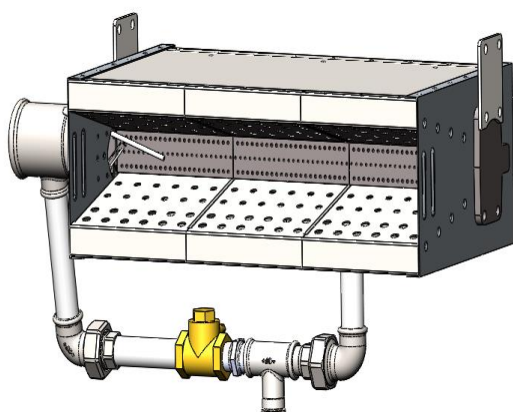
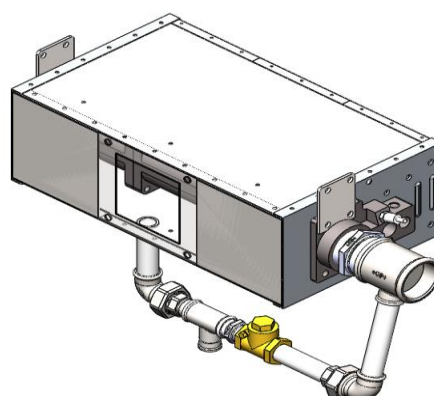


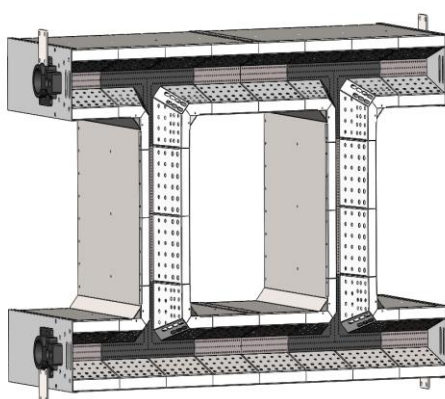
Technical Bulletin: ITAS Ductflame Model H / T / C *Design Guide*



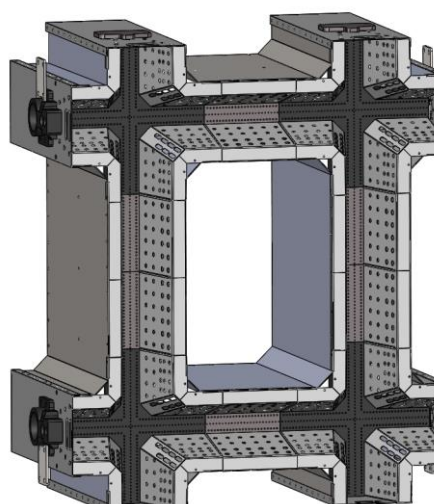
Type H Front View



Type H Back View



Type T Front View



Type C Front View

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1. Product Description

ITAS Ductflame type H or T or C are line type burners ideal for generating large volumes of clean, hot air.

Applications include ovens, dryers, fume Incinerators and similar industrial equipment.

The models H, T, C feature an integral combustion air blower mounted on the back of the burner steel case.

By supplying the correct air volume and pressure to the burner, the blower allows a stable operation over a wide range of duct velocities without installing a profile plate around the burner.

Combustion Air

Must be free of contaminants. Fives ITAS strongly recommends the use of a combustion air filter to remove airborne particles. If corrosive fumes or materials are present in the air, supply the blower with fresh, clean air from an uncontaminated area of the plant.

Access

Provide access to the burner for inspection and maintenance.

WARNING

It is dangerous to use any fuel-burning equipment unless it is equipped with suitable flame sensing devices and automatic fuel shut-off valves.

Fives ITAS can supply such equipment or information on alternate sources.

2. Safety

Important notices which help provide safe burner operation will be found in this section. To avoid personal injury and damage to the property or facility, the following warnings must be observed.

All involved personnel should read this entire manual carefully before attempting to start or operate this system. If any part of the information in this manual is not understood, contact Fives ITAS before continuing.

Safety Warnings



- The burners, described herein, are designed to mix fuel with air and burn the resulting mixture. All fuel burning devices are capable of producing fires and explosions if improperly applied, installed, adjusted, controlled or maintained.
- Do not bypass any safety feature; fire or explosion may result.
- Never try to light a burner if it shows any signs of damage or malfunctioning



- The burner and duct sections are likely to have HOT surfaces. Always wear the appropriate protective equipment when approaching the burner



- This manual provides information regarding the use of these burners for their specific design purpose. Do not deviate from any instructions or application limits described herein without written approval from Fives ITAS.

Capabilities

Only qualified personnel, with sufficient mechanical or electrical aptitude and experience with combustion equipment, should adjust, maintain or troubleshoot any mechanical or electrical part of this system.

Operator Training

The best safety precaution is an alert and trained operator. Train new operators thoroughly and have them demonstrate an adequate understanding of the equipment and its operation. A regular retraining schedule should be administered to ensure operators maintain a high degree of proficiency.

Replacement Parts

Order replacement parts from Fives only.

Storage

Store the burner indoor: exposure to the elements can damage the burner.

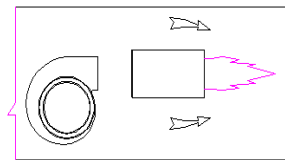
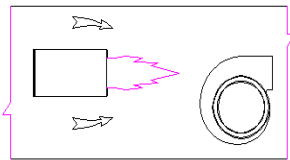
3. Specification

Nominal Input	120 kW for each Line section (120 kW/152,4 mm) ,360 kw for each T section ,480 kw for each Cross section		
Fuels	Natural Gas or 100% LPG (70% But – 30% Prop). Call Fives ITAS for information on using other fuels.		
Gas Turndown	20:1		
Pilot Input	Approximately 7,3 kW		
dP Gas Inlet Pressure	Nominal Input	Natural Gas density 0,8 kg/Nm3 LHV 9,5 kWh/Nm3	8,7 mbar
		LPG density 1,96 kg/Nm3 LHV 25,5 kWh/Nm3	3,2 mbar
dP Combustion Air over wings	Nominal Input	Natural Gas density 0,8 kg/Nm3 LHV 9,5 kWh/Nm3	2 mbar
		LPG density 1,96 kg/Nm3 LHV 25,5 kWh/Nm3	2,6 mbar
Combustion Air Quantity	170 Nm³/h each section		
Air Turn Down	1:1 Fives ITAS Ductflame is able to operate on ratio. To learn more, please contact your Fives ITAS representative		
Combustion Air Temperature Limit	STANDARD DESIGN 100 °C SPECIAL VERSION UP TO 200 °C		
Process Air Inlet Temperature Limit	400 °C		
Downstream Temperature Limit	800 °C		
Piloting	Direct ignition up to and including 500 kW. Integral spark-ignited pilot. Ignition plug included.		
Flame Monitoring	Flame rod or UV scanner		
Flame Length	At nominal Input 120 kW/section 152,4 mm	650 to 750 mm	
Pressure Drop	Low pressure Drop across the Burner. Call Fives ITAS for more information.		
Materials	All parts in contact with the flame are in Aisi 310		
Emissions	CO 50 mg/Nm3 @ 17% O2 – Nox 100 mg/Nm3 @ 17% O2		
	Call Fives ITAS for estimates of emissions performance in your application.		
Packaging Options	Available with complete valve train, combustion air blower and control system. All burners can be supplied already mounted in duct sections as specified by the customer, with mounting plate or with mounting flange for customer duct connection.		
Models	H Line-section (Max Line section 17)		
	T "T"-section (1 T section is equivalent to 3 Line-sections)		
	C Cross-section (1 Cross section is equivalent to 4 line-sections)		
Related Documents	Contact Fives ITAS for more information on valve trains, combustion air blower, control systems and accessories.		
Reference List	On request Fives ITAS shall be pleased to send an extensive list of references.		

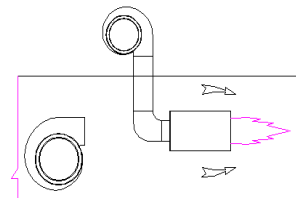
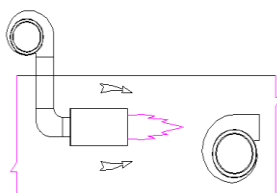
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4. Installation

4.1 Burner mounted in Duct

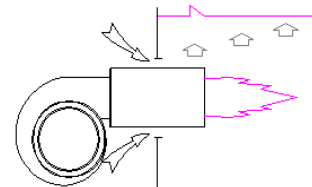
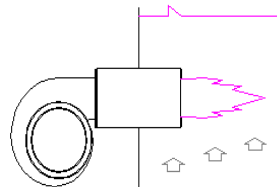
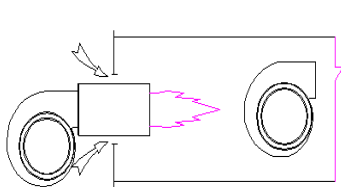


Min/Max Velocity 15 to 20 m/s (Optimum 18 m/s)
Min O₂ level in Process Air ≥ 18%



Min/Max Velocity 4 to 20 m/s (Optimum 15 m/s)

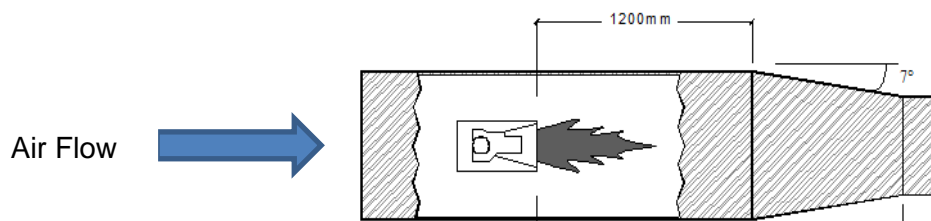
4.2 Burner mounted outside Duct



Optimum Velocity 3 to 6 m/s

4.3 Duct Lengths

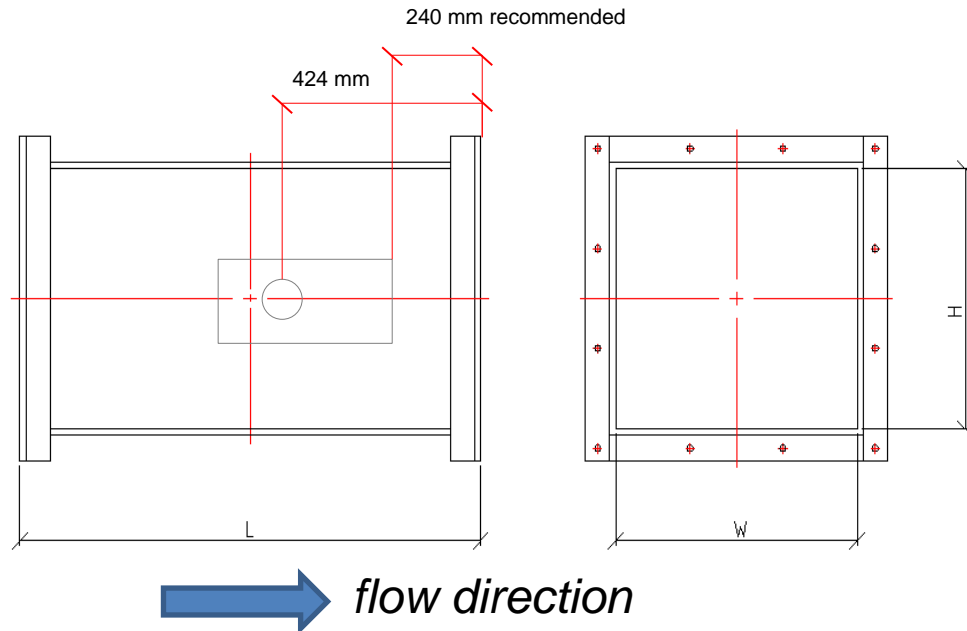
Minimum Distance Before Transition
Rectangular ducts: One height or width, whichever is greater
Round ducts: One diameter



NB: Temperature uniformity downstream the burners strongly depends on uniformity upstream

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5. Standard Duct Design

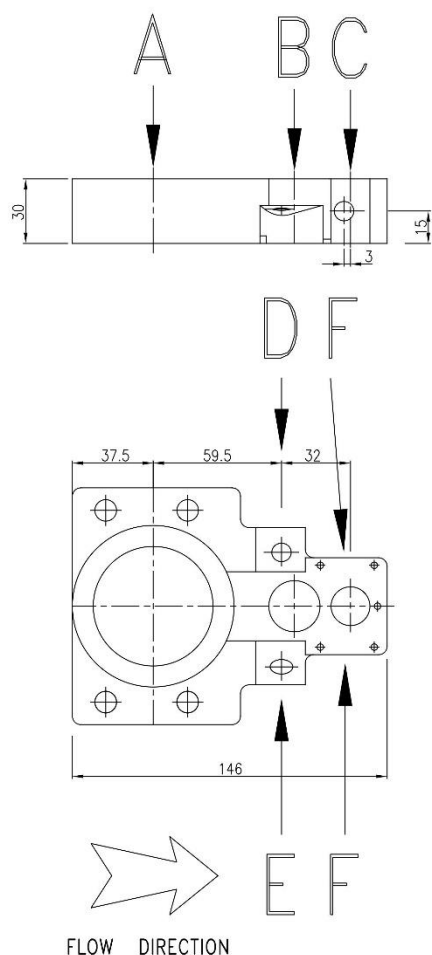


Burner Model	Burner Weight Kg	W mm min	H mm min	L mm min
H/1	12	400	400	1050
H/2	16	600	500	1300
H/3	22	750	500	1300
H/4	28	1000	600	1300
H/5	34	1100	600	1300
H/6	38	1250	600	1300
H/7	46	1350	600	1300
H/8	51	1500	600	1300
H/9	59	1650	600	1300
H/10	66	1800	600	1300
H/11	74	2000	600	1300
H/12	79	2150	600	1300
H/13	84	2300	600	1300
H/14	89	2450	600	1300
H/15	97	2600	600	1300
H/16	105	2750	600	1300
H/17	110	2900	600	1300

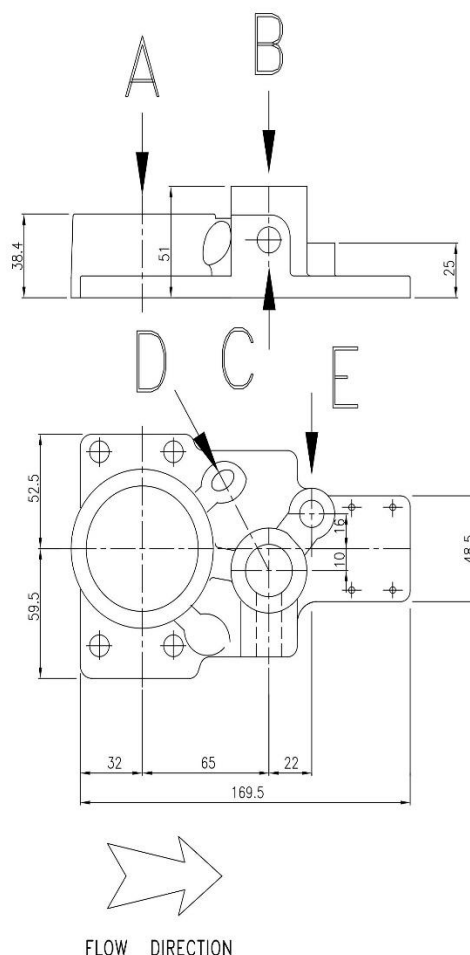
NB: These duct sizes are the minimum required sizes to mechanically fit the burner into the ducting. It is necessary to calculate/ check if the process flow velocities are not getting too high. For special duct design, to take into consideration min free area between burner and combustion chamber 150mm.

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Gas Inlet Flange for Standard Spark Plug



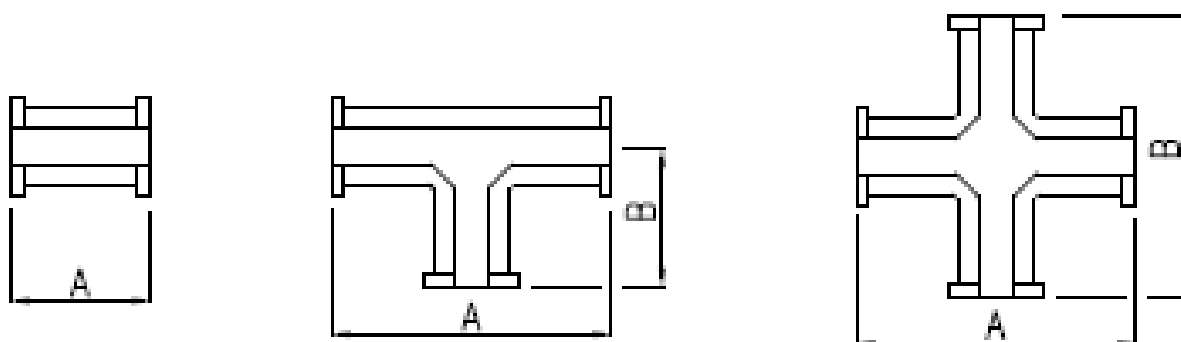
Gas Inlet Flange for External Removal Spark Plug



		Standard Spark Plug	External Removal Spark Plug
A	Main Gas Inlet	2"	2"
B	UV Port	3/4"	3/4"
C	Pilot Gas Inlet	1/2"	1/4"
D	Flame Rod	1/4"	1/4"
E	Spark Plug	M14x1,25	M14x1,25
F	Pilot Gas Inlet	1/4"	-

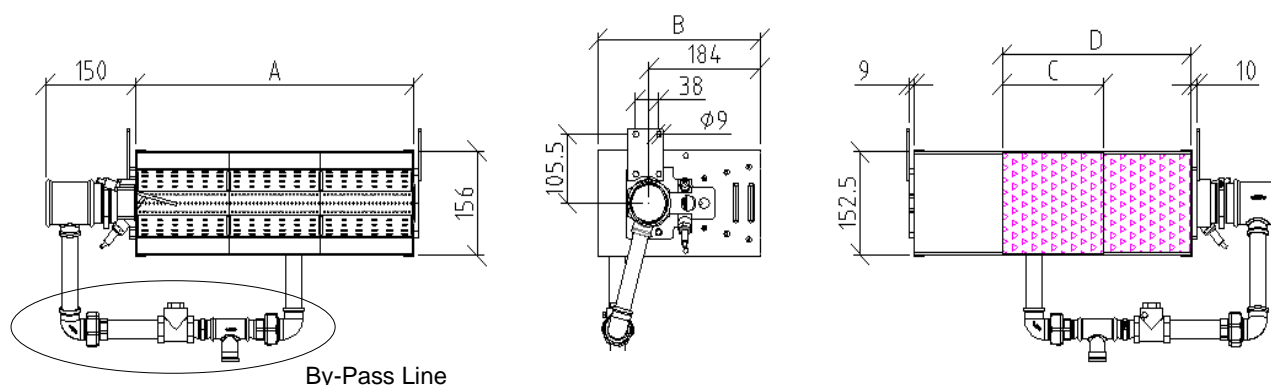
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6. Burner Design: Modules



Burner modules	A mm	B mm	Area m2
H/1	152.5		0,0247
T/1	305	152.5	0,0595
C/1	305	305	0,0710

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Burner Model	Burner Weight Kg	A mm	B mm	C mm	D mm (Air Inlet)	By-Pass Line
H/1	12	152.5	268	152	---	1/2"
H/2	16	305	268	166	---	1/2"
H/3	22	457.5	268	166	---	3/4"
H/4	28	610	313	166	---	3/4"
H/5	34	762.5	313	216	---	1"
H/6	38	915	313	268	---	1"
H/7	46	1067.5	313	268	---	1.1/4"
H/8	51	1220	313	---	763	1.1/4"
H/9	59	1372.5	357	---	858	1.1/4"
H/10	66	1525	402	---	953	1.1/4"
H/11	74	1677.5	402	---	1048	1.1/2"
H/12	79	1830	402	---	1149	1.1/2"
H/13	84	1982.5	402	---	1214	1.1/2"
H/14	89	2135	402	---	1337	1.1/2"
H/15	97	2287.5	402	---	1433	2"
H/16	105	2440	402	---	1465	2"
H/17	110	2592.5	402	---	1555	2"

Table 1

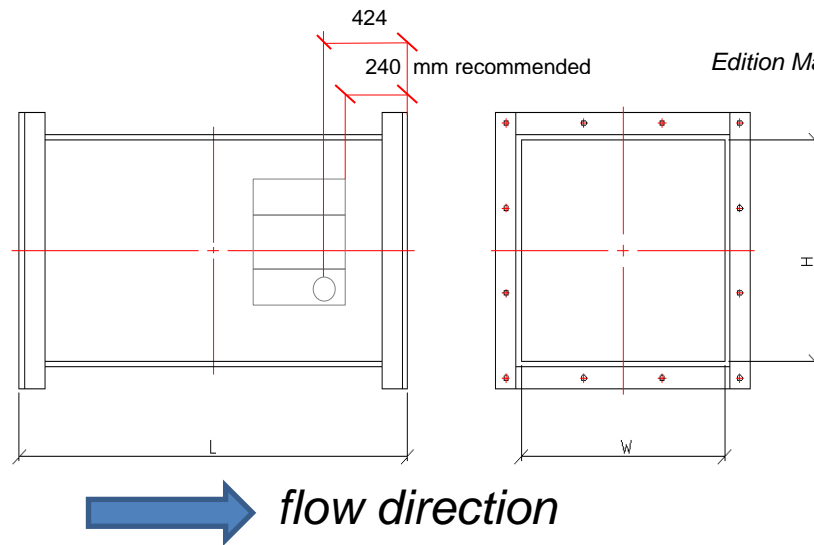
Air inlet Burner model H1-H7 is C x 152,5 mm

Air inlet Burner model H8-H17 is D x 152,5 mm

Dimensions

The most common dimensions for installation are referred to Table 1 and Table 2.
Any other required capacity and/or for C model upon request.

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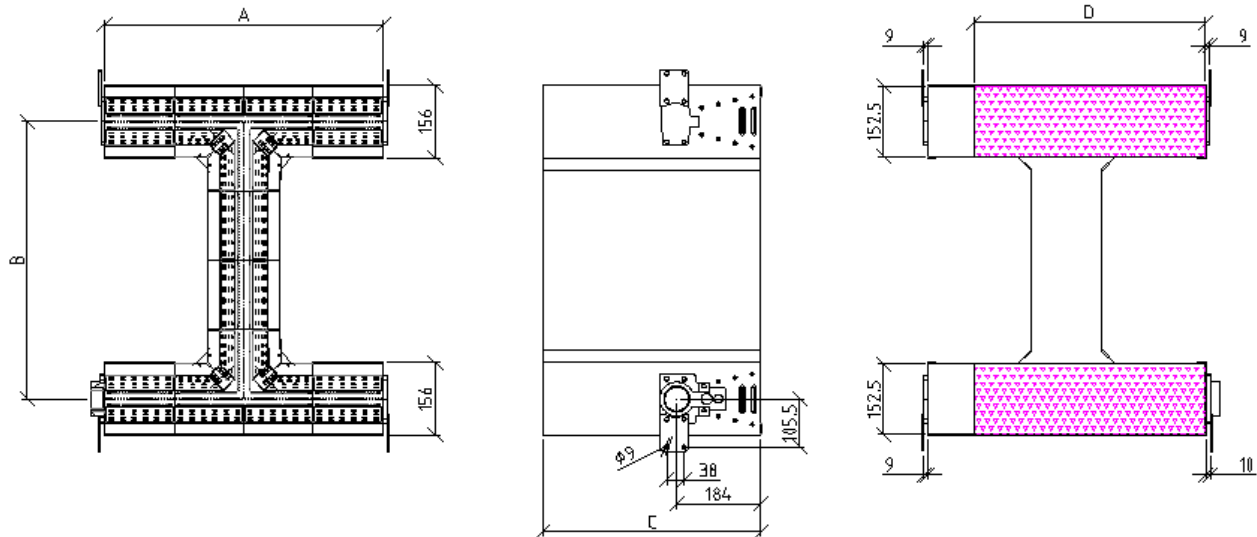
Edition March 2019 - Version 1.0

Burner Model	Burner Weight Kg	W mm	H mm	L mm
T/6	46	600	750	1050
T/7	59	600	1000	1300
T/8	64	600	1250	1300
T/9	69	600	1250	1300
T/10	79	1000	750	1050
T/11	85	1000	1000	1050
T/12	95	1000	1250	1300
T/13	101	1000	1250	1300
T/14	106	1250	750	1300
T/15	116	1250	1000	1300
T/16	121	1250	1250	1300
T/17	126	1250	1250	1300
T/18	131	1250	1500	1300
T/19	140	1500	1000	1300
T/20	145	1500	1250	1300
T/21	155	1500	1250	1300
T/22	160	1500	1500	1300
T/24	175	1500	1250	1550
T/26	190	1500	1250	1550
T/30	220	1500	1500	1550
T/32	235	1750	1500	1550
T/36	265	2000	1500	1550
T/41	300	2000	1500	1550
T/45	325	2250	1500	1550
T/50	365	2250	1250	1550
T/56	410	2250	1750	1550
T/61	445	2000	2000	1550
T/64	465	*	*	1550
T/72	510	*	*	1550
T/80	585	*	*	1550

NB: These duct sizes are the minimum required sizes to mechanically fit the burner into the ducting. It is necessary to calculate/ check if the process flow velocities are not getting too high.

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For special duct design, to be taken into consideration min free area between burner and combustion chamber 150mm.



Burner Model	Burner Weight Kg	A mm	B mm	C mm	D mm (Air Inlet)	By-Pass Line
T/6	46	305	305	313	*	1"
T/7	59	305	457	478	*	1/4"
T/8	64	305	609.5	478	*	1/4"
T/9	69	305	762	478	*	1/4"
T/10	79	610	305	478	500	1/4"
T/11	85	610	457	478	500	1/2"
T/12	95	610	609.5	478	560	1/2"
T/13	101	610	762	478	560	1/2"
T/14	106	915	305	478	665	1/2"
T/15	116	915	457	478	665	1/2"
T/16	121	915	609.5	478	665	2"
T/17	126	915	762	478	765	2"
T/18	131	915	914.5	478	765	2"
T/19	140	1220	457	478	920	2"

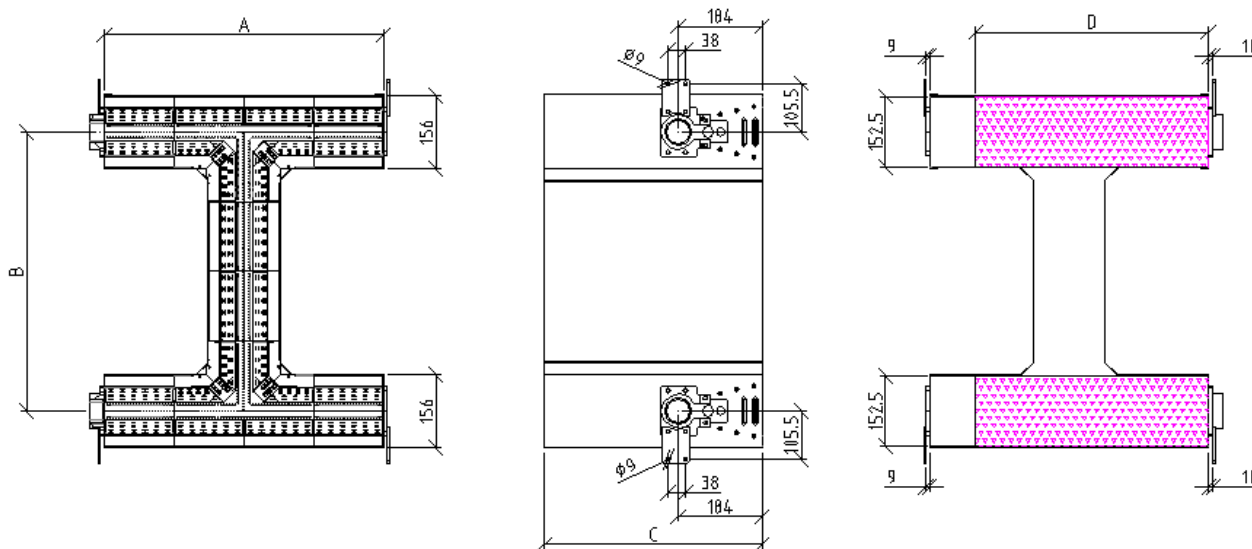
Table 2

* Burner models T6 to T9 have a special flange air inlet
Contact Fives ITAS for more informations

Remarks

Burner models T6 to T19 have a single gas inlet.

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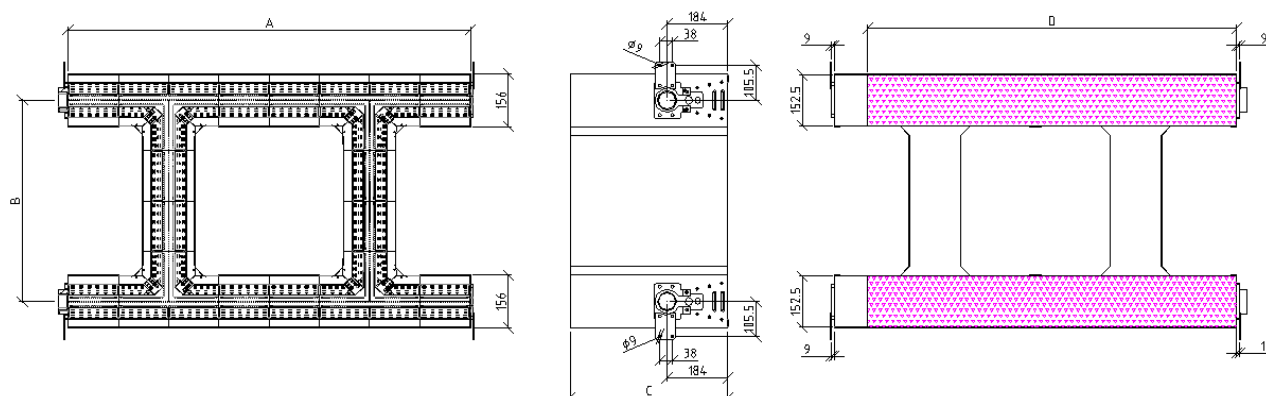


Burner Model	Burner Weight Kg	A mm	B mm	C mm	D mm (Air Inlet)
T/20	145	1220	609.5	478	920
T/21	155	1220	762	478	920
T/22	160	1220	914.5	478	920

Table 3

Remarks

Burner models T20 to T22 have two gas inlets, one pilot and one flame scanner.



Burner Model	Burner Weight Kg	A mm	B mm	C mm	D mm (Air Inlet)	By-Pass Line
T/24	175	1220	609.5	478	1120	2"
T/26	190	1220	762	478	1120	2"
T/30	220	1200	1066	478	1120	2"
T/32	235	1373	1066	478	1270	2"
T/36	265	1678	1066	478	1575	2"
T/41	300	1525	1066	478	1425	2"
T/45	325	1830	1066	478	1730	2"
T/50	365	1983	609.5	478	1880	2"
T/56	410	1830	609.5x2	478	1730	2"
T/61	445	1525	457x3	478	1425	2"
T/64	465	1525	457x3	478	1425	2"
T/72	510	1830	457x3	478	1730	2"
T/80	585	1830	457x3	478	1730	2"

Table 4

Remarks

Burner models T24 to T50 have two gas inlets, one pilot connection and one flame supervision.

Burner models T56 has three gas inlets, two pilot gas connection and two flame supervision.

Burner models T61 to T80 have four gas inlets.

Contact Fives ITAS for Burner model C and other dimensions/capacities.

7. Start and Adjustment

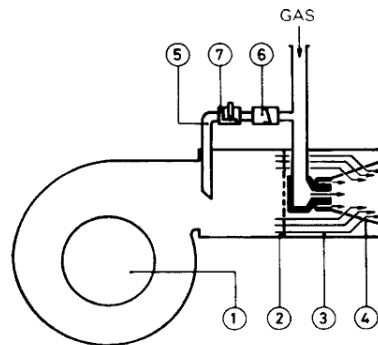


Fig.1

The burner is of the nozzle mixing type. The combustion air (see scheme of Fig.1) is sent to the burner by a blower with a flow rate set by an air damper placed on the blower inlet (1). The mixing of air and gas takes place at the exit from the nozzles, thus avoiding any possible flash-back. For normal operating the combustion air in excess conditions of 45 to 55 % reaches the burner through the air box (3) and a distribution plate (2). The wing (4) is made of heat resistant steel and covers the complete length of the burner, ensuring:

- A complete and uniform combustion over the whole operating range.
- A stable and safe flame.

The by-pass (5) includes a check valve (6) and an adjusting tee (7) creating partial pre-mixing at low flow rate ensuring a flame stability in these conditions.

Check Valve

At high fire, the gas pressure at the burner inlet is higher than the air pressure and the check valve is closed. On low fire, gas pressure falls below the air pressure, and the check valve opens, permitting a small amount of air to mix with the gas. This premix at low fire stabilizes the flame and helps distribute the flame evenly down the length of the burner. See Figure I.

The minimum and maximum burner capacity is regulated by gas control only.

The excess air ensures a flame, with low temperature, without radiation, resulting in an excellent temperature uniformity within the air stream.

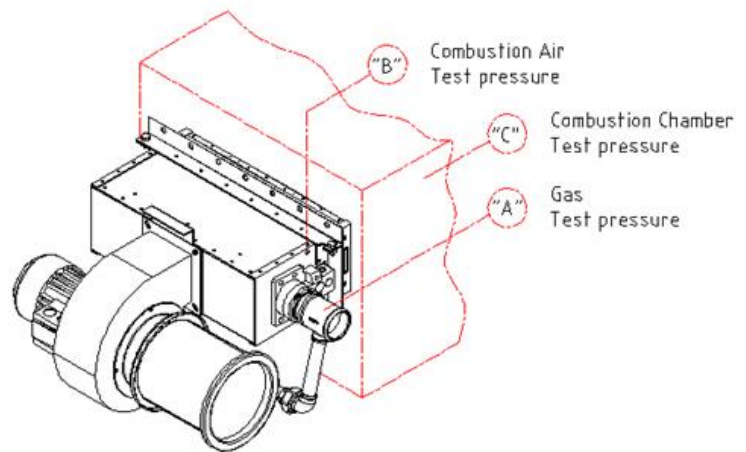
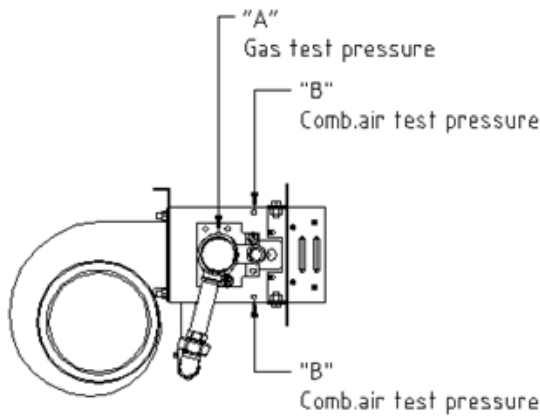
7.1 Preliminary operations before firing

Before starting-up the plant it is necessary to carry out the following checks:

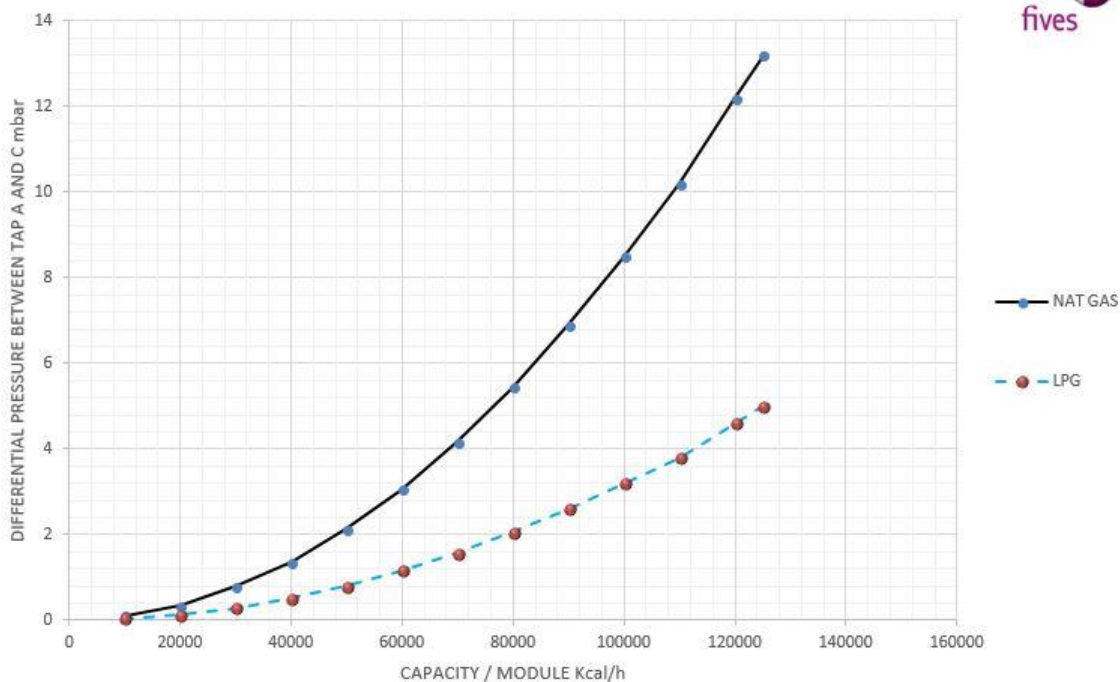
- Supply voltage to the whole plant.
- Check the rotation direction of all fan motors.
- Ensure that all recirculation and exhaust blowers are working properly and there are no obstacles that prevent the re-circulating air to pass the burner.
- Make sure that the gas is available at the gas valve train at the required pressure and that the piping is sized to the maximum flow rate.
- Ensure that the gas supply piping has been purged up to the inlet of the gas train.

7.2 Burner Regulation

TABLE A		
GAS	GAS PRESSURE AT REQUIRED CAPACITY DIFFERENTIAL between A and C	COMBUSTION AIR PRESSURE DIFFERENTIAL between B and C
Natural Gas LHV 9,5 kWh/Nm ³	8.7 mbar	2 mbar
LPG LHV 25,5 kWh/Nm ³	3 mbar	2.6 mbar

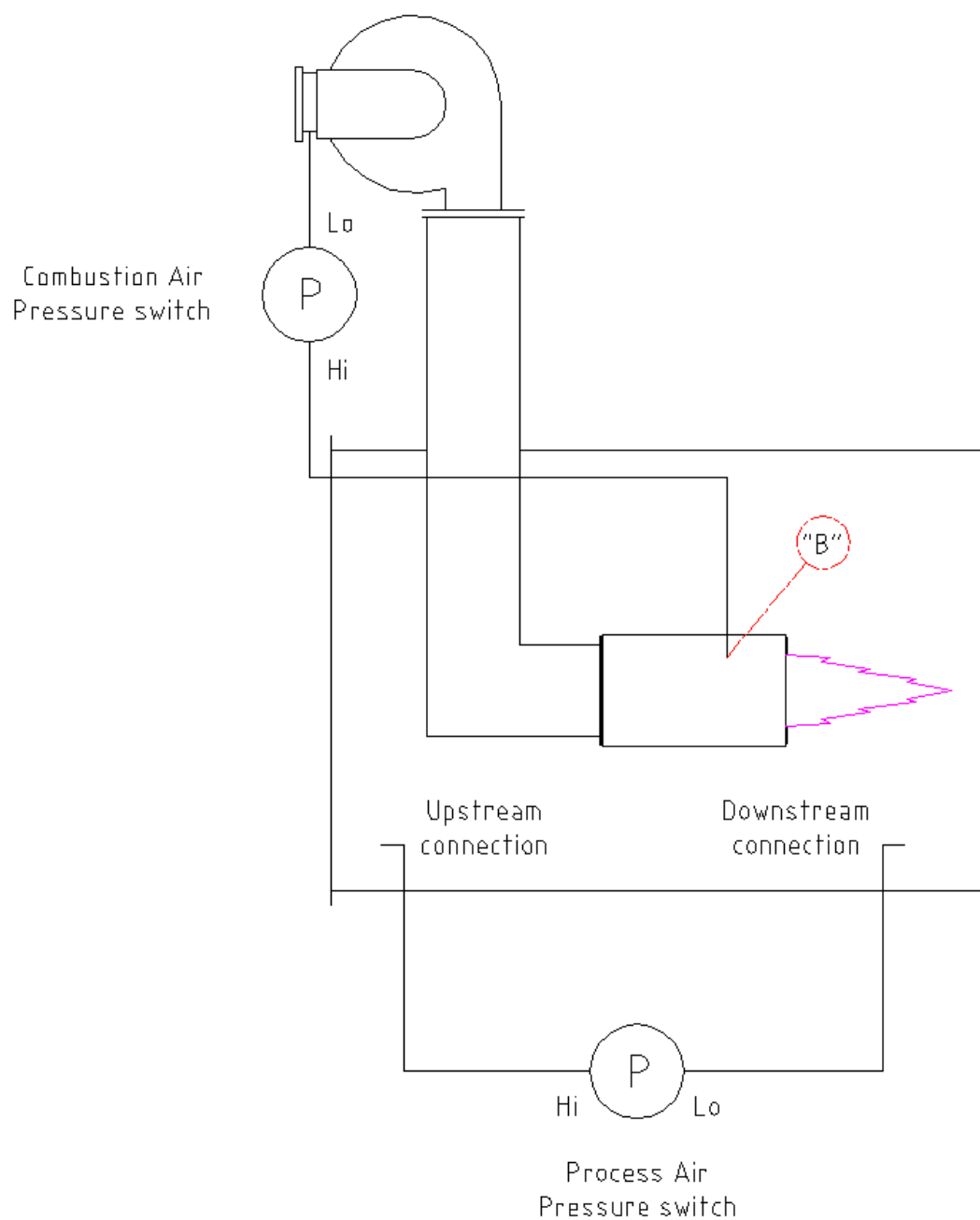


IT151/H/T/C BURNER



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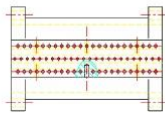
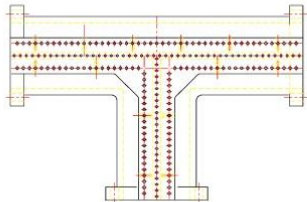
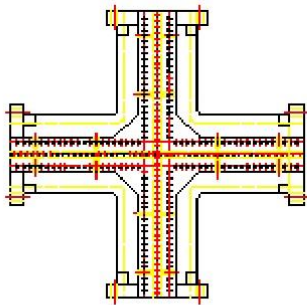
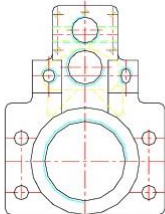
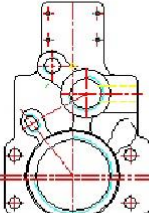
7.3 Pressure Switch Location



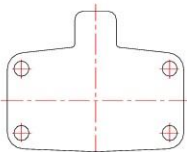
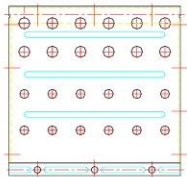
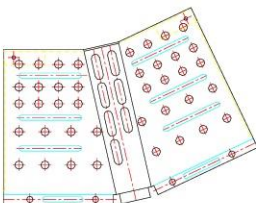

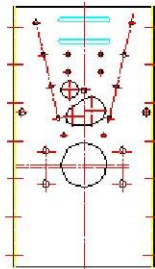
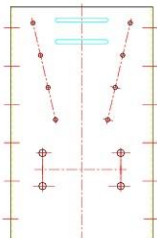
Δp at optimum velocity 1,5 mbar

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8. Spare Parts

Spare	Description	Weight(kg)
	Itas Code	
	Gas distributore H type	2,42
	A535111883	
	Gas distributore T type	6,5
	A535109674	
	Gas distributore C type	8,5
	A535110148	
	Gas inlet flange	1,15
	A535109295	
	Gas inlet flange for external spark plug	1,15
	A535113152	

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	closing back GAS flange	0,344
	A535110208	
	STRAIGHT MIXING PLATE	0,27
	A538116197	
	CORNER MIXING PLATE	0,36
	A538116198	
	BURNER SIDE PLATE	
	A535108076 (H=268)	0,42
	A535108016 (H=313)	0,5
	A535108042 (H=478)	0,8
	BURNER SIDE PLATE FOR EXTERNAL SPARK PLUG	
	(H=268)	
	(H=313)	
	A805122996 (H=478)	0,82
	BURNER SIDE CLOSING PLATE	
	A535108075 (H=268)	0,45
	A535108015 (H=313)	0,55
	A535108043 (H=478)	0,82

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FIXING SCREW T.E. M8 X 40 PARTIALLY SREWED	A828111704	
M8 HEXAGONAL NUT WITH A KNIFEED PIN	A828110448	
SELF-FREE SCREW 4.8 X 13	A501108062	
RIVET D 3.2 X 6	A501108063	
SEALING MASTIC	ARI34000-	
SPARK PLUG	A314102535	
FLAME ROD	A315106039	
EXTERNAL REMOVAL SPARK PLUG	ON REQUEST	

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