 7. TriOx Burner and Tile Weights

2. Furnish an opening in the furnace shell 1/2" (13 mm) larger than the burner tile outside diameter.
3. For installation in an existing refractory wall, refer to Figure 1. From inside the furnace, remove rammed, cast or brick refractory as required to allow for installation of the port block using cast or rammed refractory.

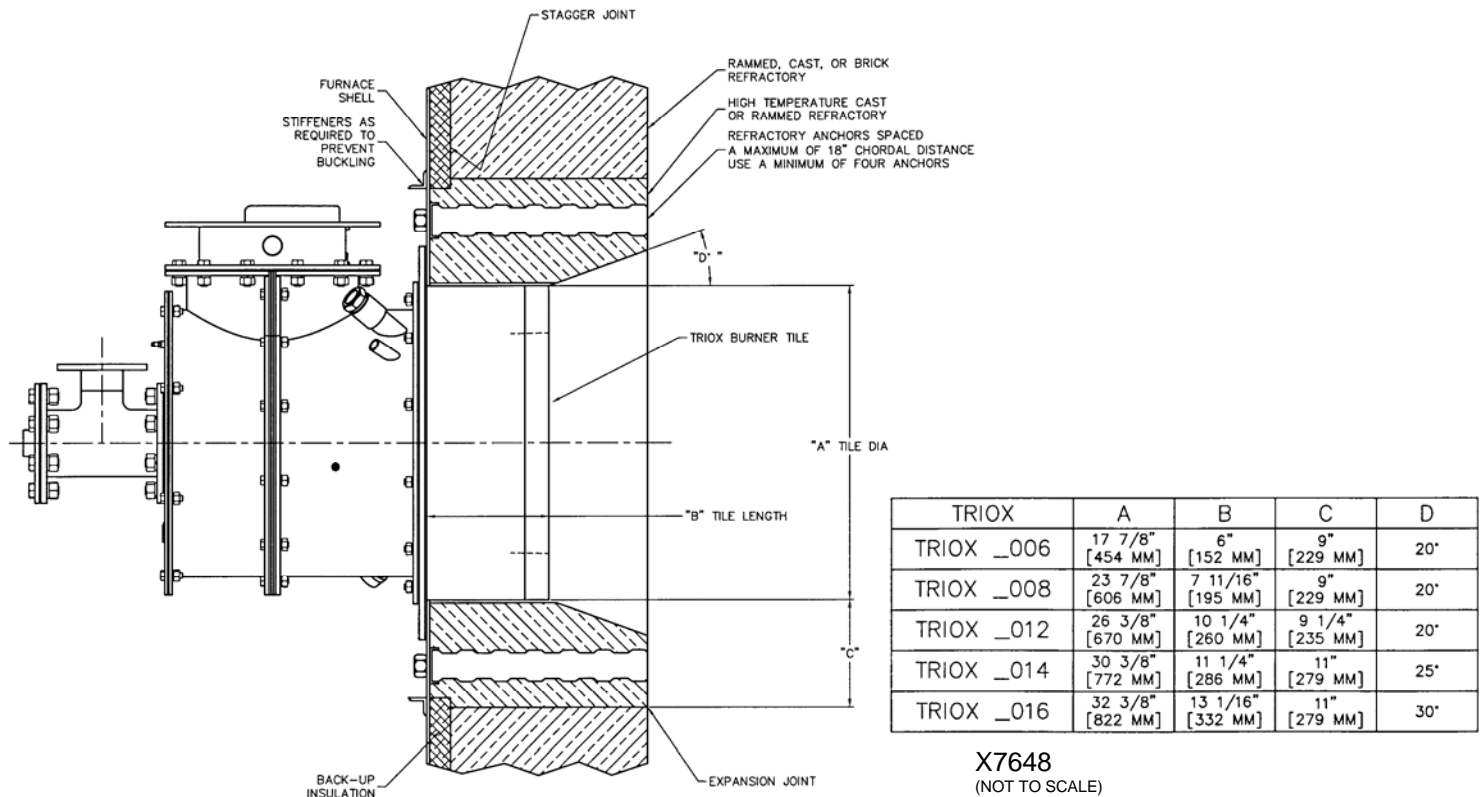
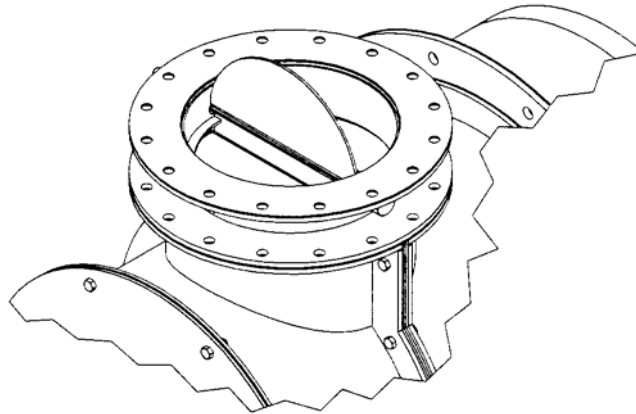


Figure 1. Burner Mounting and Refractory Installation

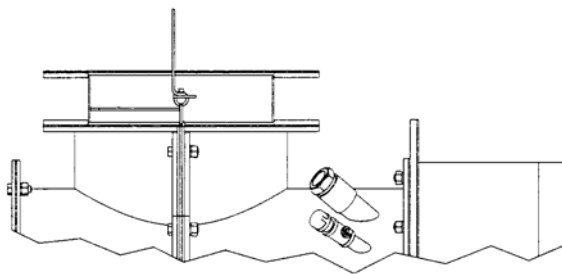
4. Mount the self-supporting burner tile to the furnace shell plate using 3/4" (19 mm) studs positioned as shown on Hauck's dimension sheet TriOx-3. Place the tile mounting flange gasket over the studs and then the burner tile assembly. Secure with lock washers and hex nuts.
5. Wrap the cylinder of the tile with one layer of 1/4" (6 mm) fiber paper rated for a higher temperature than the furnace. Secure fiber paper with tape to retain the fiber during casting or pouring of refractory port block.
6. Install refractory anchors to the furnace shell to secure the refractory port block to the furnace shell. Refer to Figure 1 for spacing of anchors and provision for expansion joints, or follow the refractory manufacturer's recommendations.
7. Form the burner port block per the indicated dimensions using wood or metal mandrels centered on the I.D. of the burner tile. Ensure that the mandrel includes sufficient draft or taper for easy removal.
8. Cast or ram refractory into the port block mandrel. Hauck recommends use of a quality refractory with a temperature rating of 2400°F (1315°C), or 400°F (222°C) above the maximum furnace design temperature, whichever is higher.
9. After the refractory has set properly, remove the burner port mandrel.
10. Mount the burner to the self-supporting tile mounting plate as follows:
 - a. Position the main air inlet in the desired orientation (6 or 12 o'clock positions possible). Ensure that the connections for UV scanner and observation port/gas pilot are located above the burner body center line.
 - b. Place the mounting plate gasket provided over the burner mounting studs.
 - c. Place the tile cushion gasket in place inside the tile, tape or mortar in place to ensure the gasket does not move or block the stage 3 air slots during assembly.
 - d. Gently position the burner on its mounting studs and insert the body into the burner tile. Check to make sure the main air inlet is positioned in the desired direction and ensure that the large stage 3 air slots through the burner refractory line up with the corresponding stage 3 air slots in the refractory tile.
 - e. Position lock washers and mounting nuts on studs and tighten.

Air & Fuel Connections

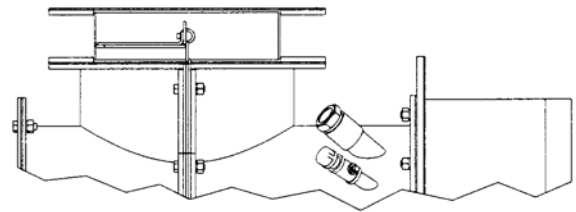
1. If using the optional switching valve assembly, sandwich the supplied gasket between the switching valve and the burner air inlet; use 5/8" (16 mm) bolts to secure the switching valve to the main air inlet. Note the burner and switching valve assembly have an RPM flange which is one pipe size larger than the switching valve I.D. (see Hauck dimension sheet TriOx-3). Ensure that the plate running through the center of the switching valve matches up to the center divider plate in the burner body to provide a metal to metal seal for the valve (see Figure 2).



SWITCHING VALVE
ALIGNMENT TO BURNER BODY



60/40
OPERATING MODE



90/10
OPERATING MODE

X7649
(NOT TO SCALE)

Figure 2. Switching Valve Alignment/Operating Mode

2. The optional switching valve **must** be installed in the fully open position to ensure the proper air staging ratio for cold furnace startup. Verify the switching valve control motor is in the 'open' or '60/40' operating mode position prior to burner startup. The switching valve should only be driven to the 'closed' or '90/10' ultra low NOx operating mode position by the PLC once the required furnace temperature set point of 1600°F (870°C) or higher is reached.
3. Install the main air line at the burner body or optional switching valve RPM flange using the gasket provided. A companion flange is supplied when ordering the metric version of the burner.
4. If necessary, the gas connection can be rotated in 45° increments as follows:
 - a. Remove the hex nuts and washers holding the gas tee to the main air body.
 - b. Rotate the gas tee to the desired position.
 - c. Make sure the gaskets between the gas tee and the main air body are properly seated.
 - d. Replace washers, hex nuts and tighten.

IMPORTANT

All piping must be properly supported and aligned to avoid stresses on the burner and associated equipment. Hauck recommends that unions and flexible connections be used on all air and fuel lines. The unions will allow the burner to be more easily serviced when required, and the flexible connections will help isolate the burner from piping movement due to expansion, contraction and vibration.

IMPORTANT

All burner models are provided with two sets of connections for observation port, optional pilot and UV scanner mounting. If the main air connection is at 6 or 12 o'clock, the accessory ports located above the burner center line should be used. However, both the pilot and UV scanner **MUST** be in adjacent ports on the SAME side of the burner. Neither the pilot nor the flame scanner should be located below the horizontal centerline of the burner, where they could be adversely affected by dirt and debris

5. Install and connect the gas line.
6. Install the spark igniter via the burner gas tee assembly (refer to applicable sections of Section I. Maintenance, Figure 4 or 5). Pipe ambient cooling air to the 1/2 NPT (DN 15) connection for continuous spark igniter cooling flow. The UV scanner connection should be supplied with minimum 8 "wc (1990 Pa) of ambient purge air.
7. If applicable, install the IPG pilot tip in the 1-1/2 NPT (DN 40) connection located above the burner center line on the burner body. For the metric burner w/ pilot option, the ZMI pilot is pre-assembled and located through the burner centerline axis. Consult the appropriate dimensional sheet and instructions that accompany the pilot for additional information (IPG-9 and ZMI Instructions).
8. If a UV scanner is used, install it in the correct accessory port adjacent to the pilot connection (if applicable). Provide a minimum 8 "wc (1990 Pa) ambient air source for the UV scanner air purge by connecting a cold air supply line to the 3/8 NPT (DN 10) bushing on the scanner adapter using 3/8" (1 mm) OD tubing or pipe and a suitable isolating valve.
9. Complete the mounting of pilot components and connection of air, gas, and air purge lines.
10. Inspect all bolted joints on the burner. Be sure all fasteners are tight.

CAUTION

In order to ensure an adequate seal, it is important that the burner backplate bolts be sufficiently tight. **Before any attempt is made to start the burner, check to ensure that the bolts are sufficiently tight and conduct a gas leak test. Failure to check and ensure that a satisfactory seal exists by conducting a leak test could result in the formation of a hazardous gas leakage condition.** Whenever burner internals are removed for cleaning or replacement, **be sure to tighten the backplate bolts and conduct a gas leak test.**



WARNING

Adjustment of this equipment, and its components, by unqualified personnel, can result in fire, explosion, severe personal injury, or even death.

F. IGNITION

TriOx burners can be equipped with an air cooled spark igniter, IPE 50, or a gas pilot igniter, IPG5413 or a ZMI pilot. For any igniter type, a 5000/6000 volt standard coil type ignition transformer can be utilized.

NOTE

Manual ignition or torch lighting is not recommended.

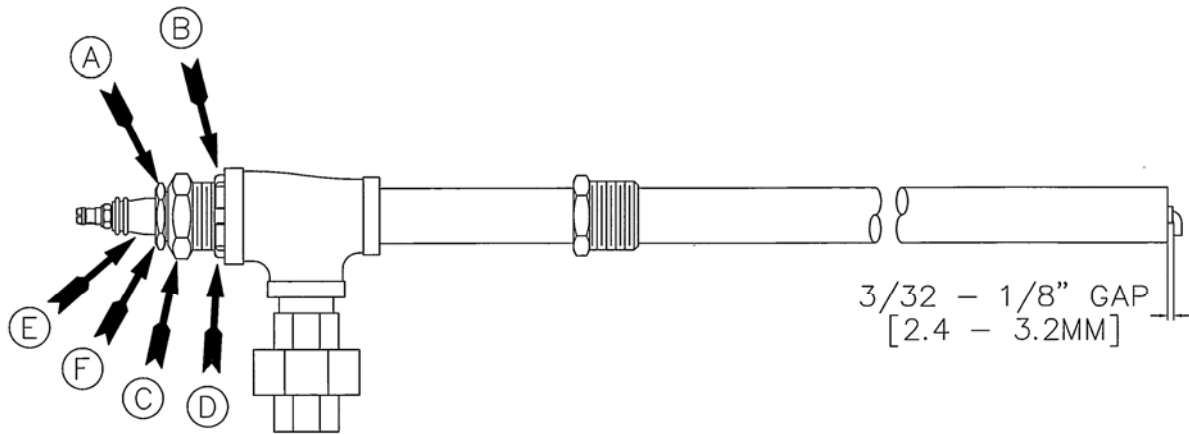


WARNING

When using a standard coil ignition transformer, provisions must be made to eliminate the ignition spark falsely satisfying the “flame on” UV scanner. Hauck designed flame supervisory panels accomplish this by “timing out” the spark transformer after a short (10 seconds for most applications) trial for ignition.

For air cooled spark igniter set-up, accomplish the following:

1. Disconnect cooling air from spark igniter and remove spark igniter from burner (refer to applicable sections of Section I. Maintenance, Figure 4 or 5).
2. Connect ignition wire to spark igniter electrode connection.
3. Energize the ignition transformer and verify that an adequate spark is produced between the bent electrode tip and the outer tube.
4. De-energize ignition transformer.
5. If the spark is adequate, re-install spark igniter into burner. If the spark is weak or absent, adjust the spark gap as shown in Figure 3 and repeat until adequate spark is obtained.
6. If spark is still absent, consult Hauck.



SPARK GAP ADJUSTMENT INSTRUCTIONS

- (A) NOTE POSITION OF BENT ELECTRODE TIP AT OPPOSITE END AND LOOSEN SPARK IGNITER BUSHING.
- (B) LOOSEN LOCKNUT
- (C) TURN SPARKPLUG ADJUSTMENT NUT TO ACHIEVE DESIRED SPARK GAP
- (D) TIGHTEN LOCKNUT
- (E) REPOSITION BENT ELECTRODE TIP TO ORIGINAL LOCATION BY TURNING INSULATOR
- (F) TIGHTEN SPARK IGNITER BUSHING
NOTE: DO NOT OVERTIGHTEN OR INSULATOR WILL CRACK

Y8295
(NOT TO SCALE)

Figure 3. Air-Cooled Spark Igniter Gap Adjustment

For gas pilot igniter operation, see instruction sheet IPG-9 in the Appendix.

G. INITIAL SETUP

TriOx burners typically operate with automatic control systems. The burners are capable of proportional control over their entire capacity range. In a typical system, ignition will be preceded by a series of steps.

CAUTION

Initial adjustment and burner start-up should be undertaken only by trained and experienced personnel familiar with combustion systems, control and safety circuitry and overall installation procedures.

CAUTION

Ensure that all safety equipment and limits are working properly before proceeding.

CAUTION

Failure to achieve ignition of pilot or main flame within a safe period (10 seconds) could result in a build-up of a combustible gas mixture which could lead to an explosion. In the event that the pilot or main flame does not light within the above time period, shut off fuel valves and re-purge the chamber before attempting further adjustment.

IMPORTANT

The burner tile should **not** be subjected to rapid heat increases at initial start-up. **Allow low fire drying for at least 6 – 8 hours before exposing the system to normal firing operation.** Thereafter, if the tile is exposed to excessive moisture or extended periods of dampness, allow **at least 30 minutes** of low fire drying before beginning normal operation.

1. Once installed, the burner is ready for initial set-up. The specific operation of the burner will depend on the individual system components in the entire combustion system. Refer to the instruction sheets that accompany the individual components.
 2. Combustion air pressure should be set at the combustion air control valve. Typical combustion air pressure range from a minimum of approximately 0.1"wc (25 Pa) to a maximum of 8"wc (1990 Pa) static pressure at the burner static pressure test points provided. Hauck recommends that the combustion air setting remain at minimum until the burner has been ignited (refer to the appropriate capacity sheet for burner air flow at low fire conditions).
 3. Gas pressure should be set at the gas control valve (typically limiting gas valve for ambient combustion air, or automatic butterfly valve for preheated combustion air). Nominal natural gas pressure required at the burner is approximately 7"wc (1740 Pa). Actual gas pressure required may vary (refer to the appropriate capacity sheet for burner gas flow at low fire conditions).
 4. If not previously completed, refer to Section F for air-cooled spark igniter or gas pilot igniter set-up.
 5. Once the igniter is set and the initial gas and air adjustments are made, the burner can be ignited as follows:
 - a. **BE SURE THAT ALL FUEL SHUTOFF VALVES ARE CLOSED AND ALL CONTROL VALVES ARE IN THE LOW FIRE POSITION.**
 - b. Position the burner switching valve to the 'open' or '60/40' operating position (if applicable).
 - c. Start the combustion air blower.
- AIR-COOLED SPARK IGNITION**
- d. Energize the ignition transformer.
 - e. Open (energize) the main automatic gas safety shutoff valves.
 - f. Once flame has been established de-energize the ignition transformer. Proceed to step n.

GAS PILOT IGNITION

- g. Ensure that the pilot automatic safety solenoid valves and the pilot manual gas valve are closed.
 - h. Turn the pilot manual air valve to the full open position.
 - i. Energize the ignition transformer.
 - j. Open the pilot gas automatic safety shutoff solenoid valves and the pilot manual gas valve.
 - k. Once the pilot flame has been established (confirm using observation port or UV flame supervision), de-energize the ignition transformer.
 - l. Open (energize) the main automatic gas safety shutoff valves.
 - m. Once flame has been established, de-energize the ignition transformer, close the pilot manual valve, and leave the manual pilot air valve open.
 - n. Proceed to ignite all burners (if applicable) per the above procedure.
6. When all burners are ignited, increase the combustion air to the high fire position (refer to appropriate capacity sheet for burner air flow at high fire conditions).
 7. When high fire combustion air is set, adjust the gas control valve (limiting gas valve or automatic butterfly valve) to achieve the desired gas flow at high fire (refer to appropriate capacity sheet for burner gas flow at high fire conditions).
 8. Verify air/fuel ratio using orifice meters in the air and gas lines. Static air pressure at the burner air inlet can be related to air flows if an air orifice meter is not available.
 9. Drive the burner to the low fire position and verify that the settings are consistent. Repeat steps 6 through 9 as necessary until high and low fire settings remain constant.
 10. Lock all control motor linkage or direct-couplings in place and return all control system functions to normal, if changed during initial adjustments.
 11. To shut down the burner system:
 - a. Return the burner to the low fire position.
 - b. Close all fuel shutoff valves.
 - c. Allow the furnace to cool to 800°F or less before shutting off the combustion air blower.

H. OPERATION

Once properly installed, ignited and fired, the burner is ready for operation. The operation of the burner will depend on the specific items in the combustion control system and the application of the burners. Refer to the instruction sheet that accompanies each item. The burner should always be ignited under low fire conditions. When the burner is firing, the spark igniter or gas pilot should be shut off.

IMPORTANT

If the refractory in the burner is exposed to excessive moisture or extended periods of dampness, **allow at least 30 minutes of low fire drying before beginning normal operation. Failure to do so can cause moisture present to expand rapidly, causing damage to the refractory.**

I. MAINTENANCE

Hauck TriOx burners have been engineered to provide dependable performance while requiring low maintenance. As with any product, it is very important to follow operating instructions and all procedures carefully to obtain optimum performance. Please refer to the applicable TriOx Parts List to become familiar with the various burner components and assemblies.

CAUTION

Be sure burner internals have cooled sufficiently before attempting to disassemble any components. Use care when separating gasket surfaces to avoid damage to the gaskets.

1. Should replacement of the air-cooled spark igniter be required, accomplish the following:

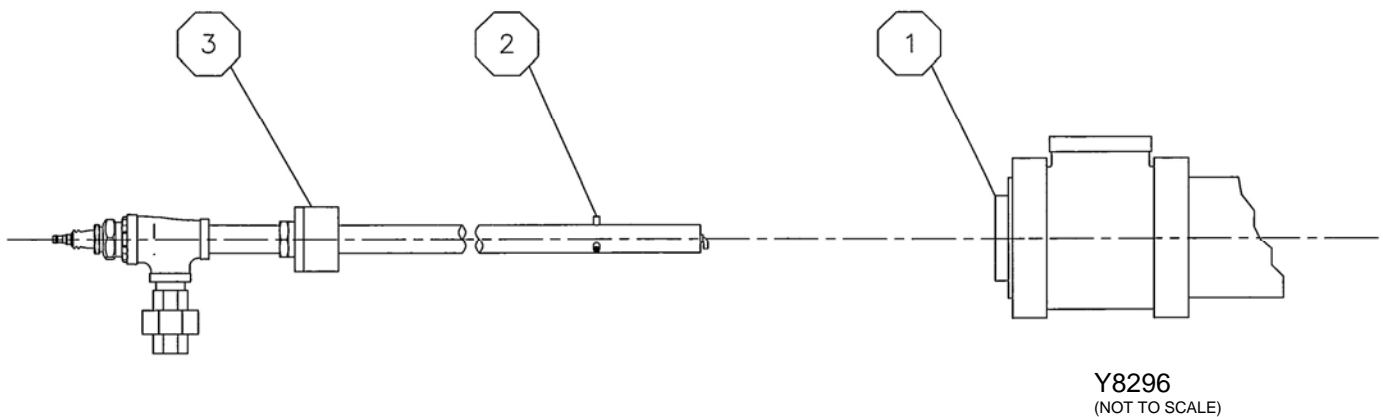


Figure 4. TriOx_006 Spark Igniter Replacement

TriOx_006

- a. Remove ignition wire from spark plug and disconnect cooling air from spark igniter.
- b. Loosen 1½" x ¾" bushing (3) from bushing (1).
- c. Gently slide spark igniter out from bushing (1) using care to not damage centering pins (2).
- d. Apply suitable pipe sealant (Loctite 565 or equal) to 1½" x ¾" bushing (3) on new spark igniter.
- e. Gently slide spark igniter into bushing (1) using care not to damage centering pins (2).
- f. Tighten 1½" x ¾" bushing (3) into bushing (1).
- g. Reconnect cooling air to spark igniter and reattach ignition wire to spark plug.

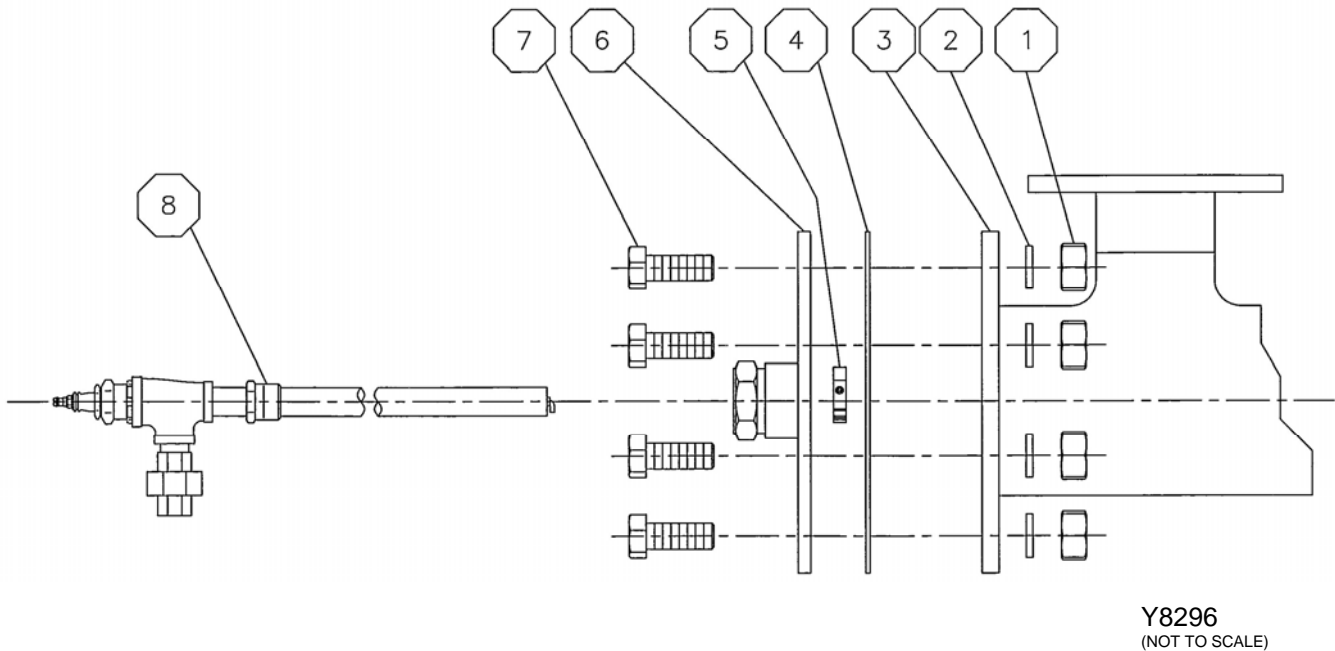


Figure 5. TriOx_008 to _016 Spark Igniter Replacement

TriOx_008 to _016

- a. Remove ignition wire from spark plug and disconnect cooling air from spark igniter.
 - b. Remove burner gas tee backplate (6) with attached spark igniter (8) by removing nuts (1), washers (2) and bolts (7), and retain gasket (4).
 - c. Gently slide spark igniter (8) with attached burner gas tee backplate (6) from gas tee assembly (3).
 - d. Loosen setscrew on centering spacer (5), then slide spacer off spark igniter (8).
 - e. Loosen spark igniter tube bushing (8) from bushing on burner gas tee backplate (6).
 - f. Mark location of centering spacer (8) on new spark igniter tube, then loosen setscrew and remove centering spacer (5) from spark igniter tube.
 - g. Apply suitable pipe sealant (Loctite 565 or equal) on spark igniter tube bushing (8).
 - h. Tighten spark igniter tube bushing (8) into bushing on burner gas tee backplate (6).
 - i. Slide centering spacer (5) onto new igniter tube to location marked previously and tighten setscrew.
 - j. Inspect gasket (4), and replace if damaged.
 - k. Install gasket (4), and burner gas tee backplate (6) with attached spark igniter (8), with bolts (7), washers (2) and nuts (1). Tighten all flange bolts securely.
 - l. Reconnect cooling air to spark igniter and reattach ignition wire to spark plug.
2. Burner components which should be checked periodically and cleaned, if necessary, include:

Gas Body Assembly (All Models).

- a. Disconnect the gas line.
- b. Remove the IPE spark igniter (if applicable – refer to Figure 4).
- c. Remove front set of hex bolts from air body backplate.
- d. Remove gas tee assembly from burner.
- e. Loosen the packing nut and remove the center gas tube assembly from the burner.
- f. Inspect internal parts. Clean the interior walls of gas body assembly and gas tube assembly of any residue.
- g. Inspect radial gas holes near end of gas tube and the center gas tube orifice for blockage, clean if necessary.
- h. Inspect the four air holes, pipe nipples attached to the plate on the front of the gas tube, and clean of any residue if necessary.

- i. Check condition of internal refractory baffle and stage 2 air openings, semi circles in refractory baffle, and clean if necessary.
- j. Reinsert gas tube assembly. **Ensure that the four stage 1 air holes located on the flat plate attached to the end of the gas tube line up with the stage 1 air openings (four innermost holes refractory baffle).** If not, the packing gland located on the rear of the gas tube, inside the gas inlet tee, can be loosened to rotate the gas tube to correctly align the radial gas holes with the four innermost air holes. Retighten packing after correct alignment is attained. Ensure that the gasket is properly seated and inlets are properly repositioned.
- k. Replace gas inlet tee and securely tighten hex bolts.
- l. Reconnect the gas line.

Switching Valve Seat (If applicable).

- a. Disconnect the main air line to the switching valve inlet.
- b. Inspect the valve and valve seat, clean of any debris. Ensure that the valve disc makes contact with the seat located in the valve body when in the 'closed' or 90/10 mode.
- c. Install a new fiberfrax gasket between the valve and air line.
- d. Reconnect the main air line to the switching valve inlet.

3. Replacement of Internal Baffle

In certain situations, it may become necessary or desired to replace the internal baffle of the burner. The baffle on the TriOx burner is made of high temperature refractory. In order to replace the internal baffle, use the following procedure:

- m. Disconnect the gas line.
- n. Disconnect the air line and switching valve(if applicable).
- o. Loosen the backplate bolts and remove the backplate and gas tee assembly. Note the center gas tube will pull out as part of the sub-assembly.
- p. Remove the center air separation tube by removing the bolts holding it to the internal divider plate, see Parts List.
- q. Support the burner weight before loosening rear half of burner shell mounting nuts.
- r. Carefully remove the rear half of the burner shell and center dividing plate by loosening the bolts on the outside burner shell flange.
- s. Remove burner internals after breaking the seal between the center refractory baffle and the outer refractory ring. Be careful not to damage the internal body liners (TriOx 2000 models)
- t. Coat the outside of the new baffle with high temperature coating cement (Hauck recommends Fiberfrax QF-150 or equivalent).
- u. Install the new baffle in the burner refractory ring being sure to align the baffle key with the inner refractory ring keyway to ensure proper alignment of parts.
- v. Install new gaskets if required on both sides of the burner center divider plate, reinstall divider plate and rear half of the burner shell. Tighten all bolts securely.
- w. Re-install the center air separation tube, tighten all bolts securely.
- x. Reinstall the burner backplate, use a new gasket if necessary. Ensure that the burner internal fiber linings (2000 series only) are securely in place to protect the burner shell from overheating. Tighten all flange bolts securely.
- y. Reinstall the burner switching valve, being careful to position the valve in the 'open' or '60/40' position for cold furnace startup. Use new gaskets if necessary, tighten all flange bolts securely.
- z. Reinstall all gas piping and check for gas leaks before restarting burner.

CAUTION

Failure to check and ensure that a satisfactory seal exists by conducting a gas leak test could result in a hazardous condition.

4. Replacement of Self-Supporting Refractory Tile

Refractory tiles should be checked for damage. If this cannot be done from inside the furnace, it will be necessary to gain access to the tile by removing the burner backplate assembly as described in step 3. Should it ever become necessary to replace the burner refractory tile, use the following procedure:

- a. Complete steps 3.a. through 3.g. above.
- b. Remove flame scanning equipment and pilot from accessory ports.
- c. Support the burner weight before loosening burner forward shell mounting nuts.
- d. Loosen the burner forward shell mounting nuts from the burner tile mounting studs and remove the forward half of the burner assembly from the furnace.
- e. Loosen and remove the 7/8" (22 mm) tile mounting plate studs.
- f. Remove the existing burner tile from the furnace wall and clean the tile port opening.
- g. Inspect the refractory in the area surrounding the tile and repair any damage.
- h. Replace the burner tile mounting gasket, if necessary.
- i. Mount the new burner refractory tile.
- j. Replace tile mounting nuts and tighten.
- k. Scrape off any excess mortar from the face of the burner.
- l. Repeat steps 1 through 18 in Section E of these instructions.

J. RECOMMENDED SPARE PARTS LIST

Item	Qty.	Part Number	Description
1	1	See Parts List	Spark Igniter Assembly (If Applicable)
2	1	See Parts List	Igniter, Gas Pilot (If Applicable)
3	1	See Parts List	Actuator, Burner Switching Valve

Table 8. Recommended Spare Parts

**IPG IGNITION GAS PILOTS
BACK-LOADED GAS**



WARNING

These instructions are intended for use only by experienced, qualified combustion start-up personnel. Adjustment of this equipment and its components by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

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These instructions are intended to serve as guidelines covering the installation, operation, and maintenance of Hauck equipment. While every attempt has been made to ensure completeness, unforeseen or unspecified applications, details, and variations may preclude covering every possible contingency. **WARNING: TO PREVENT THE POSSIBILITY OF SERIOUS BODILY INJURY, DO NOT USE OR OPERATE ANY EQUIPMENT OR COMPONENT WITH ANY PARTS REMOVED OR ANY PARTS NOT APPROVED BY THE MANUFACTURER.** Should further information be required or desired or should particular problems arise which are not covered sufficiently for the purchaser's purpose, contact Hauck Mfg. Co.



WARNING

This equipment is potentially dangerous with the possibility of serious personal injury and property damage. Hauck Manufacturing Company recommends the use of flame supervisory equipment and fuel safety shutoff valves. Furthermore, Hauck urges rigid adherence to National Fire Protection Association (NFPA) standards and insurance underwriter's requirements. Operation and regular preventative maintenance of this equipment should be performed only by properly trained and qualified personnel. Annual review and upgrading of safety equipment is recommended.

A. GENERAL INFORMATION

The Hauck Series IPG Blast Type Back-Loaded Gas Pilot provides a means of lighting the flame of Hauck burners and many other industrial gas or oil burners. IPG pilots are engineered for exceptional flame stability and long life, even under the most severe and adverse operating conditions. IPG pilots are designed for electric spark ignition. The standard IPG Back-Loaded Pilots are suitable for firing into neutral, negative or positive pressure applications.

The back-loaded feature offers the capability to compensate the pilot air/fuel ratio for variations in furnace or burner pressure.

B. RECEIVING AND INSPECTION

Upon receipt, check each item on the bill of lading and/or invoice to determine that all equipment has been received. A careful examination of all parts should be made to ascertain if there has been any damage in shipment.

IMPORTANT

If the installation is delayed and the equipment is stored outside, provide adequate protection as dictated by climate and period of exposure. Special care should be given to all motors and bearings, if applicable, to protect them from rain or excessive moisture.

C. CAPACITIES

SPECIFICATIONS	PILOT SIZE		
	1	2	3
Port Area (in ²)	0.069	0.122	0.254
Input @ Stoichiometric Air/Fuel (Btu/hr)	21,800	40,800	80,500
Air Flow @ 27.7"wc (scfh)	205	385	760

NOTES:

1. Capacities based on natural gas with HHV of 1034 Btu/ft³, a stoichiometric air/gas ratio of 9.74:1 with a 6"wc mixture pressure and the pilot firing into burner.
2. Ambient combustion air is required at a constant air pressure to the inlet of the mixing tee in the 14 - 55"wc range; capacities listed based on static air pressure of 27.7"wc.
3. Ambient gas should be supplied to the inlet of the gas regulator at a nominal 14"wc; maximum gas supply pressure is 27.7"wc.

Table 1. IPG Capacities

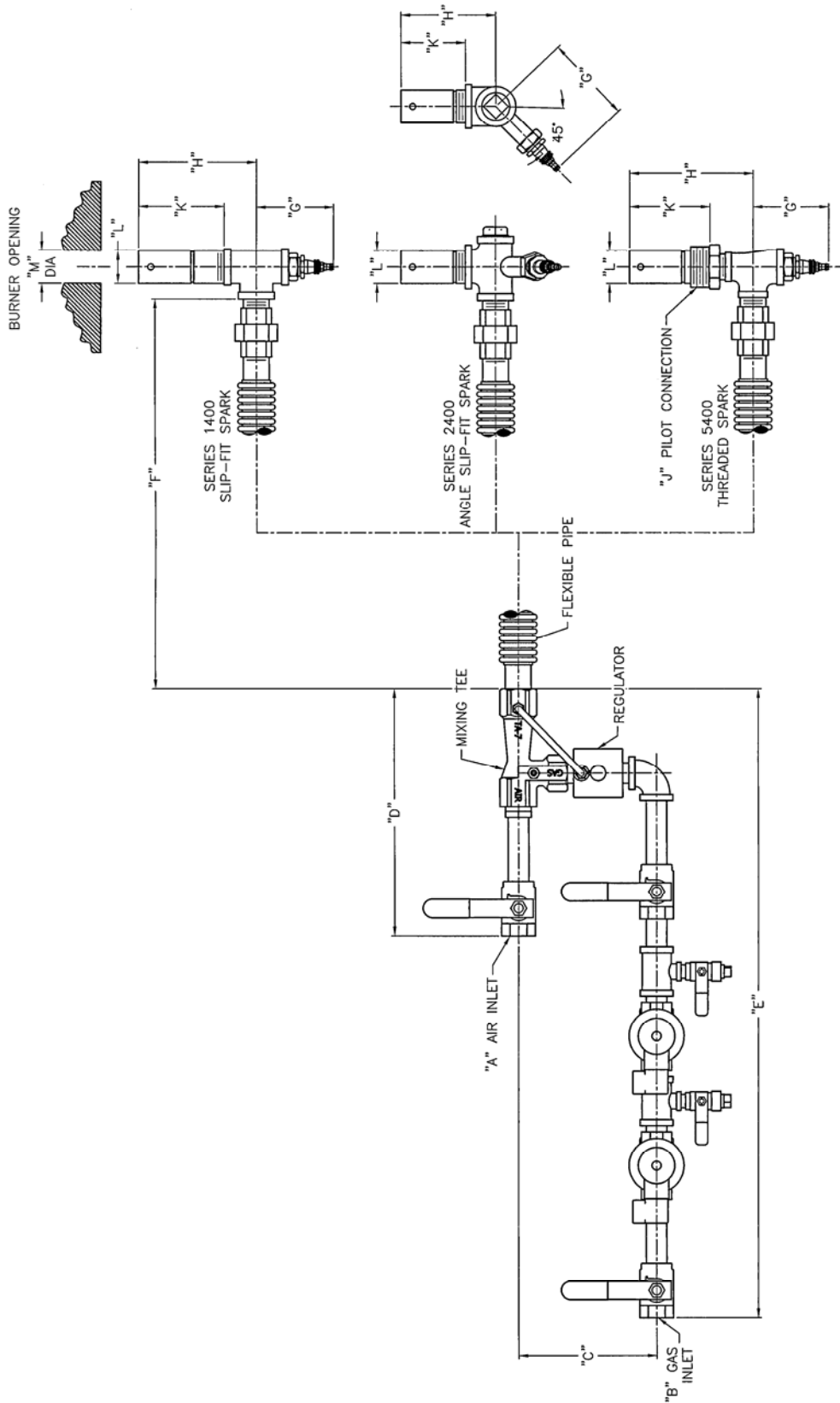
SPECIFICATIONS	PILOT SIZE		
	1	2	3
Port Area (nm ²)	44.5	78.7	164
Input @ Stoichiometric Air/Fuel (kW)	5.8	10.8	21.3
Air Flow @ 6.9 kPa (nm ³ /hr)	5.5	10.3	20.4

NOTES:

1. Capacities based on natural gas with LHV of 36.74 MJ/nm³, a stoichiometric air/gas ratio of 9.74:1 with a 1.5 kPa mixture pressure and the pilot firing into burner.
2. Ambient combustion air is required at a constant air pressure to the inlet of the mixing tee in the 3.5 - 14.7 kPa range; capacities listed based on static air pressure of 6.9 kPa.
3. Ambient gas should be supplied to the inlet of the gas regulator at a nominal 3.5 kPa maximum gas supply pressure is 6.9 kPa.

Table 2. IPG Metric Capacities

D. DIMENSIONS

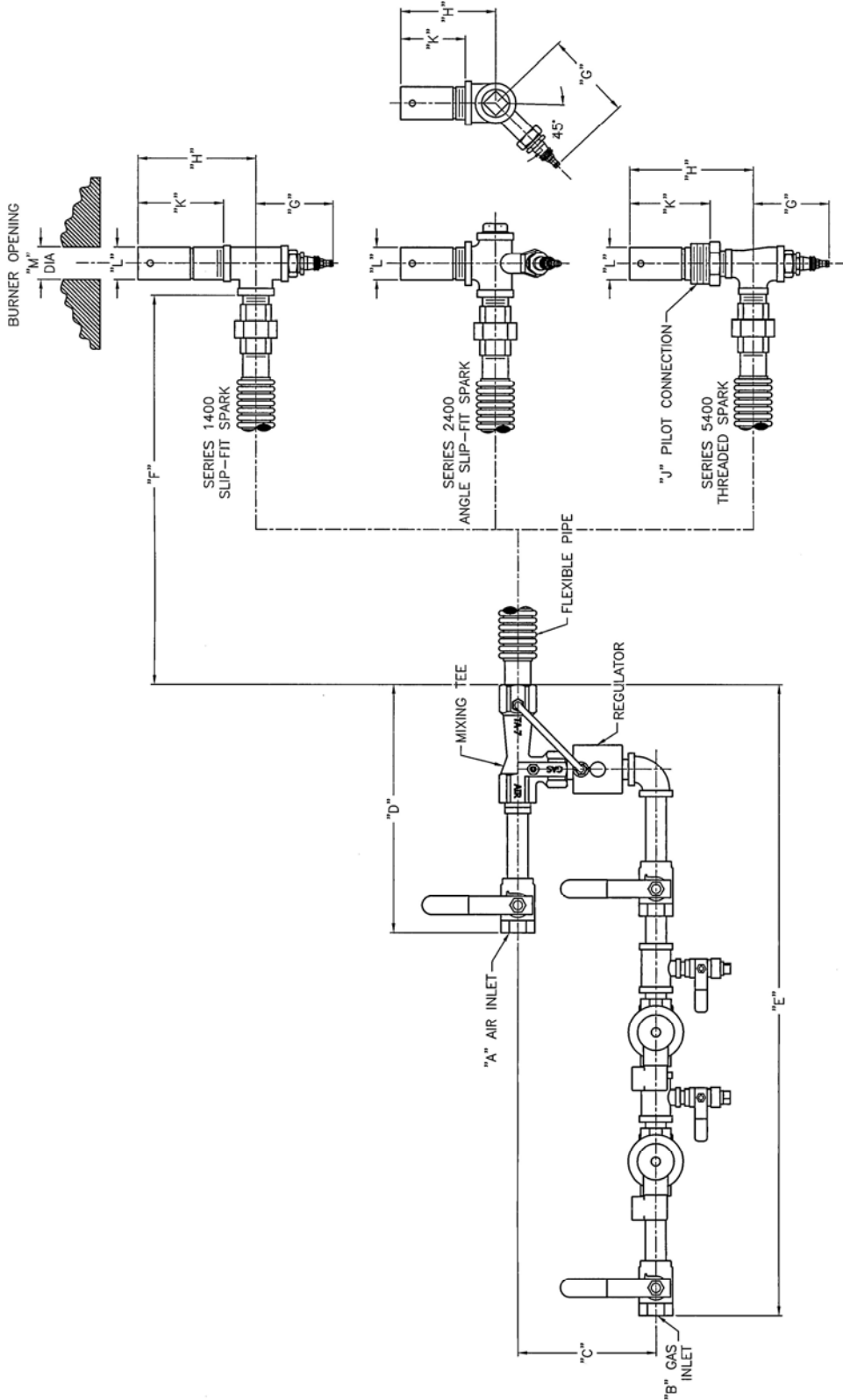


MODEL NO.	A	B	C	D	E	F	G	H	J	K	L	M (MIN-MAX)
1411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	26 13/16	5 5/8	2 15/16	3 1/2	-	2 7/16	27/32	.862-.856
1412	1/2 NPT	1/2 NPT	5 5/8	10 1/8	25 3/4	6 1/4	3	4 3/8	-	3	1 1/16	1.072-1.066
1413	1/2 NPT	1/2 NPT	5 5/8	10 1/8	25 3/4	6 1/4	3	5	-	3 7/16	1 5/16	1.337-1.331
2411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	26 13/16	5 5/8	3 1/16	3 1/2	-	2 7/16	27/32	.862-.856
5411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	25 3/4	5 5/8	2 15/16	4 3/8	3/4 NPT	2 9/16	27/32	-
5413	1/2 NPT	1/2 NPT	5 5/8	10 1/8	25 3/4	6 1/4	3	5 3/8	1 1/4 NPT	2 15/16	1 11/32	-

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(NOT TO SCALE)

Figure 1. Dimensions Back-Loaded Gas

D. DIMENSIONS (Continued)



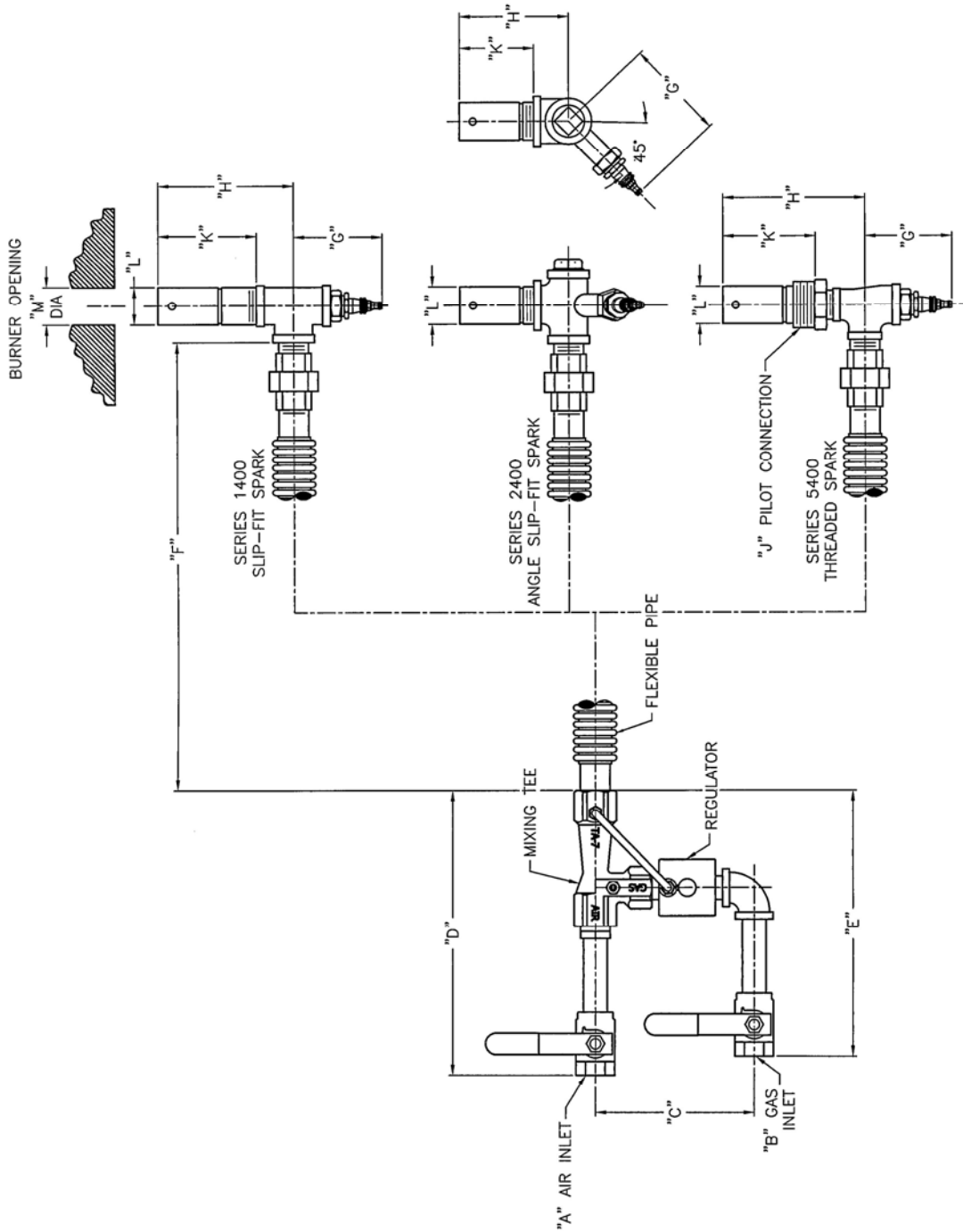
MODEL NO.	A	B	C	D	E	F	G	H	J	K	L	M (MIN-MAX)
1411	3/8 NPT	3/8 NPT	87	205	681	143	75	89	-	62	21	21.9-21.7
1412	1/2 NPT	1/2 NPT	143	257	654	159	76	111	-	76	27	27.2-27.1
1413	1/2 NPT	1/2 NPT	143	257	654	159	76	127	-	87	33	34.0-33.8
2411	3/8 NPT	3/8 NPT	87	205	681	143	78	89	-	62	21	21.9-21.7
5411	3/8 NPT	3/8 NPT	87	205	654	143	75	111	3/4 NPT	65	21	-
5413	1/2 NPT	1/2 NPT	143	257	654	159	76	137	1 1/4 NPT	75	34	-

NOTES:
1. DIMENSIONS AIR IN MM.

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Figure 2. Metric Dimensions Back-Loaded Gas

D. DIMENSIONS (Continued)

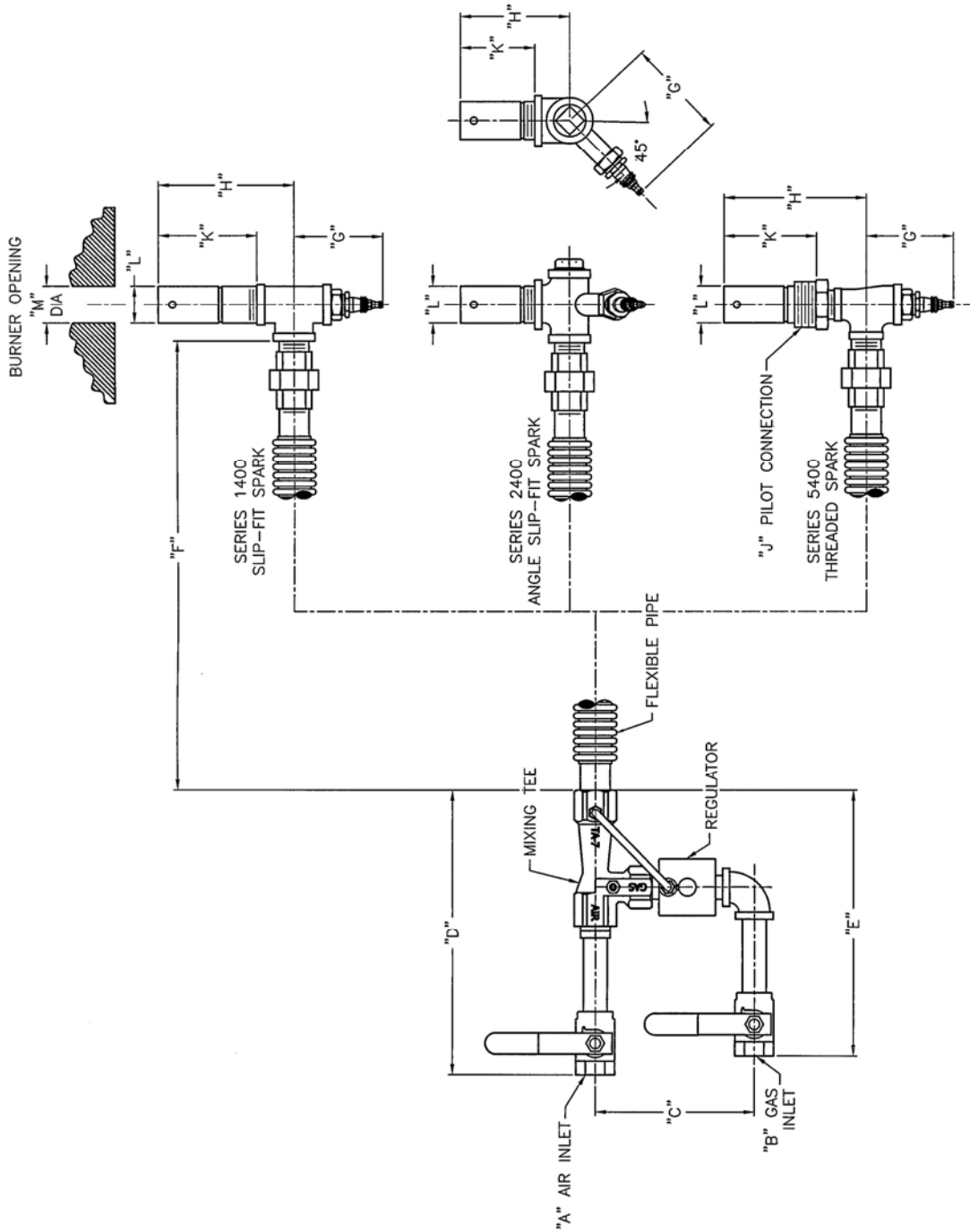


MODEL NO.	A	B	C	D	E	F	G	H	J	K	L	M (MIN-MAX)
1411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	11 1/16	5 5/8	2 15/16	3 1/2	-	2 7/16	27/32	.862-.856
1412	1/2 NPT	1/2 NPT	5 5/8	10 1/8	9 7/16	6 1/4	3	4 3/8	-	3	1 1/16	1.072-1.066
1413	1/2 NPT	1/2 NPT	5 5/8	10 1/8	9 7/16	6 1/4	3	5	-	3 7/16	1 5/16	1.337-1.331
2411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	11 1/16	5 5/8	3 1/16	3 1/2	-	2 7/16	27/32	.862-.856
5411	3/8 NPT	3/8 NPT	3 7/16	8 1/16	9 7/16	5 5/8	2 15/16	4 3/8	3/4 NPT	2 9/16	27/32	-
5413	1/2 NPT	1/2 NPT	5 5/8	10 1/8	9 7/16	6 1/4	3	5 3/8	1 1/4 NPT	2 15/16	1 11/32	-

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(NOT TO SCALE)

Figure 3. Dimensions Back-Loaded Gas Less Solenoid Valves

D. DIMENSIONS (Continued)



MODEL NO.	A	B	C	D	E	F	G	H	J	K	L	M (MIN-MAX)
1411	3/8 NPT	3/8 NPT	87	205	281	143	75	89	-	62	21	21.9-21.7
1412	1/2 NPT	1/2 NPT	143	257	240	159	76	111	-	76	27	27.2-27.1
1413	1/2 NPT	1/2 NPT	143	257	240	159	76	127	-	87	33	34.0-33.8
2411	3/8 NPT	3/8 NPT	87	205	281	143	78	89	-	62	21	21.9-21.7
5411	3/8 NPT	3/8 NPT	87	205	240	143	75	111	3/4 NPT	65	21	-
5413	1/2 NPT	1/2 NPT	143	257	240	159	76	137	1 1/4 NPT	75	34	-

Figure 4. Metric Dimensions Back-Loaded Gas Less Solenoid Valves

E. INSTALLATION

1. Ensure that all components of the factory assembled pilot are present and properly connected. The pilot unit consists of a low pressure gas regulator, air ball valve, gas ball valve, gas mixer, pilot nozzle assembly, union (threaded pilots only), and flexible pipe nipple.
2. Install the pilot assembly in the air and gas lines. The gas pressure regulator is used as a zero governor and is suitable for any mounting position without restriction.
 - a. Connect the air piping to the inlet side of the air ball valve. Low pressure air should be supplied at a constant pressure ranging from 14 - 55"wc (3.5 - 13.7 kPa) at the inlet of the ball valve.
 - b. Connect the gas piping to the inlet side of the gas ball valve. Low pressure gas should be supplied at approximately 14"wc (3.5 kPa) at the inlet of the regulator. The regulator is designed to operate from 13.8 - 27.7"wc (3.4 - 6.9 kPa); maximum allowable inlet pressure is 1 psig (6.9 kPa).
 - c. Ensure that the air and gas ball valves are fully closed.

F. IGNITION



WARNING

Adjustment of this equipment by unqualified personnel can result in fire, explosion, severe personal injury, or even death.

NOTE

To reduce pressure losses, use adequate sized pipe and minimize elbows in the air and gas lines to the pilot assembly. It is recommended that the air and gas supply be equal to or greater than their respective pilot air and gas connection sizes. If the pilot is installed at the end of a long run of pipe or will be operated in a dirty environment, it is recommended that a sediment trap be installed in the pilot air line.

1. Be sure the spark plug is set as shown in Figure 5. Ideally, initial pilot set-up should be done with the pilot outside of the burner.
2. Connect a 5000/6000 volt standard coil type ignition transformer to the spark plug on the spark igniter using a high voltage ignition wire. Ensure that the spark plug's wire electrode is centered in the pilot nozzle.

F. IGNITION Continued)

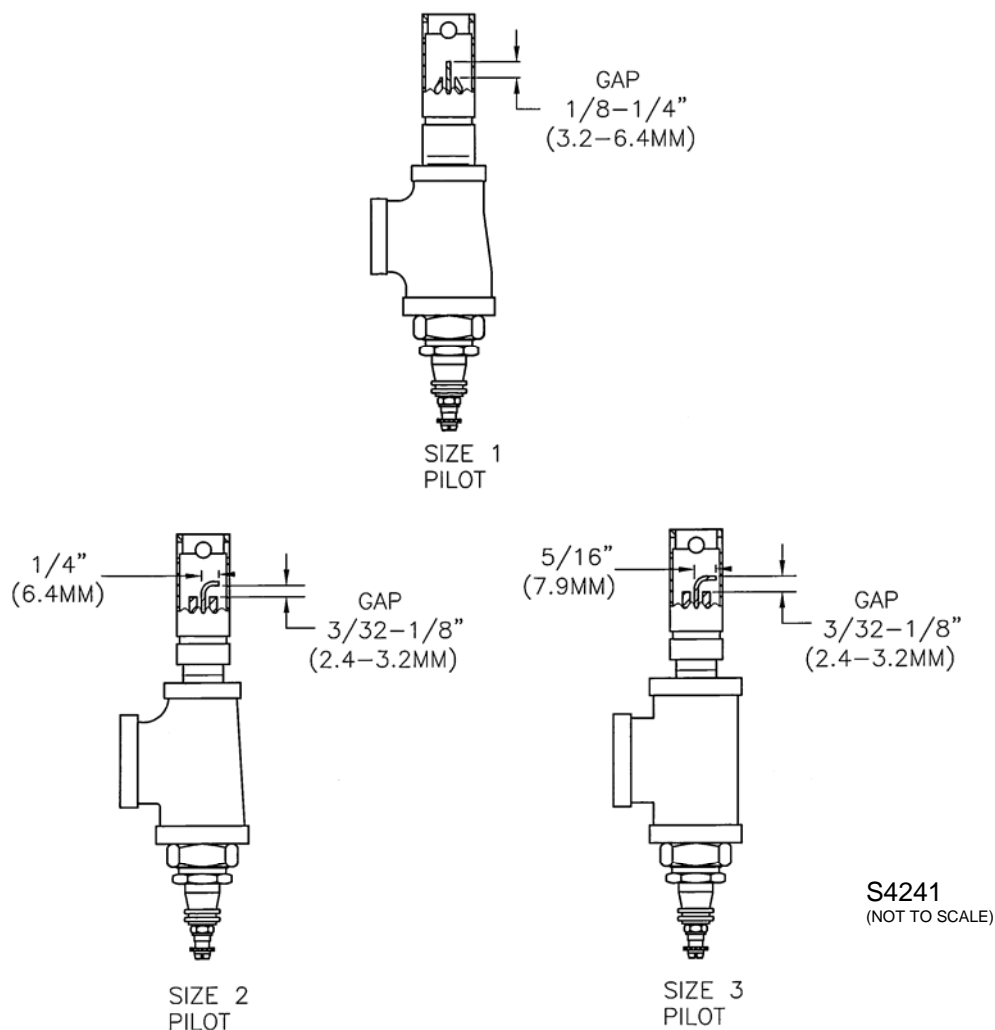


Figure 5. Spark Gap Setting and Electrode Positioning

NOTE

Ensure pilots are properly grounded to prevent equipment damage or personal injury. Exercise care to avoid over-tightening the spark plug holding nut as this may crack the ceramic insulator of the plug. Avoid, where possible, the use of long ignition wires. Long ignition wire can cause rapid spark plug wear or erosion. Suggested methods to avoid this problem are explained in Application Sheet GJ57.

CAUTION

Ignition of the pilot results in a high voltage spark in excess of 5000 volts and an open flame. Remain clear of ignition wire, spark plug and pilot nozzle while firing the pilot.

3. Ensure that the gas ball valve is closed.
4. Start the blower or air supply.
5. Open the air ball valve to the full open position.

6. Energize the ignition transformer and verify that an adequate spark is produced.
7. **Open the gas ball valve fully. This ball valve should be open fully at all times when the pilot is burning.**

NOTE

When lighting grouped pilots, as soon as one pilot in a group (supplied by one large mixer) is ignited, light the others in the group at once before starting a new group or igniting the main burners.

8. Adjust the pilot until the proper flame is achieved. The best flame is a sharp, high velocity, blast type, blue flame. The tangential holes around the nozzle should have small sharp flames coming out of them and the edges of the nozzle should begin to glow red. However, if this flame is achieved when the nozzle is outside of the burner port, the pilot can burn rich (i.e., excess fuel) when properly seated in the burner. Therefore, when adjusting the pilot outside of the burner port, a slightly lean (i.e., excess air) flame is recommended. When the pilot nozzle is inserted into the burner, the flame will burn 'on ratio' (i.e., stoichiometric air/fuel ratio) and have the characteristics desired.

Air/Fuel ratio adjustment is accomplished as follows:

- a. Loosen the lock nut on the mixer.
- b. Rotate the mixture adjusting screw **clockwise for a leaner flame or counterclockwise for a richer flame.**
- c. Tighten the lock nut.

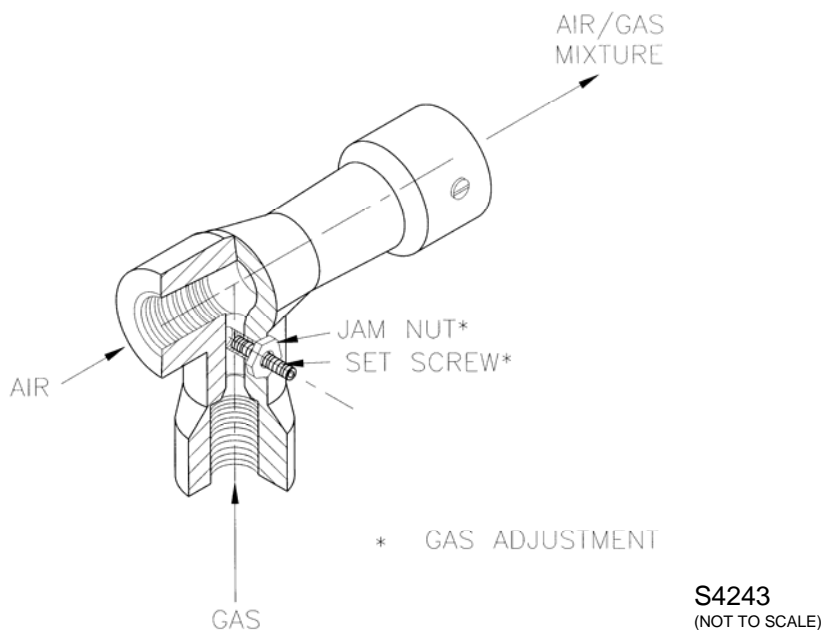


Figure 6. Pilot Mixer Adjustment

9. To extinguish the pilot:
 - a. Close gas ball valve first.
 - b. Close air ball valve last (if desired).

10. Insert a slip-fit pilot into the burner and tighten the setscrew on the burner to lock the pilot nozzle in place (if applicable).
11. Insert a threaded pilot as follows:
 - a. Disconnect the union between the pilot nozzle and flex nipple.
 - b. Thread the pilot into the port and wrench tighten until snug.
 - c. Reconnect the union.

NOTE

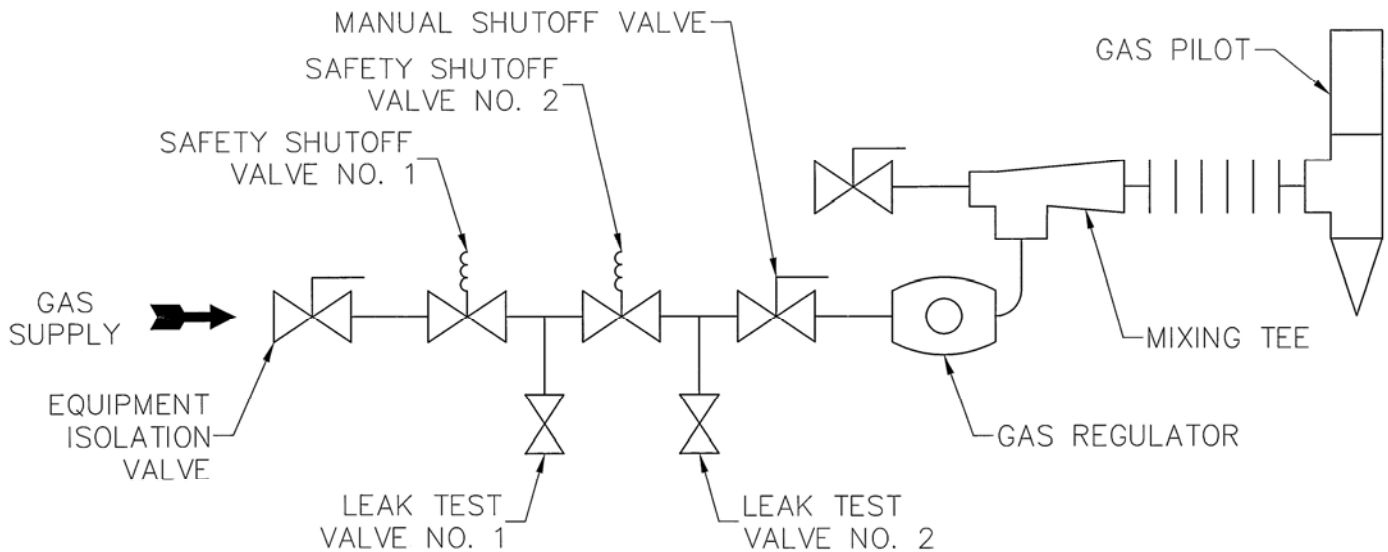
The pilot nozzle tip should be located slightly behind the main burner nozzle discharge area so that it will not obstruct or be affected by the air/fuel discharge of the main burner.

G. OPERATION

When properly adjusted, the pilot should produce a sharp, high velocity, blast type, blue flame. If adjustment is necessary, refer to the Ignition section.

H. SHUTOFF VALVE LEAK TESTING

Both safety shutoff valves in the gas pilot manifold should be leak tested on a yearly basis at minimum. Refer to the gas pilot piping diagram for leak testing shown in Figure 7.



W8151
(NOT TO SCALE)

Figure 7. Gas Pilot Piping Diagram for Leak Testing

H. SHUTOFF VALVE LEAK TESTING (Continued)

1. Shutoff the burner (s) and furnace.
2. Close the manual shutoff valve downstream of Safety Shutoff Valve No. 2.
3. Open the equipment isolation valve downstream of Safety Shutoff Valve NO. 2
4. Bleed off trapped gas by opening **both** Leak Test Valves No. 1 and No. 2.
5. Close Leak test Valve No. 2.
6. Connect 3/16" (4.8mm) ID tubing to Leak Test Valve No. 1 and immerse the open end of the tubing in a container of water. Hold the tubing vertically 1/8 to 1/4" (3 to 6mm) below the surface. If bubbles appear, record the leakage rate in bubbles/min and refer to the **IMPORTANT** note at the end of this section.
7. Close Leak Test Valve No. 1 and apply auxiliary power to open Safety Shutoff Valve No. 1.
8. Wait several minutes so that any leakage through Safety Shutoff Valve No. 2 will have time to fill the pipe between Safety Shutoff Valve No. 2 and the manual shutoff valve.
9. Connect the tubing to Leak Test Valve No. 2 and immerse the open end in water as before. Open Test Valve No. 2. If bubbles appear, record the leakage rate in bubbles/min and refer to the **IMPORTANT** note at the end of this section.
10. When no leaks are detected, open the shutoff valve at the outlet of the PGM and return to normal operation.

IMPORTANT

The fact that bubbles are present during the leak test does not necessarily mean that a safety shutoff valve is not functioning properly in the closed position. Refer to the National Fire Protection Association's publication NFPA 86 for acceptable leakage rates for a given pipe size per UL, ANSI, CSA, FM or EN standards. **If the acceptable bubbles/min leakage rate is exceeded, the safety shutoff valve is leaking and the manufacturer's instructions should be referenced for corrective action.**



WARNING

Do not attempt to operate the combustion system until all leaks are repaired.

I. MAINTENANCE

All components of the pilot assembly are engineered to provide relatively maintenance free operation. It is sometimes necessary, however, to clear the mixer jet of any debris as this causes mixer capacity to diminish. The mixer jet is easily cleaned by removing the air piping downstream of the air ball valve and running a wire into the mixing tee opening through the jet. The gas inlet of the mixer can also be cleaned by the same method. Fully removing the adjustment screw also provides access to clean the mixer.

The pilot nozzle may become plugged with debris or carbon buildup. To clean the nozzle, remove the pilot assembly from the burner. Disconnect the nozzle from the pilot assembly and remove the spark plug assembly. **Check carefully to ensure the ceramic insulator is not broken.** Clean the small tangential holes that surround the main hole and blow the nozzle out with air when complete. Reassemble the pilot assembly, test fire, and reinsert the pilot into the burner (see Figure 8).

Periodically remove and inspect the spark plug. If the ceramic insulator is cracked or broken, replace it. Clean the unit of any carbon buildup. **When replacing the plug, avoid over-tightening the nut holding the plug to avoid cracking the plug's ceramic insulator.** Before use, ensure the plug's wire electrode is centered in the pilot nozzle (see Figure 5 for setting spark plug).

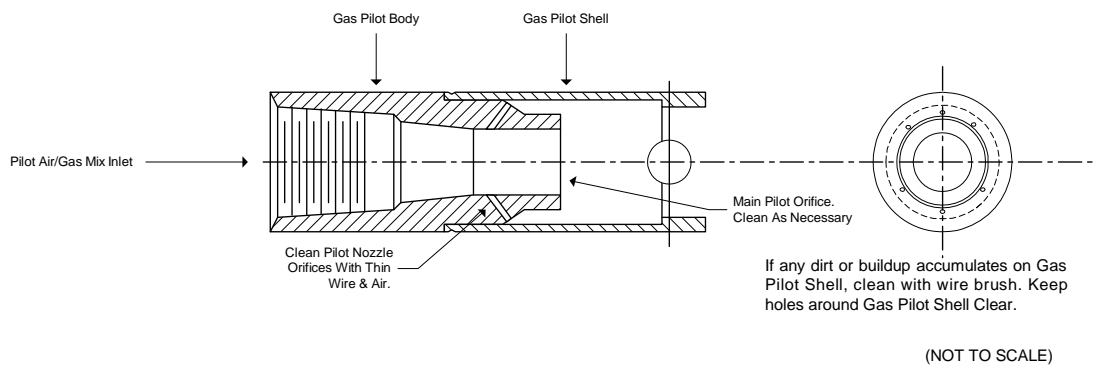
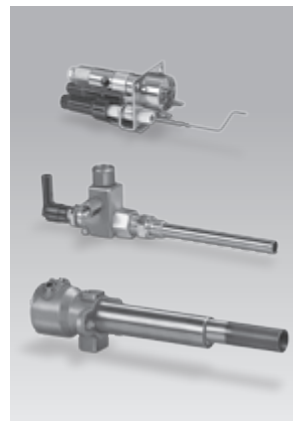


Figure 8. Cleaning Pilot Nozzle and Piloting Holes

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Ionisationszündbrenner ZAI, ZMI, ZKIH

Betriebsanleitung

- Bitte lesen und aufbewahren

Zeichenerklärung

- ①, ②, ③... = Tätigkeit
- = Hinweis

Alle in dieser Betriebsanleitung aufgeführten Tätigkeiten dürfen nur von autorisiertem Fachpersonal ausgeführt werden!

Ionisation pilot burners ZAI, ZMI, ZKIH

Operating instructions

- Please read and keep in a safe place

Explanation of symbols

- ①, ②, ③... = Action
- = Instruction

All the work set out in these operating instructions may only be completed by authorised trained personnel!

Brûleurs d'allumage à ionisation ZAI, ZMI, ZKIH

Instructions de service

- A lire attentivement et à conserver

Légendes

- ①, ②, ③... = action
- = remarque

Toutes les actions mentionnées dans les présentes instructions de service doivent être exécutées par des spécialistes formés et autorisés uniquement !

Ionisatie-aansteek- branders ZAI, ZMI, ZKIH

Bedieningsvoorschrift

- Lezen en goed bewaren a.u.b.

Legenda

- ①, ②, ③... = werkzaamheden
- = aanwijzing

Alle in deze bedrijfshandleiding vermelde werkzaamheden mogen alleen door technici worden uitgevoerd!

Brucciatori pilota a ionizzazione ZAI, ZMI, ZKIH

Istruzioni d'uso

- Si prega di leggere e conservare

Spiegazione dei simboli

- ①, ②, ③... = Operazione
- = Avvertenza

Tutte le operazioni indicate nelle presenti istruzioni d'uso devono essere eseguite soltanto dal preposto esperto autorizzato.

Quemadores de encendido controlados por ionización ZAI, ZMI, ZKIH

Instrucciones de utilización

- Se ruega que las lean y conserven

Explicación de símbolos

- ①, ②, ③... = Actividad
- = Indicación

¡Todas las actividades indicadas en estas Instrucciones de utilización, sólo deben realizarse por una persona formada y autorizada!

WARNUNG! Unsachgemäßer Einbau, Einstellung, Veränderung, Bedienung oder Wartung kann Verletzungen oder Sachschäden verursachen.
Anleitung vor dem Gebrauch lesen. Dieses Gerät muss nach den geltenden Vorschriften installiert werden.



WARNING! Incorrect installation, adjustment, modification, operation or maintenance may cause injury or material damage.
Read the instructions before use. This unit must be installed in accordance with the regulations in force.

ATTENTION ! Un montage, un réglage, une modification, une utilisation ou un entretien inadaptsés risquent d'engendrer des dommages matériels ou corporels.
Lire les instructions avant utilisation. Cet appareil doit être installé en respectant les règlements en vigueur.

WAARSCHUWING! Ondeskundige inbouw, instelling, wijziging, bediening of onderhoudswerkzaamheden kunnen persoonlijk letsel of materiële schade veroorzaken.
Aanwijzingen voor het gebruik lezen. Dit apparaat moet overeenkomstig de geldende regels worden geïnstalleerd.

ATTENZIONE! Se montaggio, regolazione, modifica, utilizzo o manutenzione non vengono eseguiti correttamente, possono verificarsi infortuni o danni.
Si prega di leggere le istruzioni prima di utilizzare il prodotto che dovrà venire installato in base alle normative vigenti.

¡ADVERTENCIA! La instalación, ajuste, modificación, manejo o mantenimiento incorrecto puede ocasionar daños personales o materiales.
Leer las instrucciones antes de usar. Este dispositivo debe ser instalado observando las normativas en vigor.

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Prüfen

ZAI, ZMI, ZKIH

Ionisch überwachte Zündbrenner zum sicheren Zünden von Gasbrennern in Verbindung mit den Gasfeuerungsautomaten BCU, IFS, IFD, PFD oder PFS. Die Leistung des Zündbrenners soll 2 bis 5 % des Hauptbrenners betragen.

Auch als eigenständig betriebene Brenner einsetzbar.

Für Erdgas, Stadtgas und Flüssiggas. Andere Gase auf Anfrage.

ZAI

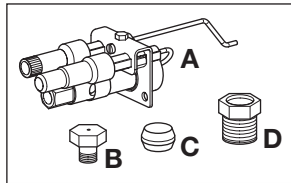
ZAI	Atmosphärischer Ionisationszündbrenner mit zwei Elektroden
R	Rp-Innengewinde
TN	NPT-Innengewinde



→ Leistung ca. 1,8 – 3 kW.

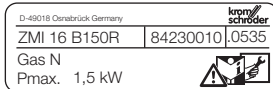
Lieferumfang

- A** Brenner mit Düse 1,3 mm (0,051") für Erdgas
- B** Düse 0,7 mm (0,028") für Flüssiggas
- C** Kegerring
- D** Überwurfmutter



ZMI

ZMI	Ionisationszündbrenner mit einer Elektrode
16–25	Brennergröße
T	T-Produkt
B	für Erdgas
G	für Flüssiggas
150–600	Flammrohrlänge
R	Rp-Innengewinde
N	NPT-Innengewinde



→ Leistung:
ZMI 16: ca. 0,8 – 1,5 kW
ZMI 25: ca. 0,9 – 3,4 kW
→ Nennleistung P_{max} , Gasart – siehe Typenschild.

ZKIH

ZKIH	Ionisationszündbrenner mit zwangsweiser Luftzufuhr
150–600	Brennerrohrlänge
/100	Flammrohrlänge
T	T-Produkt
R	Rp-Innengewinde
N	NPT-Innengewinde



→ Nennleistung P_{max} , Gasart – siehe Typenschild.

Testing

ZAI, ZMI, ZKIH

Ionisation-controlled pilot burners for the safe ignition of gas burners in conjunction with automatic burner control units BCU, IFS, IFD, PFD or PFS. The capacity of the pilot burner should be 2 to 5% of that of the main burner. Can also be used as independently operated burners. For natural gas, town gas and LPG. Other types of gas on request.

ZAI

ZAI	Thermo ionisation pilot burner with two electrodes
R	Rp internal thread
TN	NPT internal thread

→ Capacity approx. 1.8 – 3 kW.

Scope of delivery

- A** Burner with 1.3 mm (0.051") nozzle for natural gas
- B** 0.7 mm (0.028") nozzle for LPG
- C** Cone olive
- D** Union nut

ZMI

ZMI	Ionisation pilot burner with one electrode
16–25	Burner size
T	T-product
B	For natural gas
G	For LPG
150–600	Flame tube length
R	Rp internal thread
N	NPT internal thread

→ Capacity:
ZMI 16: approx. 0.8 – 1.5 kW.
ZMI 25: approx. 0.9 – 3.4 kW.
→ Rated capacity P_{max} , gas type – see type label.

ZKIH

ZKIH	Ionisation pilot burner with forced air supply
150–600	Burner tube length
/100	Flame tube length
T	T-product
R	Rp internal thread
N	NPT internal thread

→ Rated capacity P_{max} , gas type – see type label.

Vérifier

ZAI, ZMI, ZKIH

Brûleurs d'allumage à contrôle par ionisation pour un allumage sûr des brûleurs gaz en combinaison avec les boîtiers de sécurité BCU, IFS, IFD, PFD ou PFS. La puissance du brûleur d'allumage doit être entre 2 et 5 % de la puissance du brûleur principal. Peuvent également être utilisés comme brûleurs autonomes. Pour gaz naturel, gaz de ville et GPL. Autres types de gaz sur demande.

ZAI

ZAI	Brûleur pilote atmosphérique à ionisation avec deux électrodes
R	Taraudage Rp
TN	Taraudage NPT

→ Puissance env. 1,8 – 3 kW.

Programme de livraison

- A** Brûleur avec buse 1,3 mm (0,051") pour gaz naturel
- B** Buse 0,7 mm (0,028") pour GPL
- C** Bague conique
- D** Ecrou de raccord

ZMI

ZMI	Brûleur pilote à ionisation avec une électrode
16–25	Taille du brûleur
T	Produit T
B	Pour gaz naturel
G	Pour GPL
150–600	Longueur du tube de flamme
R	Taraudage Rp
N	Taraudage NPT

→ Puissance :
ZMI 16 : env. 0,8 – 1,5 kW
ZMI 25 : env. 0,9 – 3,4 kW
→ Puissance nominale P_{max} , type de gaz – voir la plaque signalétique.

ZKIH

ZKIH	Brûleur pilote à ionisation avec alimentation en air forcée
150–600	Longueur du tube de brûleur
/100	Longueur du tube de flamme
T	Produit T
R	Taraudage Rp
N	Taraudage NPT

→ Puissance nominale P_{max} , type de gaz – voir la plaque signalétique.

Controleren

ZAI, ZMI, ZKIH

Aansteekbranders met ionisatiebewaking voor het veilig ontsteken van gasbranders in combinatie met de branderautomaten BCU, IFS, IFD, PFD of PFS. Het vermogen van de aansteekbrander moet 2 tot 5% van het vermogen van de hoofdbrander bedragen. Ook als zelfstandig gebruikte branders inzetbaar. Voor aardgas, stadsgas en LPG. Andere gassen op aanvraag.

ZAI

ZAI	Atmosferische ionisatie-aansteekbrander met twee elektroden
R	Binnendraad Rp
TN	Binnendraad NPT

→ Vermogen: ca. 1,8 – 3 kW.

Leveringsomvang

- A** Brander met 1,3 mm (0,051") pijp-stuk voor aardgas
- B** 0,7 mm (0,028") pijpstuk voor LPG
- C** Conische ring
- D** Wartelmoer

ZMI

ZMI	Ionisatie-aansteekbrander met een elektrode
16–25	Brandergroote
T	T product
B	Voor aardgas
G	Voor LPG
150–600	Lengte van de vlammbuis
R	Binnendraad Rp
N	Binnendraad NPT

→ Vermogen:
ZMI 16: ca. 0,8 – 1,5 kW
ZMI 25: ca. 0,9 – 3,4 kW
→ Nominiaal vermogen P_{max} , gas-soort – zie typeplaatje.

ZKIH

ZKIH	Ionisatie-aansteekbrander met geforceerde luchttoevoer
150–600	Lengte van de branderbuis
/100	Lengte van de vlammbuis
T	T product
R	Binnendraad Rp
N	Binnendraad NPT

→ Nominiaal vermogen P_{max} , gas-soort – zie typeplaatje.

Verifica

ZAI, ZMI, ZKIH

Bruciatori pilota con controllo a ionizzazione per l'accensione sicura di bruciatori a gas con apparecchiature di controllo fiamma BCU, IFS, IFD, PFD o PFS. La potenza del bruciatore pilota deve essere tra il 2 e il 5 % del bruciatore principale. Utilizzabili anche come bruciatori autonomi. Per gas metano, gas di città e gas liquido. Altri tipi di gas su richiesta.

ZAI

ZAI	Bruciatore pilota atmosferico a ionizzazione con due elettrodi
R	Filettatura femmina Rp
TN	Filettatura femmina NPT

→ Potenza ca. 1,8 – 3 kW.

Corredo di forniture

- A** Bruciatore con ugello 1,3 mm (0,051") per metano
- B** Ugello 0,7 mm (0,028") per gas liquido
- C** Conico conico
- D** Dado ad ogiva

ZMI

ZMI	Bruciatore pilota a ionizzazione monolettrodo
16–25	Dimensioni bruciatore
T	Prodotto T
B	Per metano
G	Per gas liquido
150–600	Lunghezza tubo guida-fiamma
R	Filettatura femmina Rp
N	Filettatura femmina NPT

→ Potenza:
ZMI 16: ca. 0,8 – 1,5 kW
ZMI 25: ca. 0,9 – 3,4 kW
→ Portata nominale P_{max} , tipo di gas – vedi targhetta dati.

ZKIH

ZKIH	Bruciatore pilota a ionizzazione ad aria soffiata
150–600	Lunghezza tubo bruciatore
/100	Lunghezza tubo guida-fiamma
T	Prodotto T
R	Filettatura femmina Rp
N	Filettatura femmina NPT

→ Portata nominale P_{max} , tipo di gas – vedi targhetta dati.

Comprobar

ZAI, ZMI, ZKIH

Quemadores de encendido controlados por ionización, para el encendido seguro de quemadores de gas en combinación con los controles de quemador BCU, IFS, IFD, PFD o PFS. La potencia del quemador de encendido debe ser del 2 hasta el 5 % de la del quemador principal. También se pueden utilizar como quemadores operados independientemente. Para gas natural, gas ciudad y GLP. Otros tipos de gas bajo demanda.

ZAI

ZAI	Quemador atmosférico de encendido por ionización con dos electrodos
R	Rosca interior Rp
TN	Rosca interior NPT

→ Potencia aprox. 1,8 – 3 kW.

Componentes del suministro

- A** Quemador con tobera de 1,3 mm (0,051") para gas natural
- B** Tobera de 0,7 mm (0,028") para GLP
- C** Anillo cónico
- D** Tuerca de racor

ZMI

ZMI	Quemador de encendido por ionización con un electrodo
16–25	Tamaño del quemador
T	Producto T
B	Para gas natural
G	Para GLP
150–600	Longitud del tubo de llama
R	Rosca interior Rp
N	Rosca interior NPT

→ Potencia:
ZMI 16: aprox. 0,8 – 1,5 kW
ZMI 25: aprox. 0,9 – 3,4 kW
→ Potencia nominal P_{max} , tipo de gas – véase la placa de características.

ZKIH

ZKIH	Quemador de encendido por ionización con alimentación de aire forzada
150–600	Longitud del tubo del quemador
/100	Longitud del tubo de llama
T	Producto T
R	Rosca interior Rp
N	Rosca interior NPT

→ Potencia nominal P_{max} , tipo de gas – véase la placa de características.

Vorbereiten

- Gasarten:
Erdgas = **N**
Flüssiggas = **F**
Stadtgas = **S**
- Alle Zündbrenner sind bei Lieferung auf Erdgas **N** eingestellt.
- Falls der Zündbrenner mit einer anderen Gasart als Erdgas betrieben wird, Brenner für Gasart vorbereiten.

Preparation

- Types of gas:
Natural gas = **N**
LPG = **F**
Town gas = **S**
- All pilot burners are set for natural gas **N** on delivery.
- If the pilot burner is to be used with a different type of gas, prepare the burner for its use.

Préparation

- Types of gaz :
Gaz naturel = **N**
GPL = **F**
Gaz de ville = **S**
- A la livraison, tous les brûleurs pilotes sont réglés pour le gaz naturel **N**.
- Si le brûleur pilote est utilisé avec un autre type de gaz que du gaz naturel, préparer le brûleur pour ce type de gaz.

Vorbereiden

- Gassoorten:
Aardgas = **N**
LPG = **F**
Stadtgas = **S**
- Bij levering zijn alle aansteekbrander op aardgas **N** ingesteld.
- Indien de aansteekbrander met een andere gassoort dan aardgas wordt gebruikt, de brander op de gassoort voorbereiden.

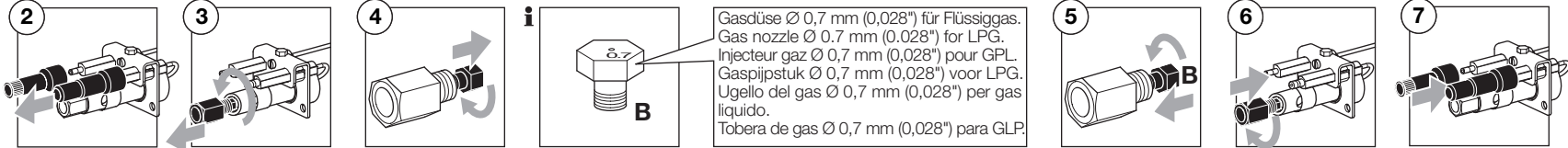
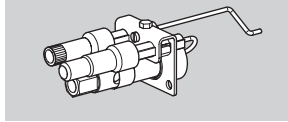
Predisposizione

- Tipi di gas:
Metano = **N**
Gas liquido = **F**
Gas di città = **S**
- Alla consegna tutti i bruciatori pilota sono impostati su gas metano **N**.
- Se il bruciatore pilota funziona con un tipo di gas diverso dal metano, predisporlo per il tipo di gas specifico.

Preparar

- Tipos de gas:
Gas natural = **N**
GLP = **F**
Gas ciudad = **S**
- Todos los quemadores de encendido están ajustados para gas natural **N** en el momento del suministro.
- Si el quemador de encendido tiene que funcionar con un tipo de gas diferente al gas natural, se deberá preparar al quemador para ese tipo de gas.

ZAI



- ⑧ Nach der Umstellung auf Flüssiggas die Luft neu einstellen (siehe „In Betrieb nehmen“).

- ⑧ After conversion to LPG, adjust the air volume (see “Commissioning”).

- ⑧ Après adaptation au GPL, procéder au réglage du débit d'air (voir “Mise en service”).

- ⑧ Na de omstelling op LPG de hoeveelheid lucht opnieuw instellen (zie “In bedrijf stellen”).

- ⑧ Dopo la conversione su gas liquido, impostare di nuovo la quantità di aria (vedi “Messa in servizio”).

- ⑧ Después de cambiar a GLP, ajustar de nuevo la cantidad de aire (ver “Puesta en funcionamiento”).

ZMI

- Düsen für den Betrieb mit Flüssiggas **F** oder Stadtgas **S** müssen separat bestellt werden (siehe „Zubehör“).

- ZMI**
→ Nozzles for use with LPG **F** or town gas **S** must be ordered separately (see “Accessories”).

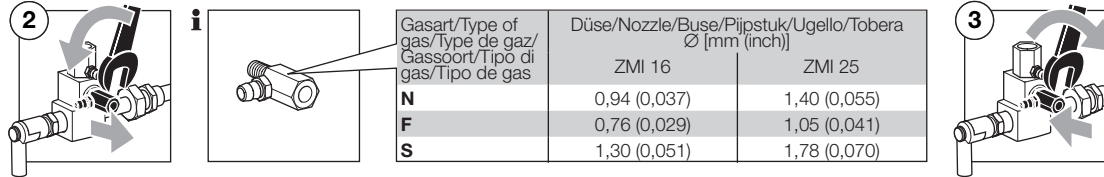
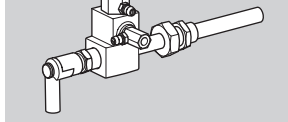
- ZMI**
→ Les buses pour l'emploi de GPL **F** ou de gaz de ville **S** doivent être commandées séparément (voir “Accessoires”).

- ZMI**
→ Pijpstukken voor het gebruik met LPG **F** of stadgas **S** moeten apart worden besteld (zie “Toebehoren”).

- ZMI**
→ Gli ugelli per il funzionamento con gas liquido **F** o gas di città **S** devono essere ordinati separatamente (vedi “Accessori”).

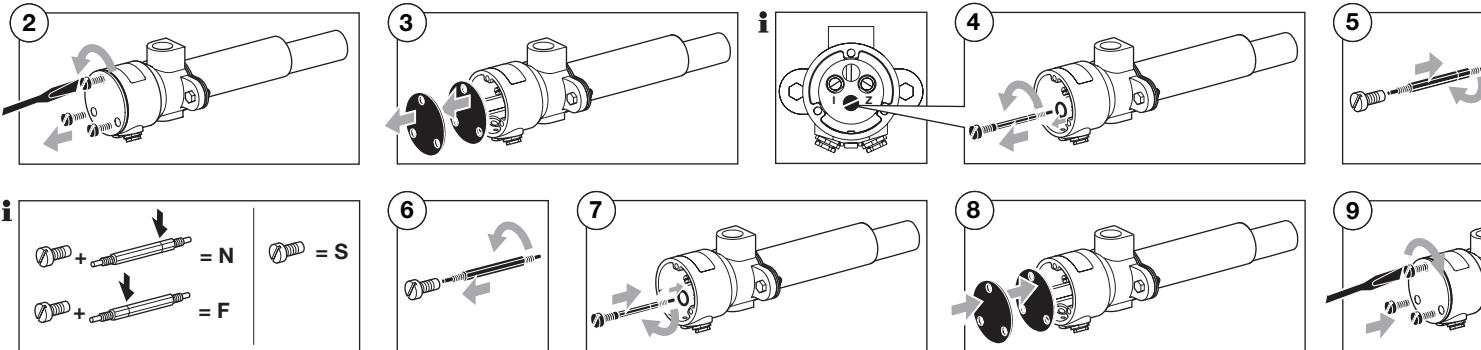
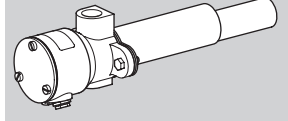
- ZMI**
→ Las toberas para el funcionamiento con GLP **F** o gas ciudad **S** deben pedirse por separado (ver “Accesorios”).

ZMI



Gasart/Type of gas/Type de gaz/ Gassoort/Tipo di gas/Tipo de gas	Düse/Nozzle/Buse/Pijpstuk/Ugello/Tobera Ø [mm (inch)]	
	ZMI 16	ZMI 25
N	0,94 (0,037)	1,40 (0,055)
F	0,76 (0,029)	1,05 (0,041)
S	1,30 (0,051)	1,78 (0,070)

ZKIH



- Bei Betrieb mit Stadtgas **S** die Halteschraube ohne den Düsen-einsatz wieder einschrauben – den Düsen-einsatz nicht im Anschlusskasten aufbewahren.

- For operation with town gas **S** screw the retaining screw back in without the nozzle insert – do not store the nozzle insert in the connection box.

- En cas d'emploi de gaz de ville **S**, revisser la vis de fixation sans la garniture de buse – ne pas conserver la garniture de buse dans la boîte de jonction.

- Bij gebruik met stadgas **S** de borgschroef er zonder het inzetstuk weer inschroeven – het inzetstuk niet in de aansluitkast bewaren.

- In caso di funzionamento con gas di città **S** stringere di nuovo la vite di fissaggio senza l'adattatore per l'ugello – non conservare l'adattatore nella scatola di raccordo.

- En caso de funcionar con gas ciudad **S**, volver a atornillar el tornillo de sujeción sin el suplemento de la tobera – no guardar el suplemento de la tobera en la caja de conexiones.

- ⑩ Nach der Umstellung auf eine andere Gasart die Luft neu einstellen (siehe „In Betrieb nehmen“).

- ⑩ After conversion to another type of gas, adjust the air volume (see “Commissioning”).

- ⑩ Après adaptation à un autre type de gaz, procéder au réglage du débit d'air (voir “Mise en service”).

- ⑩ Na de omstelling op een andere gassoort de hoeveelheid lucht opnieuw instellen (zie “In bedrijf stellen”).

- ⑩ Dopo la conversione su un altro tipo di gas, impostare di nuovo la quantità di aria (vedi “Messa in servizio”).

- ⑩ Después de cambiar a otro tipo de gas, ajustar de nuevo la cantidad de aire (ver “Puesta en funcionamiento”).

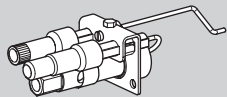
Einbauen

- Zündbrenner so einbauen, dass ein sicheres Zünden des Hauptbrenners gewährleistet ist.
- Wir empfehlen in die Gas- und Luftzuleitung je einen Filter einzubauen.

ZAI

- Eingangsdruck:
 - Erdgas: 12 – 30 mbar (4,8 – 12 "WC),
 - Stadtgas: 6 – 20 mbar, (2,4 – 8 "WC),
 - Flüssiggas: 30 – 50 mbar (12 – 20 "WC).
- Bei höherem Eingangsdruck Gasvordrossel einsetzen.

ZAI



- ② Zündgasleitung mit 8x1 Kupferrohr anschließen:
 - Beim Festschrauben der Überwurfmutter **D** auf die richtige Lage des Kegelrings **C** achten – Kegelring einfetten.

ZMI

- Eingangsdruck:
 - Gas: 20 – 50 mbar (8 – 20 "WC),
 - Luft: 20 – 50 mbar (8 – 20 "WC).
- Vor den Brenner Druckregler in die Luft- und Gaszuleitung einbauen, um den Luft- und Gasdruck einstellen zu können.
- Bei Betrieb mit Erdgas L, Stadtgas und Flüssiggas sollte der eingestellte Luftdruck 20 – 30 % über dem Gasdruck liegen.
- Bei Betrieb mit anderen Gasarten den Gasdruck entsprechend anpassen.

ACHTUNG! Bei Einsatz als Zündbrenner müssen Gas- und Luftdruck höher sein als die Anschlussdrücke des Hauptbrenners.



Installation

- Install the pilot burner so that reliable ignition of the main burner is guaranteed.
- We recommend that a filter be installed in the gas and air supply line respectively.

ZAI

- Inlet pressure:
 - Natural gas: 12 – 30 mbar (4,8 – 12 "WC),
 - Town gas: 6 – 20 mbar, (2,4 – 8 "WC),
 - LPG: 30 – 50 mbar (12 – 20 "WC).
- In the case of higher inlet pressures, insert a gas restrictor orifice.

ZMI

- Inlet pressure:
 - Gas: 20 – 50 mbar (8 – 20 "WC),
 - Air: 20 – 50 mbar (8 – 20 "WC).
- Install pressure regulators in the air and gas supply lines upstream the burner so that the air and gas pressures can be adjusted.
- For operation with natural gas L, town gas and LPG, the set air pressure should be 20 – 30% higher than the gas pressure.
- For operation with other types of gas, adjust the gas pressure correspondingly.

IMPORTANT! If used as pilot burner, the gas and air pressure must be higher than the connection pressures of the main burner.

Montage

- Procéder au montage du brûleur pilote de façon à garantir un allumage sûr du brûleur principal.
- Nous recommandons l'installation d'un filtre dans la conduite d'alimentation en gaz et dans la conduite d'alimentation en air.

ZAI

- Pression amont :
 - Gaz naturel : 12 – 30 mbar (4,8 – 12 pouces CE),
 - Gaz de ville : 6 – 20 mbar (2,4 – 8 "WC),
 - GPL : 30 – 50 mbar (12 – 20 pouces CE).
- En cas de pression amont plus élevée, installer un obturateur primaire de gaz.

ZMI

- Pression amont :
 - Gaz : 20 – 50 mbar (8 – 20 pouces CE),
 - Air : 20 – 50 mbar (8 – 20 pouces CE).
- Installer des régulateurs de pression dans les conduites d'alimentation en gaz et en amont du brûleur afin de pouvoir régler la pression d'air et de gaz.
- En cas d'emploi de gaz naturel L, de gaz de ville et de GPL, la pression d'air réglée doit se situer entre 20 et 30 % au-dessus de la pression de gaz.
- En cas d'emploi d'autres types de gaz, adapter la pression de gaz en conséquence.

ATTENTION ! En cas d'utilisation comme brûleur pilote, les pressions de gaz et d'air doivent être plus élevées que les pressions de raccordement du brûleur principal.

Inbouwen

- Aansteekbrander zo inbouwen dat een veilige ontsteking van de hoofdblander gegarandeerd wordt.
- Wij raden u aan, in de gas- en luchttoevoerleiding een filter in te bouwen.

ZAI

- Inlaatdruk:
 - Aardgas: 12 – 30 mbar, (4,8 – 12 "WC),
 - Stadtgas: 6 – 20 mbar, (2,4 – 8 "WC),
 - LPG: 30 – 50 mbar (12 – 20 "WC).
- Bij hogere inlaatdrukken een gasrestrictie-element voor de brander inzetten.

ZMI

- Inlaatdruk:
 - Gas: 20 – 50 mbar (8 – 20 "WC),
 - Lucht: 20 – 50 mbar (8 – 20 "WC).
- Voor de brander drukregelaars in de lucht- en gastoevoerleiding inbouwen om de lucht- en gasdruk te kunnen instellen.
- Bij gebruik met aardgas L, stads- en LPG moet de ingestelde luchtdruk 20 – 30% boven de gasdruk liggen.
- Bij gebruik met andere gassoorten de gasdruk evenredig aanpassen.

ATTENTIE! Bij toepassing als aansteekbrander moeten de gas- en luchtdruk hoger zijn dan de aansluitdrukken van de hoofdblander.

Montaggio

- Montare il bruciatore pilota in modo da garantire un'accensione sicura del bruciatore principale.
- Si consiglia di installare un filtro sia nella condotta del gas che in quella dell'aria.

ZAI

- Pressione di entrata:
 - metano: 12 – 30 mbar, (4,8 – 12 "WC),
 - gas di città: 6 – 20 mbar, (2,4 – 8 "WC),
 - gas liquido: 30 – 50 mbar (12 – 20 "WC).
- In caso di pressione di entrata elevata inserire un regolatore di portata gas in entrata.

ZMI

- Pressione di entrata:
 - gas: 20 – 50 mbar (8 – 20 "WC),
 - aria: 20 – 50 mbar (8 – 20 "WC).
- Montare degli stabilizzatori di pressione nella condotta dell'aria e del gas, a monte del bruciatore, per poter regolare la pressione dell'aria e del gas.
- In caso di funzionamento con metano L, gas di città e gas liquido, la pressione dell'aria impostata dovrebbe essere superiore del 20 – 30 % rispetto alla pressione del gas.
- In caso di funzionamento con altri tipi di gas adeguare, di conseguenza, la pressione del gas.

ATTENZIONE! In caso di utilizzo come bruciatore pilota, la pressione del gas e dell'aria devono essere superiori alle pressioni di collegamento del bruciatore principale.

Montaje

- Montar el quemador de encendido de manera que esté garantizado el encendido seguro del quemador principal.
- Recomendamos instalar un filtro en cada una de las líneas de alimentación de gas y de aire.

ZAI

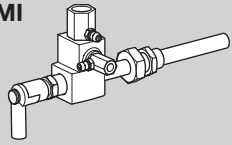
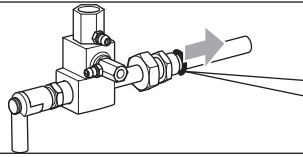
- Presión de entrada:
 - Gas natural: 12 – 30 mbar (4,8 – 12 pulg. CA),
 - Gas ciudad: 6 – 20 mbar (2,4 – 8 pulg. CA),
 - GLP: 30 – 50 mbar (12 – 20 pulg. CA).
- En caso de presión de entrada más elevada, utilizar una estrangulación previa para gas.

- ② Conectar la tubería de gas de encendido con tubo de cobre 8x1:
 - Al apretar la tuerca de racor **D** prestar atención a la correcta posición del anillo cónico **C** – engrasar el anillo cónico.

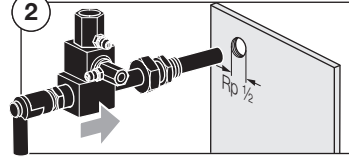
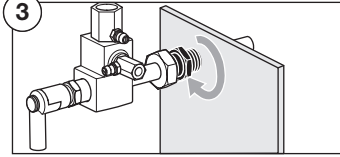
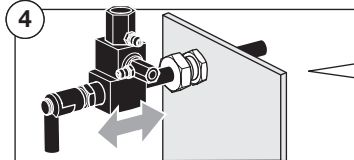
ZMI

- Presión de entrada:
 - Gas: 20 – 50 mbar (8 – 20 pulg. CA),
 - Aire: 20 – 50 mbar (8 – 20 pulg. CA).
- Instalar reguladores de presión en las líneas de alimentación de aire y de gas, aguas arriba del quemador, para poder ajustar la presión del aire y del gas.
- Si se opera con gas natural L, gas ciudad o GLP, la presión de aire ajustada deberá ser 20 – 30 % mayor que la presión del gas.
- Si se opera con otros tipos de gases, se deberá ajustar correspondientemente la presión del gas.

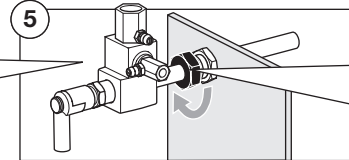
¡ATENCIÓN! Cuando se utilice como quemador de encendido, las presiones del gas y del aire deben ser mayores que las presiones de conexión del quemador principal.

ZMI**1**

Transportsicherung entfernen.
Remove transport safety device.
Retirer la sécurité de transport.
Transportbescherming verwijderen.
Togliere il dispositivo di sicurezza per il trasporto.
Retirar el seguro de transporte.

2**3****4**

Vor Festziehen Brenner positionieren.
Position the burner before tightening.
Positionner le brûleur avant de procéder au serrage.
Brander voor het vastschroeven juist positioneren.
Prima del serraggio del dado, posizionare il bruciatore.
Antes de apretar, posicionar el quemador.

5

Zum Festschrauben Schmierstoff verwenden.
When tightening, use a lubricant.
Utiliser du lubrifiant pour le vissage.
Voor het vastschroeven smeermiddel gebruiken.
Per avvitare, utilizzare un lubrificante.
Para atornillarlo, usar un lubricante.
Anzugsmoment/Tightening torque/Couple de serrage/Aanhaalkoppel/Coppia di avvitamento/Par de apriete: ZMI 16: 30–40 Nm (22–29 lbf ft), ZMI 25: 70–100 Nm (51–73 lbf ft).

⑥ Zündgasleitung mit Rp ¼ und Luftleitung mit Rp ½ anschließen.

⑥ Connect pilot gas line with Rp ¼ and air line with Rp ½.

⑥ Raccorder la conduite de gaz d'alumage avec Rp ¼ et la conduite d'air avec Rp ½.

⑥ De gasontstekingsleiding Rp ¼ en de luchtleiding Rp ½ aansluiten.

⑥ Collegare la condotta del gas pilota con Rp ¼ e la condotta dell'aria con Rp ½.

⑥ Conectar la tubería del gas de encendido con Rp ¼ y la tubería del aire con Rp ½.

ZKIH

→ Eingangsdruck:

	Gas [mbar ("WC)]	Luft [mbar ("WC)]
Erdgas	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Stadtgas	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
Flüssiggas	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

→ Bei höherem Gasdruck Gasvordrossel einbauen.

ZKIH

→ Inlet pressure:

	Gas [mbar ("WC)]	Air [mbar ("WC)]
Natural gas	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Town gas	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
LPG	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

→ In the case of higher gas pressures, insert a gas restrictor orifice.

ZKIH

→ Pression amont :

	Gaz [mbar (pouces CE)]	Air [mbar (pouces CE)]
Gaz naturel	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Gaz de ville	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
GPL	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

→ En cas de pression de gaz plus élevée, installer un obturateur primaire de gaz.

ZKIH

→ Inlaatdruk:

	Gas [mbar ("WC)]	Lucht [mbar ("WC)]
Aardgas	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Stadtgas	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
LPG	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

→ Bij hogere gasdrukken een gasrestrictie-element voor de brander inbouwen.

ZKIH

→ Pressione di entrata:

	Gas [mbar ("WC)]	Aria [mbar ("WC)]
Metano	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Gas di città	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
Gas liquido	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

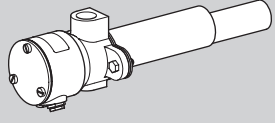
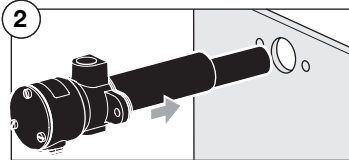
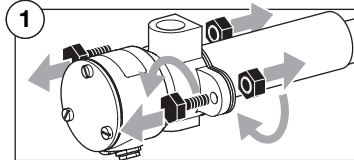
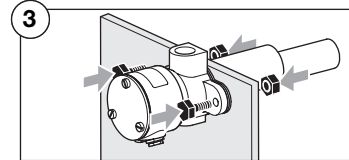
→ In caso di pressione del gas elevata inserire un regolatore di portata gas in entrata.

ZKIH

→ Presión de entrada:

	Gas [mbar (pulg. CA)]	Aire [mbar (pulg. CA)]
Gas natural	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Gas ciudad	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
GLP	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

→ En caso de presión de gas más elevada, instalar una estrangulación previa para gas.

ZKIH**1****3**

④ Zündgasleitung mit Rp ¼ und Luftleitung mit Rp ½ anschließen.

④ Connect pilot gas line with Rp ¼ and air line with Rp ½.

④ Raccorder la conduite de gaz d'alumage avec Rp ¼ et la conduite d'air avec Rp ½.

④ Gasontstekingsleiding Rp ¼ en luchtleiding Rp ½ aansluiten.

④ Collegare la condotta del gas pilota con Rp ¼ e la condotta dell'aria con Rp ½.

④ Conectar la tubería del gas de encendido con Rp ¼ y la tubería del aire con Rp ½.

Verdrchten

- Für die Ionisations- und Zündleitung nicht abgeschirmtes Hochspannungskabel verwenden:
FZLSi 1/7 -50 bis 180 °C (-58 bis 356 °F),
Best.-Nr. 04250410, oder
FZLK 1/7 -5 bis 80 °C (23 bis 176 °F),
Best.-Nr. 04250409.
- Brenner nach den Anschlussplänen des Gasfeuerungsautomaten/Zündtrafos verdrchten.

Wiring

- For the ionisation and ignition cables, use unshielded high-voltage cable:
FZLSi 1/7 -50 to 180°C (-58 to 356°F),
Order No. 04250410, or
FZLK 1/7 -5 to 80°C (23 to 176°F),
Order No. 04250409.
- Wire the burner as shown in the connection diagrams of the automatic burner control unit/ignition transformer.

Câblage

- Pour les câbles d'ionisation et d'allumage, utiliser des câbles haute tension non blindés :
FZLSi 1/7 -50 à 180 °C (-58 à 356 °F),
N° réf. 04250410, ou
FZLK 1/7 -5 à 80 °C (23 à 176 °F),
N° réf. 04250409.
- Câbler le brûleur selon les plans de raccordement du boîtier de sécurité / du transformateur d'allumage.

Bedraden

- Voor de ionisatie- en ontstekingskabel niet afgeschermd hoogspanningskabel gebruiken:
FZLSi 1/7 -50 tot 180°C (-58 tot 356°F),
Bestelnr. 04250410, of
FZLK 1/7 -5 tot 80°C (23 tot 176°F),
Bestelnr. 04250409.
- Brander bedraden volgens de aansluitschema's van de branderauto-maat/ontstekingstransformator.

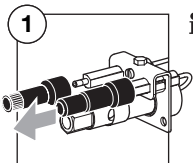
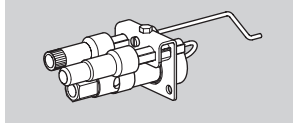
Cablaggio

- Per i conduttori di ionizzazione e di accensione utilizzare cavi ad alta tensione non schermati:
FZLSi 1/7 da -50 a 180 °C (da -58 a 356 °F),
n° d'ordine 04250410, oppure
FZLK 1/7 da -5 a 80 °C (da 23 a 176 °F),
n° d'ordine 04250409.
- Cablare il bruciatore in base agli schemi di collegamento dell'apparecchiatura di controllo fiamma / del trasformatore di accensione.

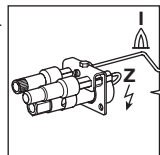
Cableado

- Utilizar cables de alta tensión no blindados para los cables de ionización y de encendido.
FZLSi 1/7 -50 hasta 180 °C (-58 hasta 356 °F),
N° de referencia 04250410, ó
FZLK 1/7 -5 hasta 80 °C (23 hasta 176 °F),
N° de referencia 04250409.
- Cablear el quemador según los esquemas de conexiones del control de quemador o del transformador de encendido.

ZAI

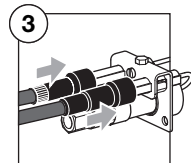
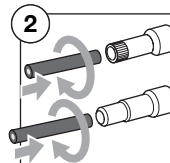


i



I = Ionisationselektrode/Ionisation electrode/Electrode d'ionisation/Ionisationselektrode/Elettrodo di ionizzazione/Elettrodo de ionización

Z = Zündelektrode/Ignition electrode/Electrode d'allumage/Ontstekingsselektrode/Elettrodo di accensione/Elettrodo de encendido



- ④ Schutzleiter für die Erdung am Brenneinsatz anschließen.

- ④ Connect the PE wire for burner earth to the burner insert.

- ④ Raccorder le conducteur de protection au corps du brûleur pour la mise à terre.

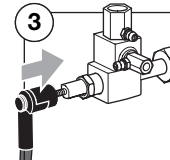
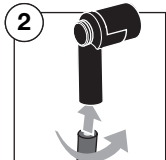
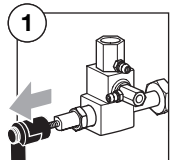
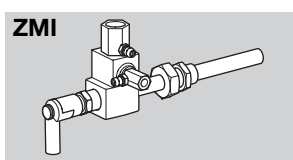
- ④ Aardleiding op het branderelement aansluiten.

- ④ Collegare il conduttore di protezione per il collegamento a terra sull'inserto del bruciatore.

- ④ Conectar el conductor de protección para la puesta a tierra en el suplemento del quemador.

ZMI

- Flammenüberwachung durch Einelektrodenbetrieb oder UV-Sonde.



- ④ Direkte Schutzleiterverbindung vom Brenneinsatz zum Gasfeuerungsautomaten herstellen.

ZMI

- Flame control with single-electrode operation or UV sensor.

ZMI

- Contrôle de la flamme par service monoélectrode ou cellule UV.

ZMI

- Vlambeveiliging door een elektrode of UV-sonde.

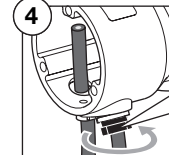
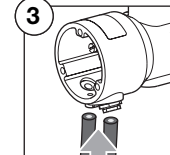
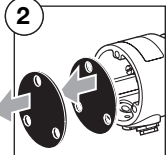
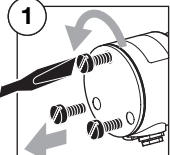
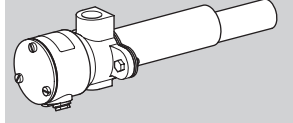
ZMI

- Controllo fiamma mediante funzionamento monolettrodo o sonda UV.

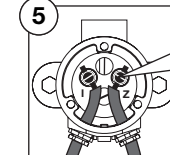
ZMI

- Control de llama mediante funcionamiento con un electrodo o mediante sonda UV.

ZKIH



PG-Verschraubung festschrauben.
Tighten PG cable gland.
Visser le raccord PG.
PG-wartel vastschroeven.
Serrare il pressacavo PG.
Apretar el pasacables PG.



I = Ionisationselektrode/Ionisation electrode/Electrode d'ionisation/Ionisationselektrode/Elettrodo di ionizzazione/Elettrodo de ionización

Z = Zündelektrode/Ignition electrode/Electrode d'allumage/Ontstekingsselektrode/Elettrodo di accensione/Elettrodo de encendido

- ⑥ Ionisations- und Zündleitung gut festschrauben.
⑦ Dichtung und Deckel wieder aufsetzen und festschrauben.
⑧ Schutzleiter für die Erdung am Brenneinsatz anschließen.

- ⑥ Tighten ionisation and ignition cables securely.
⑦ Replace seal and cover and screw into place.
⑧ Connect the PE wire for burner earth to the burner insert.

- ⑥ Serrer les câbles d'ionisation et d'allumage.
⑦ Remettre et revisser le joint et le couvercle.
⑧ Raccorder le conducteur de protection au corps du brûleur pour la mise à terre.

- ⑥ Ionisatiekabel en ontstekingskabel goed vastschroeven.
⑦ Dichting en deksel weer aanbrengen en vastschroeven.
⑧ Aardleiding op het branderelement aansluiten.

- ⑥ Serrare bene il conduttore di ionizzazione e di accensione.
⑦ Rimettere la guarnizione e il coperchio e avvitare.
⑧ Collegare il conduttore di protezione para la puesta a tierra en el inserto del bruciatore.

- ⑥ Apretar bien los cables de ionización y de encendido.
⑦ Colocar de nuevo la junta y la tapa y atornillar firmemente.
⑧ Conectar el conductor de protección para la puesta a tierra en el suplemento del quemador.

Dichtheit prüfen

Achtung! Damit keine Gefährdung durch eine Leckage entsteht, unmittelbar nach der Inbetriebnahme des Brenners die gasführenden Verbindungen am Brenner auf Dichtheit prüfen!



Tightness test

Important! To ensure that there is no danger resulting from a leak, check the gas connections on the burner for leaks immediately after the burner has been put into operation.

Vérifier l'étanchéité

Attention! Afin qu'aucun danger lié à une fuite ne survienne, vérifier l'étanchéité des raccords gaz au niveau du brûleur directement après la mise en service de celui-ci !

Controle op lekkage

Attentie! Opdat er geen risico door lekkage ontstaat, direct na de inbedrijfstelling van de brander de gasvoerende verbindingen op de brander op lekkage controleren!

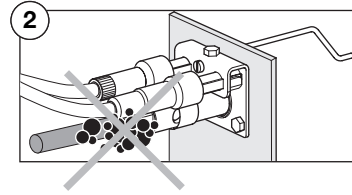
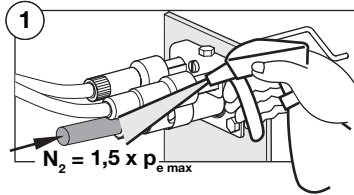
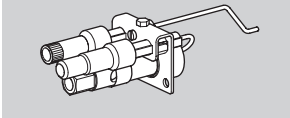
Controllo della tenuta

Attenzione! Affinché non si abbiano rischi dovuti a perdite, controllare la tenuta dei collegamenti di alimentazione del gas sul bruciatore immediatamente dopo la messa in servizio del bruciatore stesso.

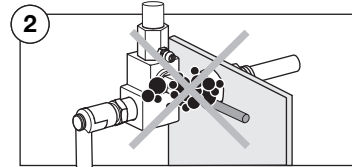
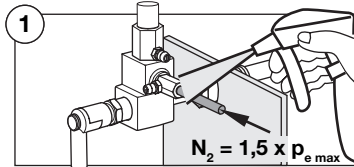
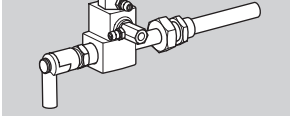
Comprobar la estanquidad

¡Atención! Para que no se produzca ningún peligro a causa de una fuga, comprobar la estanquidad de las conexiones que llevan gas en el quemador inmediatamente después de la puesta en servicio del quemador.

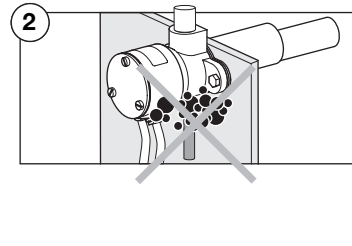
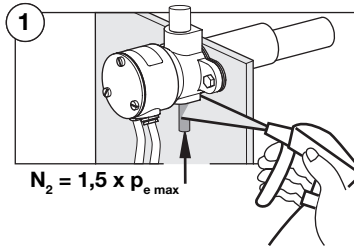
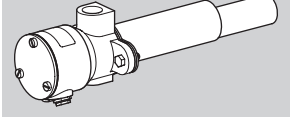
ZAI



ZMI



ZKIH



In Betrieb nehmen

- Einstellung und Inbetriebnahme des Brenners mit dem Betreiber oder Ersteller der Anlage absprechen!
- Gesamte Anlage, vorgeschaltete Geräte und elektrische Anschlüsse überprüfen.

Achtung! Vorsichtsmaßnahmen beim Zünden des Brenners und beim Öffnen der Gas- und Luftzufuhr beachten! Inbetriebnahme des Brenners nur von autorisiertem Fachpersonal durchführen lassen!

- Vor jedem Zündversuch den Ofenraum mit Luft (5 x Brennraumvolumen) vorspülen!
 - Gasleitung zum Brenner vorsichtig und sachgerecht mit Gas befüllen und gefahrlos ins Freie entlüften – Prüfvolumen nicht in den Ofenraum leiten! Explosionsgefahr!
 - Wenn der Brenner nach mehrmaligem Einschalten des Gasfeuerungsautomaten nicht zündet: gesamte Anlage überprüfen.
 - Gas- und Luftzufuhr so öffnen, dass der Brenner immer mit Luftüberschuss betrieben wird – sonst CO-Bildung im Ofenraum! Explosionsgefahr!
 - Nach dem Zünden gas- und luftseitige Druckanzeige am Brenner und die Flamme beobachten und Ionisationsstrom messen! Abschaltswelle – siehe Betriebsanleitung Gasfeuerungsautomat.
- 1) Anlage einschalten.
 - 2) Kugelhahn öffnen.
 - 3) Brenner über Gasfeuerungsautomaten zünden.
 - 4) Ionisationsstrom durch Luftverstellung einstellen.



Commissioning

- Arrange the adjustment and commissioning of the burner with the system operator or manufacturer.
- Check the entire system, upstream devices and electrical connections.

Important! Please observe the following precautions when igniting the burner and when opening the gas and air supply. The burner must only be commissioned by authorised trained personnel!

- Pre-purge the furnace chamber with air (5 x combustion chamber volume) before every ignition attempt!
 - Fill the gas line to the burner carefully and correctly with gas and vent it safely into the open air – do not discharge the test volume into the furnace chamber. Risk of explosion!
 - If the burner does not ignite although the automatic burner control unit has been switched on and off several times: check the entire system.
 - Open the gas and air supply so that the burner is always operated with excess air – otherwise CO will form in the furnace chamber! Risk of explosion!
 - After ignition, monitor the gas- and air-side pressure display on the burner and the flame. Measure the ionisation current. Switch-off threshold – see automatic burner control unit operating instructions.
- 1) Switch on the system.
 - 2) Open the manual valve.
 - 3) Ignite the burner via the automatic burner control unit.
 - 4) Set the ionisation current by adjusting the air volume.

Mise en service

- Consulter l'exploitant ou le fabricant de l'installation concernant le réglage et la mise en service du brûleur !
- Vérifier l'installation complète, les appareils montés en amont et les raccordements électriques.

Attention ! Respecter les mesures de précaution lors de l'allumage du brûleur et lors de l'ouverture de l'alimentation gaz et air ! La mise en service du brûleur ne peut être effectuée que par un personnel spécialisé autorisé !

- Pré-ventiler le four ou la chambre de combustion avec de l'air (5 x le volume du four / de la chambre de combustion) avant tout essai d'allumage !
 - Remplir la conduite de gaz allant au brûleur avec précaution et dans les règles de l'art. Purger sans risque vers l'extérieur, ne pas diriger le volume d'essai dans la chambre de combustion ! Risque d'explosion !
 - Si le brûleur ne s'allume pas après plusieurs tentatives du boîtier de sécurité : vérifier toute l'installation.
 - Ouvrir l'alimentation gaz et air de sorte que le brûleur fonctionne toujours en excès d'air – sinon, du CO est susceptible de se former dans la chambre de combustion ! Risque d'explosion !
 - Après l'allumage, observer les pressions d'air et de gaz au niveau du brûleur ainsi que la flamme et mesurer le courant d'ionisation ! Seuil de mise à l'arrêt – voir les instructions de service du boîtier de sécurité.
- 1) Mettre l'installation sous tension.
 - 2) Ouvrir le robinet à boisseau sphérique.
 - 3) Allumer le brûleur via le boîtier de sécurité.
 - 4) Régler le courant d'ionisation en ajustant le débit d'air.

In bedrijf stellen

- Instelling en inbedrijfstelling van de brander met de exploitant of constructeur van de installatie bespreken!
- De complete installatie inclusief ervoor geschakelde apparaten en elektrische aansluitingen controleren.

Attentie! Voorzorgsmaatregelen bij het ontsteken van de brander en bij het openen van gas- en luchttoevoer in acht nemen! De brander mag alleen door erkend vakpersoneel in bedrijf worden gesteld!

- Voor elke ontstekingspoging de branderkamer met lucht (5 x branderkamervolume) voorspülen!
 - Gasleiding voor de brander voorzichtig en op oordeelkundige wijze met gas vullen en veilig naar buiten ontluchten – testvolume niet in de branderkamer leiden! Ontploffingsgevaar!
 - Als de brander na het herhaalde-lijke inschakelen van de brander-automat niet ontsteekt: de gehele installatie controleren.
 - Gas- en luchttoevoer zo instellen dat de brander altijd met lucht-overmaat wordt gebruikt – anders CO-vorming in de branderkamer! Ontploffingsgevaar!
 - Na het ontsteken de gas- en luchtzijdige drukaanduiding op de brander en de vlam observeren en de ionisatiestroom meten! Uitschakeldrempel – zie bedrijfshandleiding branderautomat.
- 1) Installatie inschakelen.
 - 2) Kogelkraan openen.
 - 3) Brander via de branderautomat ontsteken.
 - 4) Ionisatiestroom door verandering van de hoeveelheid lucht instellen.

Messa in servizio

- Per la regolazione e la messa in servizio del bruciatore accordarsi con il gestore o l'esecutore dell'impianto!
- Controllare l'intero impianto, gli apparecchi inseriti a monte e i collegamenti elettrici.

Attenzione! Al momento dell'accensione del bruciatore e dell'apertura dell'alimentazione del gas e dell'aria attenersi alle misure precauzionali! La messa in servizio del bruciatore va eseguita esclusivamente da personale specializzato autorizzato!

- Prima di ogni tentativo di accensione effettuare il prelavaggio del forno con aria (5 x il volume della camera di combustione)!
 - Riempire di gas la condotta del bruciatore, usando la dovuta cautela, e farlo sfiatare all'aperto, dove non ci siano pericoli di sorta – non convogliare il volume di prova nel forno! Pericolo d'esplosione!
 - Se dopo ripetute accensioni dell'apparecchiatura di controllo fiamma il bruciatore non si accende: controllare l'intero impianto.
 - Aprire l'alimentazione del gas e dell'aria in modo che il bruciatore funzioni sempre con un eccesso d'aria – altrimenti si ha formazione di CO nel forno! Pericolo d'esplosione!
 - In seguito all'accensione osservare l'indicazione di pressione per il gas e per l'aria sul bruciatore e la fiamma e misurare la corrente di ionizzazione! Soglia di disinserimento – vedi istruzioni per l'uso dell'apparecchiatura di controllo fiamma.
- 1) Mettere in funzione l'impianto.
 - 2) Aprire la valvola a sfera.
 - 3) Accendere il bruciatore tramite l'apparecchiatura di controllo fiamma.
 - 4) Impostare la corrente di ionizzazione mediante la regolazione della quantità di aria.

Puesta en funcionamiento

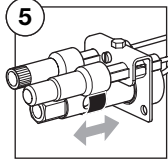
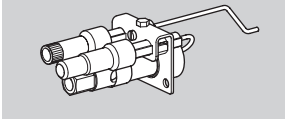
- ¡Ponerse de acuerdo sobre el ajuste y la puesta en servicio del quemador con el propietario o el diseñador/realizador de la instalación!
- Comprobar toda la instalación, los equipos conectados aguas arriba y las conexiones eléctricas.

¡Atención! ¡Observar las medidas de seguridad al encender el quemador y al abrir el suministro de gas y de aire! ¡Realizar la puesta en servicio del quemador sólo con personal especializado!

- Antes de cada intento de encendido barrer previamente con aire la cámara del horno (5 veces el volumen de la cámara de combustión).
 - Llenar la tubería de gas al quemador cuidadosa y correctamente con gas y ventilarla sin peligro al exterior – ¡no conducir el volumen de ensayo a la cámara del horno! ¡Peligro de explosión!
 - Si el quemador no se enciende después de varias conexiones del control de quemador: comprobar toda la instalación.
 - Abrir el suministro de gas y de aire de manera que el quemador siempre funcione con exceso de aire – ¡de lo contrario se formará CO en la cámara del horno! ¡Peligro de explosión!
 - Después del encendido, observar la indicación de la presión del gas y del aire en el quemador y la llama y medir la corriente de ionización. Umbral de desconexión – véanse las instrucciones de utilización del control de quemador.
- 1) Conectar la instalación.
 - 2) Abrir la válvula de bola.
 - 3) Encender el quemador a través del control de quemador.
 - 4) Ajustar la corriente de ionización mediante la regulación de la cantidad del aire.

Luft einstellen

ZAI



Setting the air flow

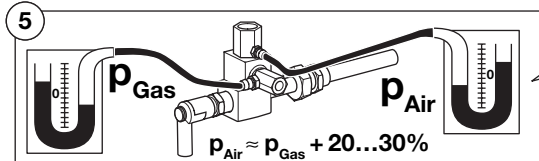
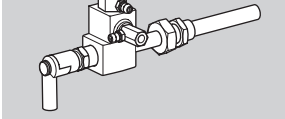
Réglage du débit d'air

Hoeveelheid lucht instellen

Regolazione della quantità di aria

Ajustar la cantidad de aire

ZMI



p_{Gas} und p_{Air} über Druckregler einstellen.
Set p_{Gas} and p_{Air} using the pressure regulators.
Régler p_{Gas} et p_{Air} via les régulateurs de pression.
 p_{Gas} en p_{Air} d.m.v. drukregelaars instellen.
Impostare p_{Gas} e p_{Air} tramite gli stabilizzatori di pressione.
Ajustar p_{Gas} y p_{Air} a través de reguladores de presión.

- Eingangsdruck:
Gas: 20 – 50 mbar (8 – 20 "WC),
Luft: 20 – 50 mbar (8 – 20 "WC).
- Bei Betrieb mit Erdgas L, Stadtgas und Flüssiggas sollte der eingestellte Luftdruck 20 – 30 % über dem Gasdruck liegen.

- Inlet pressure:
Gas: 20 – 50 mbar (8 – 20 "WC),
Air: 20 – 50 mbar (8 – 20 "WC).
- For operation with natural gas L, town gas and LPG, the set air pressure should be 20 – 30% higher than the gas pressure.

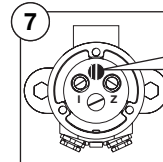
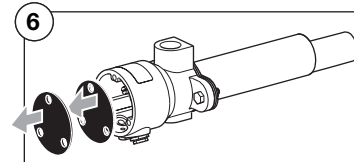
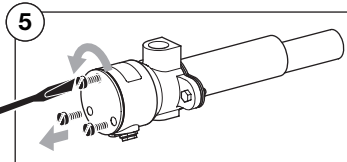
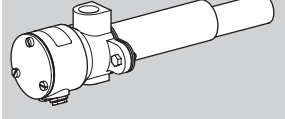
- Pression amont :
Gaz : 20 – 50 mbar
(8 – 20 pouces CE),
Air : 20 – 50 mbar
(8 – 20 pouces CE).
- En cas d'emploi de gaz naturel L, de gaz de ville et de GPL, la pression d'air réglée doit se situer entre 20 et 30 % au-dessus de la pression de gaz.

- Inlaatdruk:
Gas: 20 – 50 mbar (8 – 20 "WC),
Lucht: 20 – 50 mbar (8 – 20 "WC).
- Bij gebruik met aardgas L, stadsgas en LPG moet de ingestelde luchtdruk 20 – 30% boven de gasdruk liggen.

- Pressione di entrata:
gas: 20 – 50 mbar (8 – 20 "WC),
aria: 20 – 50 mbar (8 – 20 "WC).
- In caso di funzionamento con metano L, gas di città e gas liquido, la pressione dell'aria impostata dovrebbe essere superiore del 20 – 30 % rispetto alla pressione del gas.

- Presión de entrada:
Gas: 20 – 50 mbar
(8 – 20 pulg. CA),
Aire: 20 – 50 mbar
(8 – 20 pulg. CA).
- Si se opera con gas natural L, gas ciudad o GPL, la presión de aire ajustada deberá ser 20 – 30 % superior que la presión del gas.

ZKIH



Luftestellschraube verdrehen.
Turn air adjustment screw.
Tourner la vis de réglage de l'air.
Luchtstelschroef verdraaien.
Girare la vite di regolazione dell'aria.
Girar el tornillo de ajuste del aire.

- Eingangsdruck:

	Gas [mbar ("WC)]	Luft [mbar ("WC)]
Erdgas	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Stadtgas	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
Flüssiggas	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

- Auf guten Kontakt der Flammenwurzel am Brennermund achten – die Flamme darf nicht abheben und muss bei deutlichem Flammenmantel scharf brennen – der Flammenkern muss nicht scharf begrenzt sein.

- ⑧ Dichtung und Deckel wieder aufsetzen und festschrauben.

- Inlet pressure:

	Gas [mbar ("WC)]	Air [mbar ("WC)]
Natural gas	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Town gas	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
LPG	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

- Ensure that there is good contact between the root of the flame and the burner nozzle – the flame must not lift up and must burn with a clearly defined flame envelope – the core of the flame must not necessarily be clearly defined.

- ⑧ Replace seal and cover and screw into place.

- Pression amont :

	Gaz [mbar (pouces CE)]	Air [mbar (pouces CE)]
Gaz naturel	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Gaz de ville	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
GPL	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

- Veiller à un accrochage correct de la flamme au nez du brûleur – la flamme ne doit pas décrocher.

- ⑧ Remettre et revisser le joint et le couvercle.

- Inlaatdruk:

	Gas [mbar ("WC)]	Lucht [mbar ("WC)]
Aardgas	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Stadsgas	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
LPG	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

- Op een goed contact van het begin van de vlam met de brandermond letten – de vlam mag niet loskomen en moet bij een duidelijke vlambeeld helder branden – de vlamkern moet niet scherp begrensd zijn.

- ⑧ Dichting en deksel weer aanbrengen en vastschroeven.

- Pressione di entrata:

	Gas [mbar ("WC)]	Aria [mbar ("WC)]
Metano	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Gas di città	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
Gas liquido	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

- Assicurare un buon contatto della base della fiamma sull'imboccatura del bruciatore – la fiamma non deve staccarsi e deve ardere con un mantello slanciato – il nucleo della fiamma non deve essere limitato in modo preciso.

- ⑧ Rimettere la guarnizione e il coperchio e avvitare.

- Presión de entrada:

	Gas [mbar (pulg. CA)]	Aire [mbar (pulg. CA)]
Gas natural	12 – 30 (4,8 – 12)	3 – 40 (1,2 – 16)
Gas ciudad	6 – 20 (2,4 – 8)	10 – 120 (4 – 48)
GLP	20 – 50 (8 – 20)	7 – 90 (2,8 – 36)

- Observar que haga buen contacto la base de la llama con la boca del quemador – la llama no debe elevarse y debe arder con intensidad mostrando claramente una zona exterior – el núcleo de la llama no tiene que estar nitidamente delimitado.

- ⑧ Colocar de nuevo la junta y la tapa y atornillar firmemente.

Wartung

Zu empfehlen ist eine jährliche Funktionsprüfung.

Maintenance

We recommend an annual function check.

Maintenance

Nous recommandons de procéder à une vérification du fonctionnement une fois par an.

Onderhoud

Aanbevolen wordt, de goede werking 1 x per jaar te controleren.

Manutenzione

Si raccomanda una verifica annuale del funzionamento.

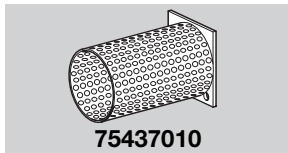
Mantenimiento

Se recomienda un ensayo del funcionamiento una vez al año.

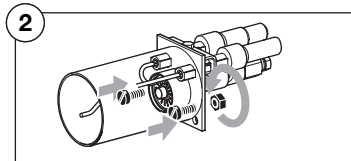
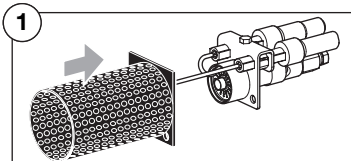
Zubehör

Schutzrohr

→ Für ZAI zum Schutz der Isolatoren und Elektroden vor hohen Temperaturen.



75437010



Accessories

Protective tube

→ For ZAI to protect the insulators and electrodes from high temperatures.

Accessoires

Tube de protection

→ Pour ZAI, pour protéger les isolateurs et les électrodes contre les températures élevées.

Toebehoren

Beschermingsbuis

→ Voor ZAI om de isolatoren en de elektroden tegen hoge temperaturen te beschermen.

Accessori

Tubo di protezione

→ Per ZAI al fine di proteggere isolatori ed elettrodi da alte temperature.

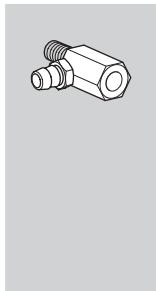
Accesorios

Tubo protector

→ Para ZAI, para proteger los aislantes y los electrodos de las altas temperaturas.

Gasdüse

→ Für ZMI, ZMI..T



Gas nozzle

→ For ZMI, ZMI..T

Injecteur gaz

→ Pour ZMI, ZMI..T

Gaspipstuk

→ Voor ZMI, ZMI..T

Ugello del gas

→ Per ZMI, ZMI..T

Tobera de gas

→ Para ZMI, ZMI..T

	Brenner Burner Brûleur Brander Bruciatore Quemador	Gasart Type of gas Type de gaz Gassoort Tipo di gas Tipo de gas	[mm (inch)]	Bestell-Nr. Order No. Référence Bestelnr. N° d'ordine N° referencia	
				ZMI	ZMI..T
ZMI 16	N*		0,94 (0,037)	75455010	75442157
	F*		0,76 (0,029)	75455147	75448032
	S*		1,30 (0,051)	75455146	–
ZMI 25	N*		1,40 (0,055)	75455012	75443157
	F*		1,05 (0,041)	75455149	75448031
	S*		1,78 (0,070)	75455148	–

*N = Erdgas/Natural gas/Gaz naturel/Aardgas/Metano/Gas natural

*F = Flüssiggas/LPG/GPL/LPG/Gas liquido/GLP

*S = Stadtgas/Town gas/Gaz de ville/Stadsgas/Gas di città/Gas ciudad

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