



# **Installation and User Guide**

**AK Series  
Gas Fired Boilers with  
Atmospheric Burners  
81 - 260 kW**



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## 1. INTRODUCTION

The AK is a cast iron sectional boiler for gas firing with atmospherical burner. AK series are CE marked on product identification number 86/AT/574 to:

Gas Appliances Directive (90/396/EEC)  
Boiler Efficiency Directive (92/42/EEC)  
Electromagnetic Compatability Directive (89/336/EEC)

and conforms the requiremets of

EN 656: Gas-fired central heating boilers; Type B boilers of nominal heat input exceeding 70 kW but not exceeding 300 kW.

EN 50081-1: Electromagnetic compatibility. Generic emission standard. Residential, commercial and light industry

EN 50082-1: Electromagnetic compatibility. Generic immunity standard. Residential, commercial and light industry

AK series boilers have been designed for firing natural gas and LPG with a two stage operation whose nominal heat outputs ranging from 81,4 kW to 260,5 kW. Boiler series are supplied with P2-A control panels for two stage operation (minimum/maximum/off) as standard accessory, or P3 control panels for automatic regulation in respect with outside and room temperatures on special request. P3 control panels will also be used for controlling mixing safety features.

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AK series boilers are suitable for central heating and indirect hot water supply at working pressures not exceeding 6 bars, and working temperatures not exceeding 110 C. The boiler must never be used for direct water supply.

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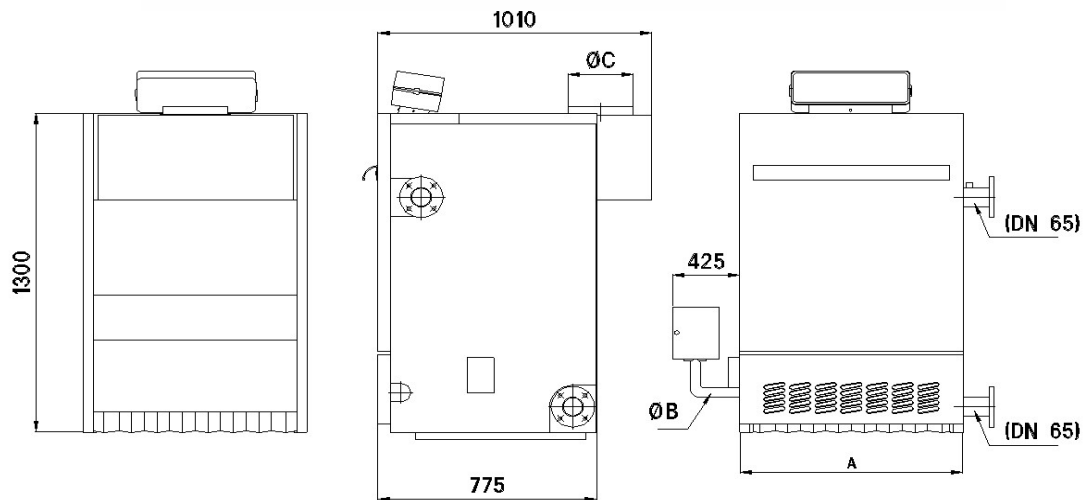
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TECHNICAL INFORMATION

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### 2. TECHNICAL INFORMATION

Boiler type		AK12	AK13	AK14	AK15	AK16	AK17
Number of sections		12	13	14	15	16	17
Product-ID number-Notified body		86/AT/574 * CE 0086					
Heat output (Natural gas, LPG)	kW	179,0	195,3	211,6	227,9	244,2	260,5
	Mcal/h	154	168	182	196	210	224
Heat input (Natural gas, LPG)	kW	196,7	214,6	232,5	250,4	268,3	286,2
	Mcal/h	169,2	184,6	200,0	215,4	230,7	246,1
Overall efficiency	%	91	91	91	91	91	91
Max operating pressure	bar	6	6	6	6	6	6
Max operating temperature	°C	110	110	110	110	110	110
Flow temperature control	°C	30 – 90					
Gas category		L <sub>2H</sub> & L <sub>2+</sub>					
Max gas inlet pressure	Natural gas	bar 20 to 300					
	LPG	bar 60					
Gas inlet size	G	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/4"
Return/flow connections	DN	65 (2 1/2")					
Flue gas temperature	°C	128 at nominal heat input					
Flue outlet	mm	300	350	350	350	350	350
Weight (boiler block)	kg	800	865	930	995	1060	1125
Weight (water content)	lt	134	144	154	164	174	184
Stand-by losses	kcal/h	391	420	450	479	509	537
	Watt	454	488	523	557	592	624
Height	mm	1300 (without control panel)					
Depth	mm	775					
Length (A)	mm	1377	1482	1588	1693	1800	1906
Number of burners		11	12	13	14	15	16
Flue gas volume (at maximum output)	Natural gas (CO <sub>2</sub> = 6%)	g/sec	132,7	144,8	156,9	169,0	181,0
		kg/h	477,8	521,3	564,8	608,3	651,8
	LPG (CO <sub>2</sub> = 7%)	g/sec	127,7	139,3	150,9	162,5	174,2
		kg/h	459,6	501,4	543,3	585,1	627,0



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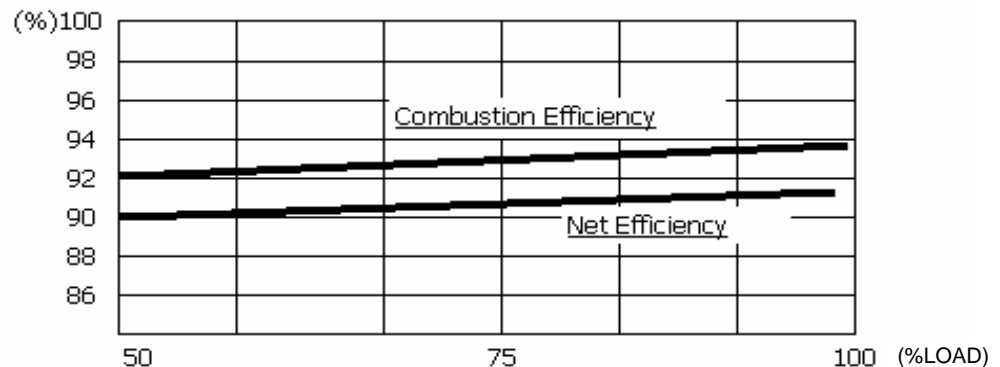
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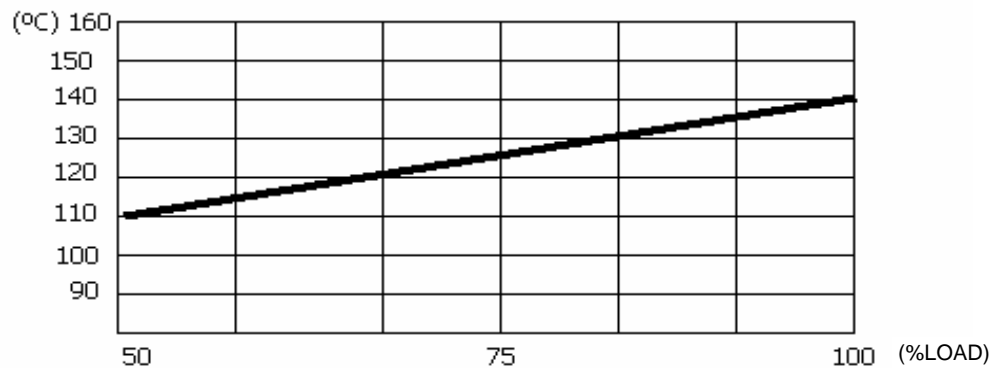
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### 2.1. EFFICIENCIES



Values given according to average boiler water temperature of 70 C

### 2.2. FLUE GAS TEMPERATURES

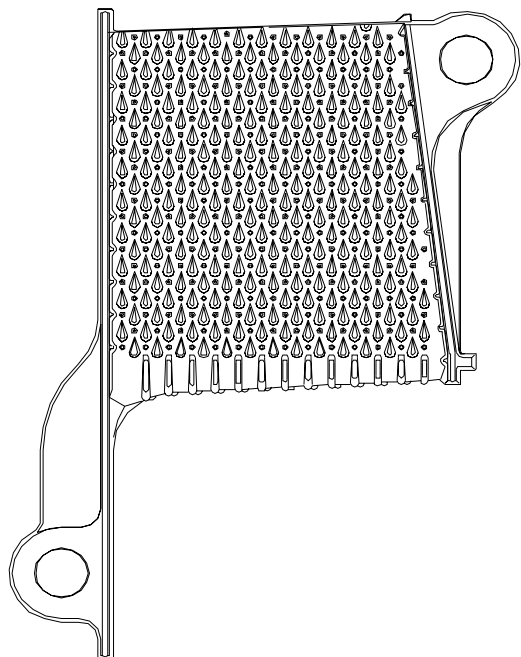


Values given according to average boiler water temperature of 70 C

### 2.3 SECTION DESIGN

The original heat surface design unique to AK series boilers in forms of water drops yield optimum heat transfer rate to boiler water with minimized resistance in flue.

Thanks to latest flexible casting technology, The AK ensures maximum reliability and longer life with high thermal stress resistance.



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Boiler Type	Heat Output	Minimum circulation rate	$\Delta T = 20^{\circ}\text{C}$	
			Water volume	Hydraulic resistance
	kW	m <sup>3</sup> /h	m <sup>3</sup> /h	mbar
AK 12	179,0	2,6	9,0	44
AK 13	195,3	2,8	9,8	48
AK 14	221,6	3,2	11,1	52
AK 15	227,9	3,3	11,4	56
AK 16	244,2	3,5	12,2	60
AK 17	260,5	3,7	13,0	64

## AK RED BOILERS WITH ERIC BURNERS

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by following components accompanied:

- \* Double ionization
- \* Smooth changeover from pilot ignition to main ignition thanks to ionisation controlled pilot ignition valve.
- \* Chimney sensor
- \* Gas inlet filter
- \* 3 thermostats to control boiler water temperature
- \* A standard service box containing ignition sequence controller and a fuse isolator otomate

### 2.5 BURNER

The special design AK series atmospheric burners hold following technical features:

- \* Stainless steel body
- \* Low CO and NOx emissions without pollutant release in environment.
- \* Operation with too low noise levels
- \* A two stage operation in accordance with supplied control panels saves energy, and ensures more comfort.
- \* Less requirements of maintenance

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### # 2.6. WATER SIDE OF BOILER

The fully watercooled sections are joined by cast iron conical nipples, and distribution pipe fitted to the return ensures even the temperature distribution throughout the boiler. The cast iron sections are to BS.1452 Grade 200 with 7 mm wall thickness. Return and flow connections to heating system are provided by flanged stub-pipes on either left or right hand side of boiler outboard the casing.

For ease of installation, the return and flow connections can be arranged on the same or different sides. However, the gas inlet pipe must be installed on the opposite side to the return connection.

The water distribution pipe must be used in every unit of 12 sections and above to ensure a homogenous temperature dispersion inside boiler sections with prevention of vapour formation.

Under no circumstances should the boiler be fired when its circulation volume is less than a recommended minimum volume calculated according to the following formula:

$$\frac{kW_{Output}}{70} = m^3 / h$$

The table on the right hand side provides hydraulic resistances at water volumes relative to boiler Dt flow/return. The difference between flow and return temperatures of the boiler should not be greater than 20 C to provide convenient operating conditions in the boiler:

Boiler Type	Heat Output	Minimum circulation rate	$\Delta T = 20^{\circ}\text{C}$	
			Water volume	Hydraulic resistance
	kW	m <sup>3</sup> /h	m <sup>3</sup> /h	mbar
AK 12	179,0	2,6	9,0	44
AK 13	195,3	2,8	9,8	48
AK 14	221,6	3,2	11,1	52
AK 15	227,9	3,3	11,4	56
AK 16	244,2	3,5	12,2	60
AK 17	260,5	3,7	13,0	64

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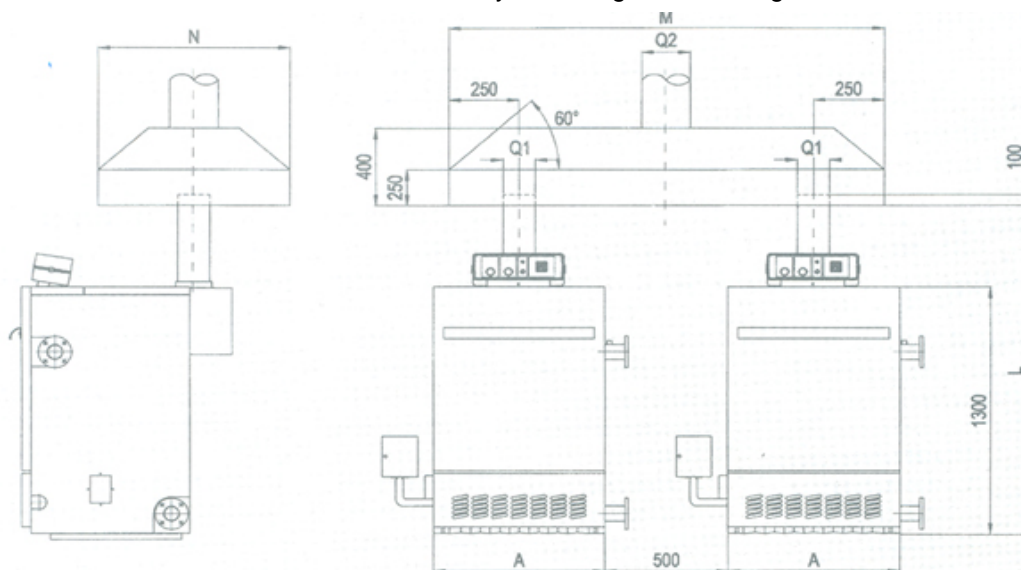
### 3. PREPARATIONS BEFORE ASSEMBLY

#### 3.1. FLUE DESIGN AND CHIMNEY INSTALLATION

Boilers must be connected to an independent chimney, using the shortest flue canal possible, starting from flue outlet of draught diverter where there is a flue ring for easy connection, which should be insulated by mineral wool or similar material. Flue canal must be placed at a rising slope of 10°-45° between flue and chimney. Conditions creating higher resistance to gas flow such as elbows should be avoided in flue canal. The flue canal outlet to the boiler should not support the weight of chimney.

At discharge from the boiler, the flue gasses should be in a balanced state, consequently, the function of the chimney is only for the disposal of the flue gasses to atmosphere via a required draught. Chimney calculations should be carried out in compliance with the standards and mandatory regulations. Conditions of existing chimney should be checked and proper precautions should be taken against excessive cooling and condensation (such as applying a chimney sheet made of stainless steel grade 316 and surrounding with insulation). Positive draught conditions must be avoided. Negative draught conditions should be contained within -5 mm wg at a level of 85 cm above flue ring of draught diverter for optimum boiler performance.

For installations of two boilers with connection to the same chimney, following technical regulations shall be taken into consideration:



Boiler Type	A	Chimney Q1	Chimney Q2	L	M	N
	mm	mm	mm	mm	mm	mm
AK 12	1377	300	450	2100	2677	800
AK 13	1482	350	450	2200	2832	800
AK 14	1588	350	450	2200	2938	800
AK 15	1693	350	500	2200	3043	800
AK 16	1800	350	500	2200	3150	800
AK 17	1906	350	500	2200	3256	800

	<p style="text-align: center;"><b>AK</b> <b>GAS FIRED BOILERS</b> <b>WITH</b> <b>ATMOSPHERIC BURNERS</b></p>	<p>NO : UGM-AK-03/04</p> <p>PAGE : 7</p>
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### 3.2. GAS SUPPLY

The installation must be in accordance with relevant standards and mandatory regulations. The local gas supply authority should always be contacted at the design state to ensure an adequate supply is available. An existing service pipe must not be used without prior consultation with the local gas supply authority and the supply must be made through a suitable meter.

### 3.3. VENTILLATION

The installation must be in accordance with relevant standards and mandatory regulations, in respect with given following table. An adequate fresh air circulation must be ensured in boiler room for efficient and safe operation of whole boiler system.

For natural ventilation grilles with minimum free areas given in following table for a single boiler shall be provided at high and low level, unless otherwise stated in local regulations. Upper and lower ventilation grilles should be installed as close as possible to levels of floor and ceiling of boiler room. Maximum vertical distance between upper grille and ceiling level should be 40 cm, and 50 cm between lower grille and floor level.

For exposed boiler houses, grilles should be provided on two or more external walls and care should be taken in siting boilers so that they are not affected by adverse draughts or situated next to powerful fans or other such equipment.

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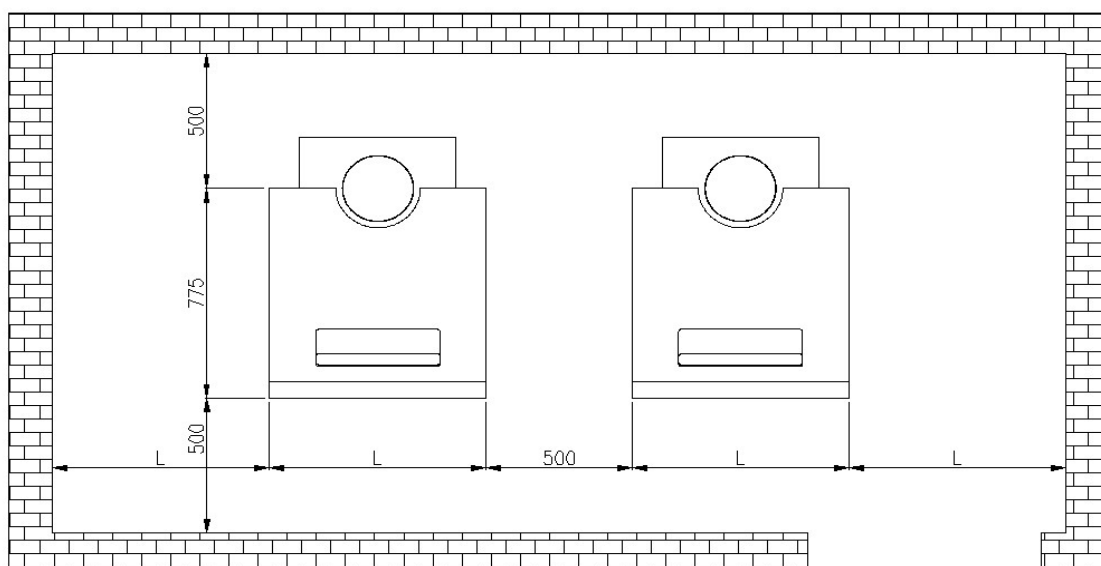
# For underground boiler houses, or those where communication with the outside is not possible then mechanical ventilation may be used. Volumes of air for mechanical ventilation are given in the prevailing BS. For mechanically ventilated boiler houses it is possible to have mechanical inlet air at low level and natural extract air at high level, all volumes and grilles should be designed on the values given in the same table. It is not allowed to have natural inlet air and mechanical extract. In all cases of mechanical ventilation the fans should be interlocked so that the boiler will not run unless the fans are running.

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### 3.4. BOILER ROOM ARRANGEMENT

The installation must be arranged in accordance with Mandatory Regulations and Codes of Practice. The following sketch shows the recommended minimum dimensions of clearance around the boiler for servicing and maintenance



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# As boilers are equipped with a water distribution pipe which is installed from inlet connection through boiler lower waterways, there should be enough space left as much as relevant boiler width, between boiler inlet and coinciding side wall. The boiler inlet and outlet connection, and thus the position of water distribution pipe may be arranged either on the right or left hand side of boiler in respect with boiler room size and heating system installed.

Before assembly of boiler sections, a raised plinth should be constructed in boiler room to support boiler weight in accordance with following recommended dimensions:

Recommended dimensions of plinth (in mm.)							
Boiler type	AK12	AK13	AK14	AK15	AK16	AK17	AK18
Width	1425	1525	1650	1750	1850	1950	2075
Length	850	850	850	850	850	850	850
Height	100	100	100	100	100	100	100

Boiler room should not be used for any other applications, floor should always be kept dry and clean. Any obstacles in front of ventilation openings must be avoided. The boiler room air openings must conform to the norms prevailing locally. Any irregular electrical installations in boiler room should be replaced. The circulating water in boiler and heating system must never be taken out for any domestic usage. Water level should be checked periodically with a hydrometer. Never add water to the system when boiler is hot. Never drain the water unless it is necessary.

Should odour is sensed in boiler room, first close the valve before gas flow meter. Never use match and never smoke in boiler room. Never turn electricity on/off. Ventilate the room opening doors and windows and consult authorised installer staff or Gas Dealer Company immediately.

Follow instructions for periodic cleaning and maintenance operations whose procedures given further in this manual.

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### 3.5. WATER CIRCULATION SYSTEM

The system design must provide water flow rates commensurate with boiler output and the temperature difference between flow and return should not exceed 20 C, or 25 C at most.

Water levels should be checked regularly and any leakages corrected in order to keep system water make-up to a minimum, because excessive make-up will lead to salt deposits forming in the boiler waterways Causing local overheating and damage to the boiler sections. Where there is doubt as to the quantity of water make-up, a water meter should be fitted.

Boiler water systems should be thoroughly flushed and cleaned before a new boiler is installed and system water should be treated by a reputable specialist and best practice observed. Consideration should be given to the fitting of sludge traps and strainers if site conditions warrant them.

For heating systems with maximum boiler temperature up to 100 C, the necessary water purification shall be in accordance with VDI 2035:

Boiler capacity range	Nr.	Requirements at the filling and auxiliary water
100 < Q in kW <350	1	No requirement is needed, if content of Calcium Hydrocarbonate (CA(HCO <sub>3</sub> )) is max 2 mol/m <sup>3</sup> , and if no more than the triple water filling of the plant does not take place
350 < Q in kW <1000	2	Like 1, however content of Calcium Hydrocarbonate is max. 1,5 mol/m <sup>3</sup>
1000 < Q in kW	3	In this case, quantity of water, which can be fed without softening, is to be determined after VDI 2035 equation (9). If the system needs more filling and auxiliary water, this must be demineralized.

The maximum quantity of water V<sub>max</sub>, which can be re-fed without softening as filling and auxiliary water, is determinable after equation (9) the VDI 2035 sheet 1:

$$V_{\max} \text{ in m}^3 = 0,0313 \times Q \text{ in kW} / \text{Concentration of (CA(HCO}_3\text{)) in mol/m}^3$$

The quality of water is important. The recommended hardness of water: 1-3 mol/m<sup>3</sup> (1 mol/m<sup>3</sup>=5.6 dH), PH:8-9.5

#### NOTE !

We strictly recommend to use water treatment products in heating system prior to first operation of the boiler. Such water pre-commission products will protect the heating system against any further attack from corrosion or limescale, and thus prevent

- Boiler noise,
- Sticking pumps,
- Radiator cold spots,
- Unestimatad thermal shocks on boiler sections,

saving energy and extending whole heating circuit operation life.

Failure to apply and maintain the correct water treatment to prevent the formation of scale and corrosion within the the heating system will render all appliance warranties null and void.

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### 3.6. SAFETY OF WATER CIRCULATION SYSTEM

The system can be built either open vented or pressurized. In case of open vented heating system, an open type expansion tank according to DIN 4807 Part 2 shall be installed at the highest level of hydraulic circuit. Delivery and return lines between expansion tank and boiler shall be constructed in accordance with DIN 4750. No globe valves must be installed on delivery and return safety lines. Safety lines should be attached to inlet and outlet lines of boiler at points as close as possible to boiler, using the shortest possible vertical way between expansion tank and boiler.

A hydrometer shall be installed on delivery line from boiler at a same level with top of boiler. After filling heating system, the minimum water level should be recorded on hydrometer in order to check water level during operation.

In case of pressurized heating system a pressure relief valve according to TRD 721 shall also be installed on heating system to ensure safety besides closed type expansion vessel.

### 3.7. GENERAL REMARKS ON HEATING SYSTEM

Gas supply line, water delivery system, and electrical installation circuit must not come into contact each other. Gas supply line must never be routed throughout the boiler to burner, and must be made of non-combustible material.

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# installed, or there is insufficient earthing application.

The mains supply must be 220 V AC and 50 Hz.

The main electric supply to the system should be established with ON/OFF button is switched ON. Switching ON this button is a priority to operation of an AK boiler system.

The electrical and mechanical installations on boiler itself or in heating system should not be interfered, and no change in settings are carried by unauthorised staff. This may result in further operational errors and danger in boiler room. The safety accessories should not be touched for any reason. In case of failure in operation, local gas supply authority must always be contacted.

Boiler should not be fired with any source other than installed pilot ignition system. In case of controlling boiler room, a flashlight should always be used.

The chimney sensor operates at 220 V AC, and thus never be touched in all cases unless main electrical supply to heating system has been cut off for a maintenance operation or seasonal shutdowns.

The boiler should not be installed where there is risk of in contact with explosive materials.

The water delivery system and hot water supply circuit should be protected against any dirt by strainers. A non return valve should be installed on main sanitary water supply to hot water heater.

If three or four way motor valve is installed in water delivery system, a shunt-pump between inlet and outlet connections of boiler must be used.

Pipings blocking water circulation in delivery system should be avoided. In worst cases, automatic air relief valves should be installed where there is risk of high temperatures and vapor formation.

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### 4. ASSEMBLY INSTRUCTIONS

#### 4.1. AK SERIES BOILERS DELIVERY MODE

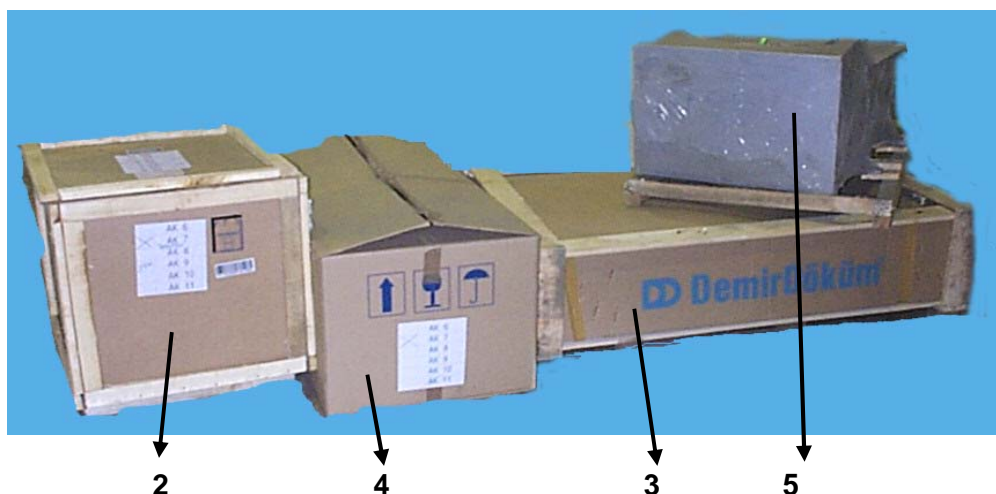
**4.1.1. Boiler block:** Disassembled boiler sections are delivered attached together on a pallet.

**4.1.2. Accessory box:** A standard accessory box contains the materials used in the assembly of the boiler block such as nipples, fibre-glass ropes, flow and return connections, gas pipes, service panel, controy panel, retarders, gas valve and its accessories.

#### 4.1.3. Casing/insulation box

**4.1.4. Gas manifold** box contains atmospheric burner together with boiler staybolts and water distribution pipe (12 Sections and Above).

**4.1.5. Draught diverter** which is delivered on a particular pallet.



Picture 4-1. AK boiler delivery mode.

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#### 4.2. ASSEMBLY OF BOILER GROUP

Number in paranthesis refer to position numbers in exploded drawing:

1. Start with left or right section (6,2), clean nipple ports and nipples using cloth and parafin. Apply red lead dye onto nipples (3) (Pic.4-2) and place nipples squarely in each nipple port and, using a wooden mallet, lightly tap nipple into port to secure (Pic.4-3).



Picture 4-2.



Picture 4-3.

2. Apply grey paste jointing compound into paste grooves of right or left section and coinciding face of one intermediate section (Pic 4-4) with sufficient amounts which is supplied as standard in accessory box.



Picture 4-4.



Picture 4-5.

3. Fit the intermediate section (5) squarely onto nipples of the right or left section and secure by using a wooden mallet. Check the condition of grey compound between sections, and apply additional compound if there are spaces free of this compound, or where the amount of the compound is not sufficient. Make sure that compound grooves are sealed throughly (Pic 4-5).

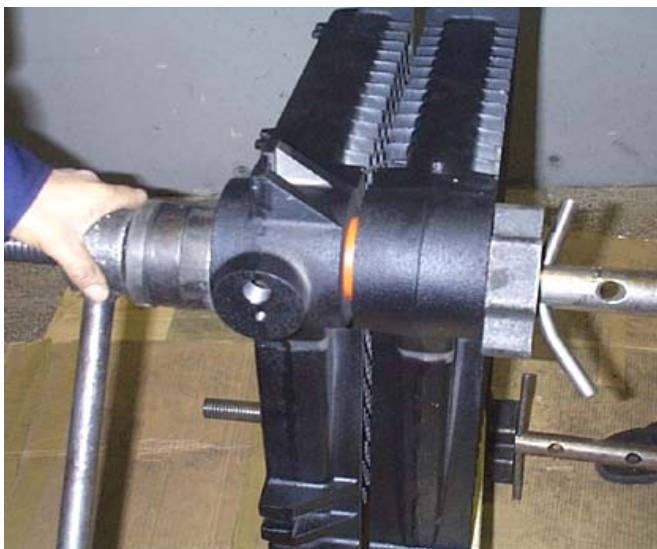
4. Continue boiler assembly repeating the same procedures with other intermediate sections. Apply "Compression Tools" routing them through bottom and top nipples as shown in following picture. We recommend to carry a compression process after fitting 2 or 3 intermediate sections at most for better secure of flue gas system (Pic 4-6).

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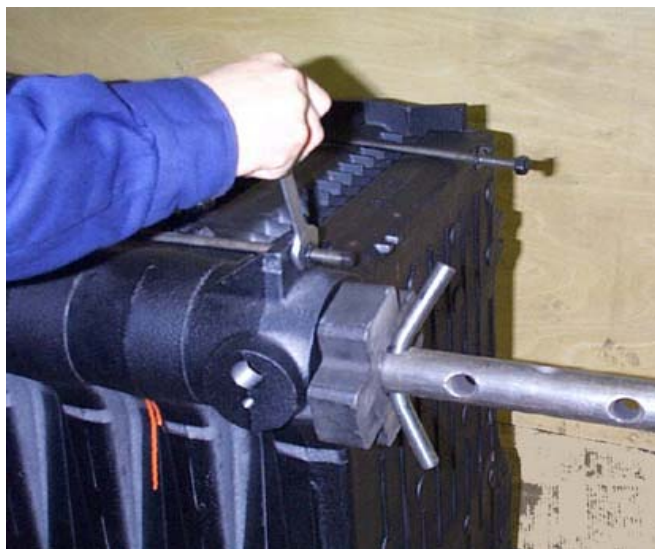
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Picture 4-6.



Picture 4-7.

5. After assembly of all sections, apply compression tools for the last time, and before loosening them, fit upper and lower staybolts (7) using M12 nuts and A13 washers (9,8). After fitting all the staybolts, leave whole free length towards to one side of the boiler (Pic 4-7).

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# Do not use excessive force to tighten the nuts up on the staybolts, from 48 to 54 Nm (35 - 40 lbf/ft) torque is recommended.



Picture 4-8.



Picture 4-9.

6. Fit distribution pipe (12 Sections and above) with gasket squarely into the return connection with the holes facing upwards as shown in Pic 4-8. Fit flanged stub-pipes (27) with their gaskets (16) to the flow and return connections on right or left section. Fix the stub-pipes using M12 nuts (19) and A13 washers (18) (Pic 4-9).

7. Fit pocket (R3/4") for capillary tubes (10) on left or right section in respect with water outlet side (Pic 4-10). In case of P3 economy panel usage, fit a R1/8" pocket on the same left or right section as well. In standard delivery a R1/8" tap should be used for covering this threaded hole. Fit R3/4" and R1/8" tapings on opposite side section.



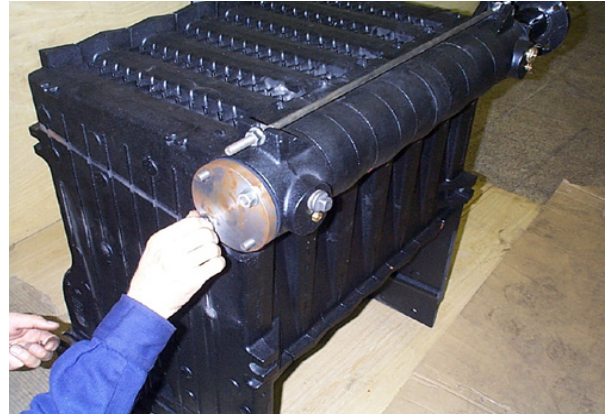
Picture 4-10.

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8. Fit blank flanges (17) on right or left section other than that of water inlet and outlet connections are carried, using gaskets (16), M12 nuts and A13 washers (18 and 19).



Picture 4-11.

### 9. Hydrostatic test

At this stage, these connections must be pressure tested by blanking off the flow and return connections by filling the boiler through a gate valve installed on return blank flange line, and venting through a gate valve installed on flow blank flange line.

Hydrostatic test shall be carried out at a pressure gauge of  $1.3 \times P$ ; where, P is the maximum operating pressure of boiler. Duration of test should be at least 30 minutes.

285 rd connected to

# heating circuit. After hydraulic test, the boiler should now be connected to heating system, and the system water should be treated as given previously.

10. Place flue gas retarders (20) into between sections as shown in Pic 4-12. Fix ceramic-fibre insulation sheet (40) in pieces onto surfaces where draught diverter is going to be fitted (Pic 4-13). Apply special adhesive compound between section and insulation sheet . Fit draught diverter (41) onto boiler group by M8x30 setscrews (42), A8.4 washers (43) and M8 nuts (44) as shown in Pic 4-14.



Picture 4-12.



Picture 4-13.



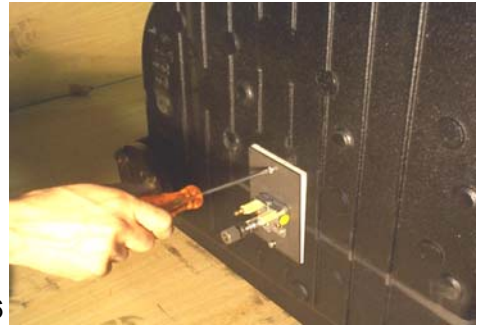
Picture 4-14.

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11. Fit pilot burner (25) onto pilot burner cover (22), and fit this group on boiler gas inlet side after placing pilot burner insulation (21). Secure pilot burner cover to side section of boiler by 2 pieces of M5x15 setscrews (24) and A5.3 washers (23) as shown in Pic 4-16.



Picture 4-15



Picture 4-16

12. Likewise, fit ionisation electrode (31), ionisation electrode cover (31) and insulation (28) on opposite side section using M5x15 setscrews (30) and A5.3 washers (23).



Picture 4-17



Picture 4-18

13. Fit combustion chamber base plate (34) inside the chamber as shown in Pic 4-19.

14. Fit M12x40 studs (35) onto boiler left and right hand sections. Apply fibre-glass rope dia 10 mm supplied within accessory box to surfaces where gas manifold is to be fitted, with help of grey paste compound. Fit gas manifold (36) by support of above studs, and secure it using M12 nuts (38) and A13 washers (37). Ensure that gas manifold compresses squarely onto boiler sections and air-tight. On gas inlet side, fit flame inspection window and its frame using M6x20 setscrews, A6.3 washers, and M6 nuts.



Picture 4-19.



Picture 4-20.



Picture 4-21.

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#### 4.3. ASSEMBLY OF BOILER INSULATION AND CASING GROUP

1. Place M12x25 sectscrews (32) routing from fire chamber towards to left and right hand sides. Fit side casing support profiles (33) to items 32 via M12 nuts (19) and A13 washers (18) as shown in Pic 4-22.



Picture 4-23



Picture 4-22

2. Wrap front insulation (48), rear insulation (52) and side insulations (54+54) around boiler body and secure insulation parts using galvanized wire dia 1 mm supplied with the boiler. Feed un-insulated areas, and connect insulation parts together using aluminum backed tape. Fit draught diverter insulation part likewise explained above (Pic 4-23).

) onto support profiles (33), and fix them onto draught diverter using self tapping screws 4.8x9.5 (56) as shown in Pic 4-24 and 25.



Picture 4-24.



Picture 4-25.

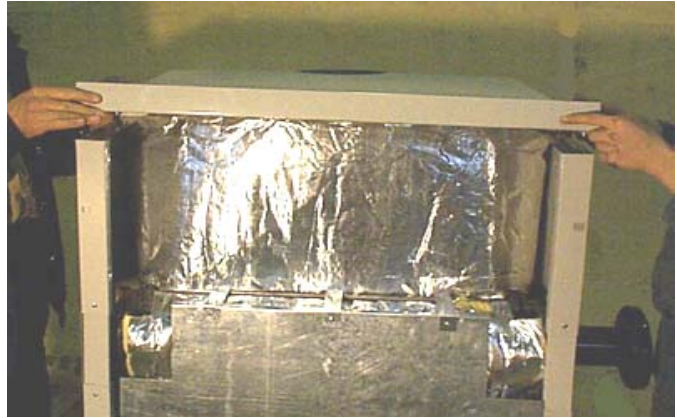
4. Fit front inner casing (49) onto front insulation part by the help of item 35 of gas manifold assembly, and M12 nuts (38) and A13 washers (37). Secure front inner casing to upper staybolt (7) using 3 pieces of fixing piece (50), and self tapping screws ST5.5 (51) as shown in Pic 4-26.

5. Likewise fit rear inner casing (53) onto side casings (55) by the help of self tapping screws.



Picture 4-26.

6. Place top casing front (93) and rear (90) parts on side casings as shown in Pic 4-27. Place front casing upper (98) and lower (97) parts having finished the installation of gas train.



Picture 4-27.

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#### 4.4. ASSEMBLY OF GAS TRAIN

Gas inlet to gas manifold can either be arranged on left on right hand side. Here, the only regulation is to place gas inlet on the opposite side to that of the return water connection.

1. Start with gas inlet pipe with length of 350 mm (item 62). Screw this pipe on appropriate end of gas manifold where gas is supplied. Fit a tap (39) on opposite end of manifold to seal as shown in Pic 4-28.

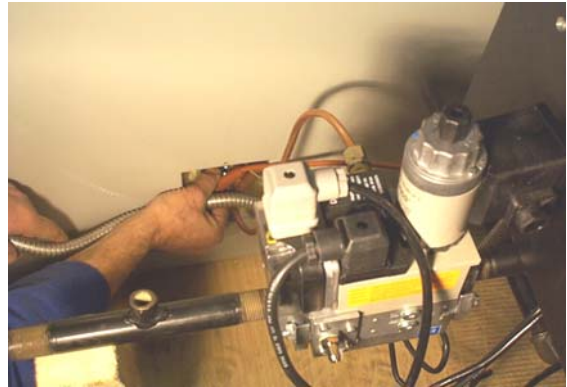
2. Fit elbow (63) at the end of gas inlet pipe (62), and fit pipe union (64) and gas pipe 2 (65) in order as shown ine boiler exploded picture.

3. Fit flange with test nipple of gas valve (74) at the end of gas pipe 2

4. After completing connection between flanges and gas valve, fit other flange of gas valve (76), and gas pipe 3 with outlet for pressure gauge (77) in order as shown in Pic 4-29.



Picture 4-28.



Picture 4-29.

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#### 4.5. ASSEMBLY OF GAS VALVE MULTIBLOCK

1. Fit gas valve multiblock (75) considering the gas flow direction so that the outlet of gas valve corresponds to flange with test nipple (74).
2. Fit a reducer nipple from G 1/4" to G 1/8" into the port signed "Pa" on gas valve. Use existing gasket of standard tapping during assembly of reducer nipple (80, 81).
3. Fit MV 502 series pilot ignition valve (99) to the end of reducer nipple.
4. Fit a special pipe union G 1/8" (78) for easy assembly of pilot burner gas pipe (79) to the pilot ignition valve.
5. Shape the pilot gas pipe (79) which made of copper in order to connect it to the same special pipe union (78) on the pilot burner as shown in the exploded drawing.

#### NOTE !

Use special sealing compound when carrying gas valve and relevant component assembly.

6. Having completed above operations, fit chimney sensor (86) onto draught diverter using 2 self tapping screws ST3.5x6.5 (87)

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## 4.6. ELECTRICAL INSTALLATION

**All electrical installations must be carried out in accordance with relevant standards and mandatory regulations.**

AK boiler can be operated either standard two stage control P2 panel or full-automatic P3 economy panel. For electrical installations of both control panels, service panel electrical installation diagram shown in next page (Diagram 4-1) is referred. This diagram contains all electrical wiring scheme of AK series boilers. During electrical installation of boiler system, followings must be taken into consideration together with wiring scheme:

1. Ensure that all mechanical installations of all heating system is carried out in accordance with supplied information so far. Fit P2 or P3 control panels or top casing front piece by 4 self tapping screws supplied as a standard accessory.
2. For assembly of service panel, first fix service panel support sheet (66) and locking sheet (68) via M8x30 sectscrews (67) and M8 nuts around gas pipe 2 (item 65) in vertical position as shown in boiler exploded drawing. Fit service panel (70) to service panel support sheet (66) 3 pieces of M5 nuts (73).
3. The cable sizes not supplied within standard delivery shall be as follows: Mains cable shall have cross sectional area of 3x1,5 mm<sup>2</sup> with basic wire colours as brown, blue, and yellow-green. The cables for fast shut-down device and gas alarm switch shall have cross sectional areas of 2x1 mm<sup>2</sup> at least. All wiring from service panel should

285 cable glands not

# used in electrical installation should be tapped using PVC plugs supplied in service panel housing.

4. There are two basic wires supplied with service panel. One contains 8 basic wires which is to be brought to accompanied control panel, and the other is to chimney sensor. Both wire groups are supplied protected with spiral wrapped hoses. First, secure 8 wire group by a spiral hose clamp fixing it relevant place in service panel. Bring this cable group to the control panel, routing it through the space where gas inlet pipe 1 is installed, passing it through the cable groove on front inner casing. Secure spiral wrapped hose carrying basic wires with one of two pieces remaining spiral hose clamp. The last clamp will be used to support group of thermocouples from control panel. Fit these two clamps onto their relevant places on front casing upper piece of boiler.

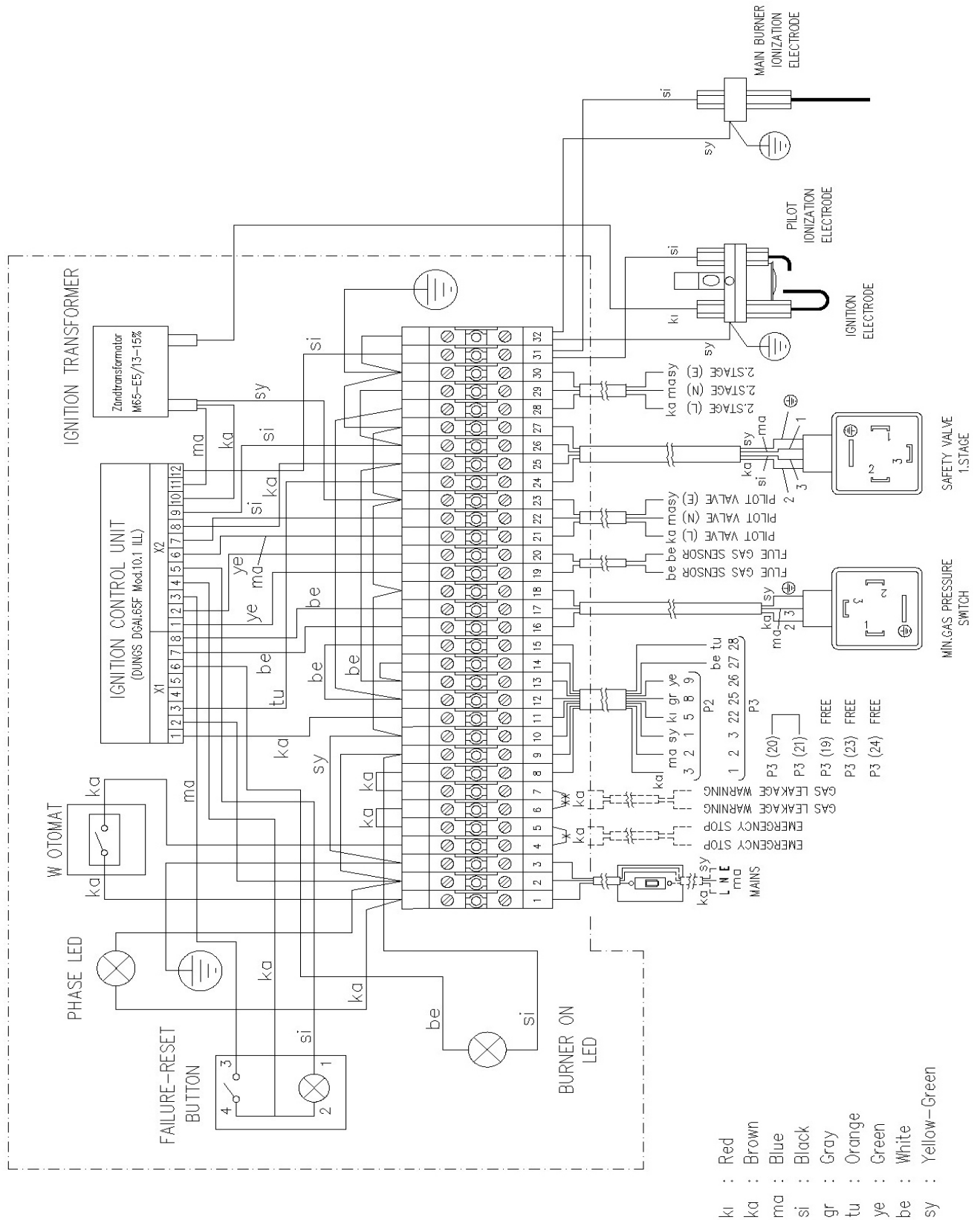
Attach basic wires to their relevant terminal strips on control panel according to wiring diagram on next page. For P2 control panel, there are 2 basic wires which are not going to be utilized in wiring, so these 2 wires shall be cut and insulated. During this installation, do not forget to by-pass number 20 and 21 terminals on P3 control panel, and to leave empty number 19, 23 and 25 terminals. Never use these terminals for an external wiring.



Picture 4-30.

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Diagram 4-1. Electrical installation and wiring scheme of AK boiler.



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5. Pass capillary tubes of boiler first stage, boiler second stage, safety thermostat, thermometer, and mixing water sensor (in case of P3 is used) from control panel, through spiral hose clamp in order to bring down first four to pocket on left or right hand section (whichever the water inlet and outlet side is) , and the lat one for P3 to special pocket on the same section. The end of capillary tubes must be placed tight in relevant pocket for optimum sense on water temperature. For this reason, use special springs supplied within control panel package as shown in Pic 4-31. Use safety rings supplied within control panel to secure all capillary tubes to pockets.



Picture 4-31.

6. Minimum pressure switch plug is coated grey whose basic wires are routed from number 16, 17, and 18 terminals of service panel. Fit plug of minimum pressure switch on relevant port on gas valve multiblock, and secure the switch by original screw.



Picture 4-32.

285 e selenoid valve

# plug is coated black whose basic wires are routed from number 24, 25, 26, and 27 terminals of service panel. Fit plug of safety and first stage selenoid on relevant port on gas valve multiblok and secure.

8. Attach chimney sensor basic wires which are routed through a spiral wrapped hose from number 19 and 20 terminals of service panel, to ports on chimney sensor on draught diverter by the help of an adaptor support (88). During this connection, ensure that spiral wrapped hose is not subject to sharpe edges of boiler construction, and surfaces with hot temperatures during operation.

9. Attach basic wires of pilot burner into relevant terminals of service panel routing them through cable gland at inlet of panel. Ensure that brown wire is attached on terminal 21, blue on terminal 22, and yellow-green on terminal 23.

10. Attach basic wires of second stage selenoid valve which are routed from number 28, 29, and 30 terminals of service panel. For this reason, first remove plastic cover of second stage selenoid terminal box, pass basic wires through associated cable glad and sealant, and attach brown wire on L terminal, blue on N terminal, and finally yellow-green on ground terminal.



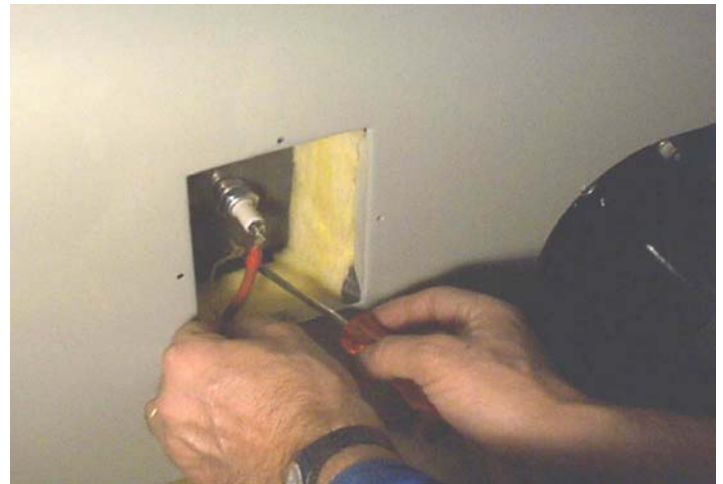
Picture 4-33.

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11. Route ignition electrode cable with black end sleeve (dia. 7 mm), which is connected to screwed terminal of ignition transformer for producing high voltage, through a PG 11 type cable gland of service panel. Fix this cable onto M4 screw on ignition electrode by slightly pushing. Check whether it is correctly placed by pulling with a little force.

12. Route 7 mm dia short cable with end sleeve connected to number 31 terminal of service box and grounding wire with the same length added a yellow-green ring terminal connected to number 32 terminal of service box, through a PG 11 type cable gland. Fit these two cables ends onto relevant ports on pilot burner. When fixing ground wire, first detach existing earth screw on pilot burner cover, pass the ring terminal of ground wire on the screw, and attach the earth screw again. Fix 7 mm dia cable onto the terminal of ionisation electrode on pilot burner by slightly pushing. Check whether it is correctly placed by pulling with a little force.

13. Route 7 mm dia long cable with end ring terminal connected to number 31 terminal of service box and grounding wire with the same length added a yellow-green ring terminal connected to number 31 terminal of service box, through a PG 11 type cable gland. Bring these two cable ends to main burner ionisation electrode on opposite side of the boiler, first routing them inside through the opening of gas inlet pipe, laying throughout the cable groove front inner sheet, and finally passing them between side casing sheet and side insulation piece. Fit the ring terminal of 7 mm dia cable onto ionisation electrode terminal using a M4 nut. Loosen one of the M5x15 setscrews used to fix ionisation electrode cover to side section, pass this setscrew through the ring terminal of grounding wire, and screw it again into its original port.



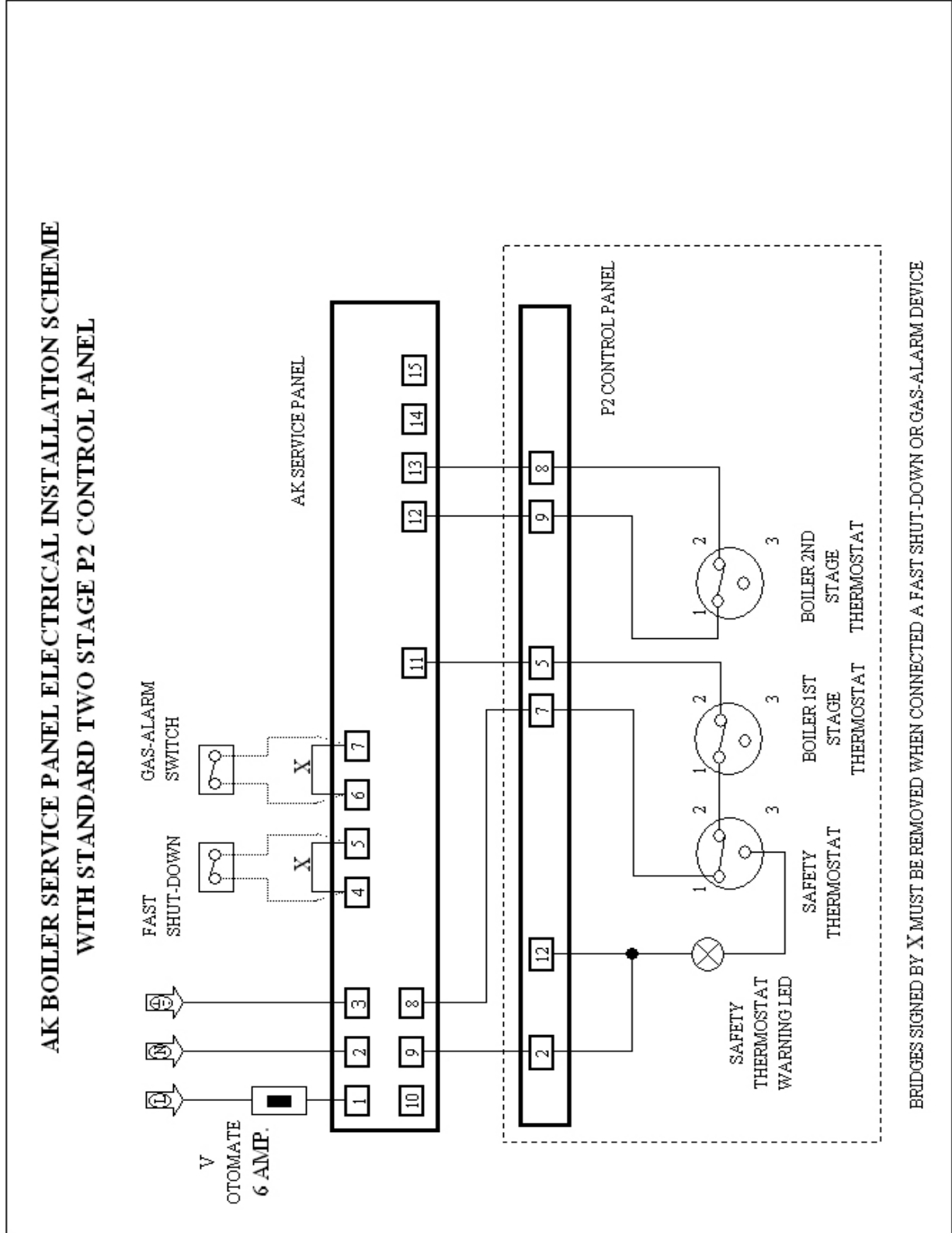
Picture 4-34.

**NOTE !**

1. When carrying all electrical wiring, ensure that basic or insulated cables are not subjected to sharpe edges of boiler construction, or surfaces with hot temperatures during operation.
2. For installation of P3 control panel, please refer to P3 OPERATING MANUAL
3. For wiring between service panel and P2 or P3 control panel, refer to wiring schemes on next pages

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Diagram 4-2. Wiring scheme between AK boiler service panel and P2 control panel



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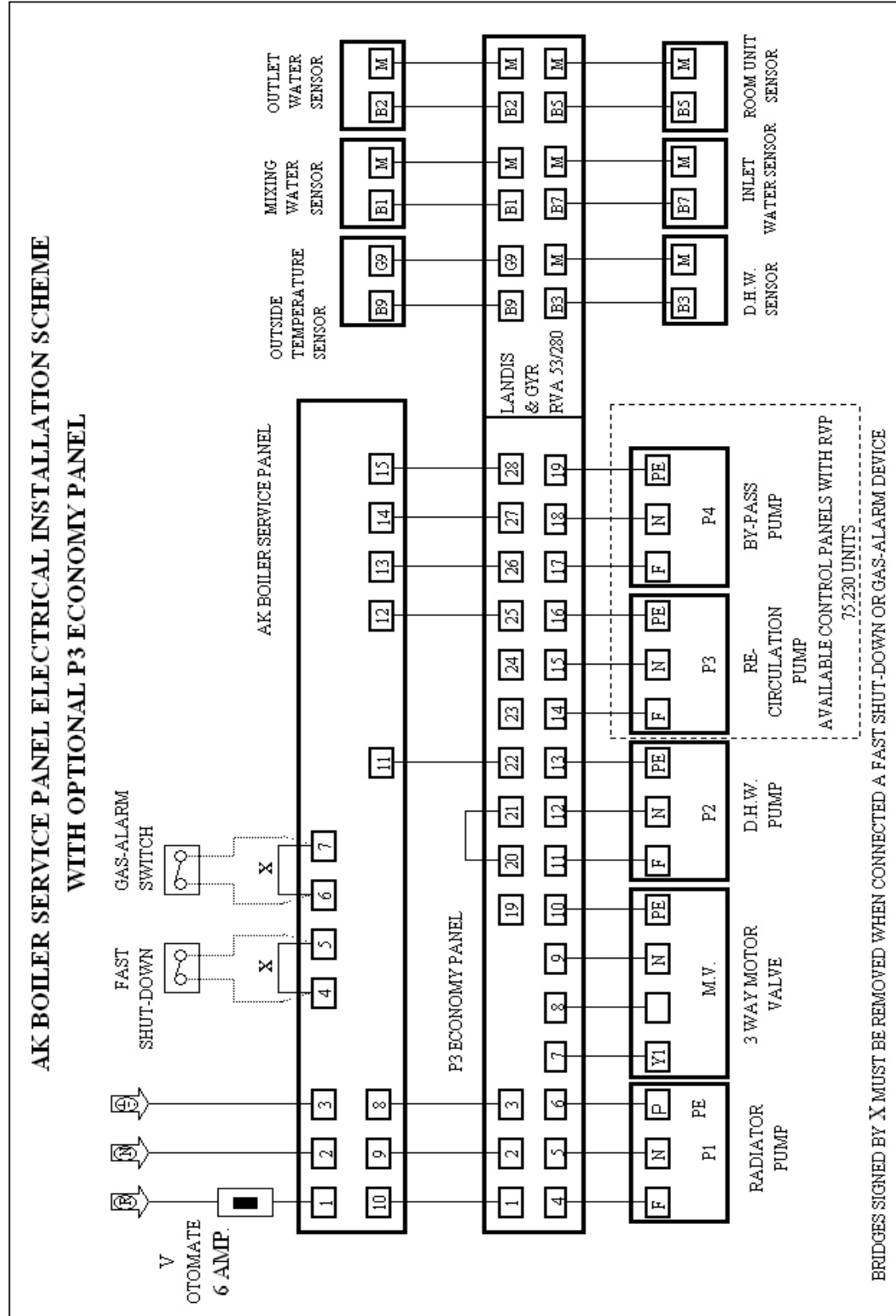
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Diagram 4-3. Wiring scheme between AK boiler service panel and P3 control panel



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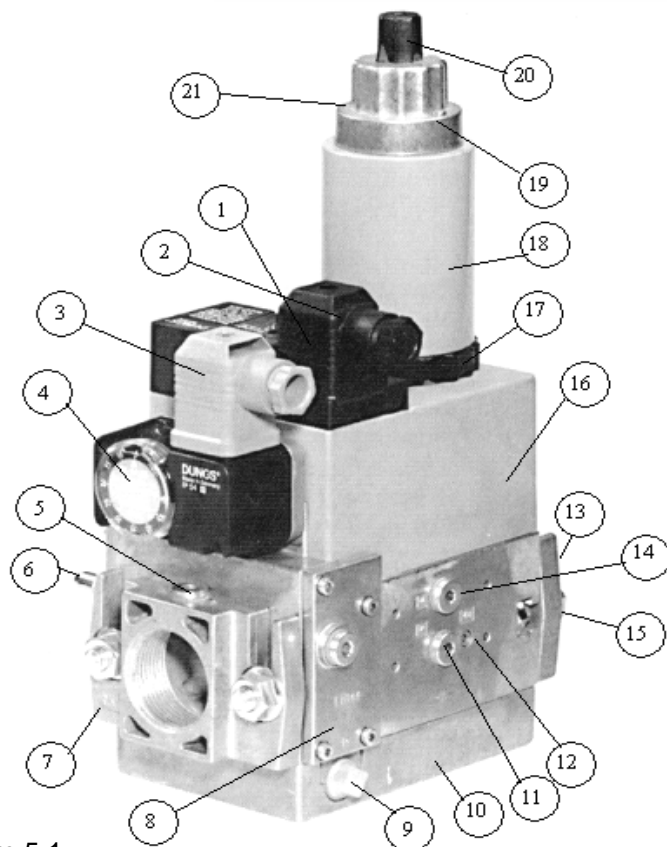
### 5. OPERATION

Before operation and adjustments of boiler gas train accessories, ensure that all mechanical, electrical, and hydraulic installations are completed and checked, and comply with relevant standards, mandatory regulations and instructions provided with this manual. Check that chimney conditions and sealing is appropriate and comply with local regulations.

#### 5.1. GAS VALVE MULTIBLOCKS

Following table shows gas valve multiblock types used in AK boiler for different gas inlet pressures and gas types:

INLET PRESSURE / GAS CATEGORY		AK12	AK13	AK14	AK15	AK16	AK17
<b>20 mbar NATURAL GAS (G20)</b>							
DUNGS	MB-ZRDLE 407 B01 S52						
DUNGS	MB-ZRDLE 410 B01 S52						
DUNGS	MB-ZRDLE 412 B01 S52	x	x	x	x	x	
DUNGS	MB-ZRDLE 415 B01 S22						x
<b>300 mbar NATURAL GAS (G20)</b>							
DUNGS	MB-ZRDLE 407 B01 S52						
DUNGS	MB-ZRDLE 410 B01 S52						
DUNGS	MB-ZRDLE 412 B01 S52	x	x	x	x	x	
DUNGS	MB-ZRDLE 415 B01 S22						x
<b>60 mbar PROPANE (G30)</b>							
DUNGS	MB-ZRDLE 407 B01 S52						
DUNGS	MB-ZRDLE 410 B01 S52						
DUNGS	MB-ZRDLE 412 B01 S52	x	x	x	x	x	x



1. Burner pressure adjustment screw
2. Safety selenoid socket
3. Minimum pressure switch socket
4. Minimum pressure switch
5. Pressure drop measurement for filter
6. Pressure drop measurement for filter
7. Connection flange
8. Filter cover
9. Plastic cap
10. Flow direction sign
11. Safety valve inlet pressure measurement
12. Outlet pressure test nipple
13. Connection flange
14. Pilot ventile port
15. Outlet pressure test nipple
16. 1.Stage selenoid
17. 1.Stage adjusting ring
18. 2.Stage selenoid
19. 2.Stage adjusting ring
20. Fast stroke
21. 2.Stage adjusting ring locking screw

Picture 5-1.

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Following should be taken into consideration prior to setting of gas valve multiblock:

1. Pilot burner ventile shall be connected to port 14 on the right side of valve or equivalent port on opposite side.
2. The electrical connection of second stage valve shall be carried out on the left hand side of gas valve multiblock.
3. There are two openings on semi-transparent plastic nut (item 9) which are used as references to inlet pressure regulator. That's why these openings must never be covered. During pressure regulation in operation, these holes should be ensured to purge air.
4. There are equivalent ports to items 6, 8, 10, 11, 12, and 14 on the left hand side of gas train multiblock.

## 5.2. MINIMUM PRESSURE SWITCH SETTING

Detach transparent top cover of minimum pressure switch (item 4 on Pic 5-1) by loosening 2 screws. The outer ring of switch dial which is scaled 5 to 150 mbar or 2.5 to 50 mbar according to boiler type can be rotated easily for adjustment.

The black rectangle is set to required pressure level for starting boiler sequence. When this set is completed and boiler is started, if the inlet pressure reaches a level pointed by ↑ sign, the sequence goes on, but when the inlet pressure decreases below a level pointed by ↓ sign the boiler sequence is stopped automatically.

Set value of minimum pressure switch according to different gas inlet pressures are as follows:

285 / value is 10 mbar

- # For natural gas, and inlet pressure is 20 mbar, then set value is 10 mbar  
For propane, and inlet pressure is 60 mbar, then set value is 32 mbar

## 5.3. OUTLET PRESSURE SETTINGS

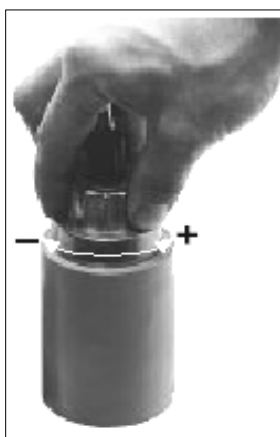
Loosen screws on setting plate (or hydraulic brake) (item 21 on Pic 5-1). Do not attempt to loosen the screw which is painted red in the factory to seal. The setting plates (items 17 and 19) are now ready to adjust (Pic 5-2).

Loosen the screw inside the burner pressure gauge connection port a little so that it is not detached from the port (item 15 in Pic 5-1). Connect one end of U-manometer into this port.

Set 2nd stage adjustment ring on setting plate (item 19) up to the maximum value turning it counterclockwise direction (Pic 5-3). Likewise, set 1st stage adjustment ring on setting plate (item 17) up to maximum value turning it in the same direction (Pic 5-4).



Picture 5-2



Picture 5-3



Picture 5-4

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Turn the main gas supply valve on, and ensure that the minimum required gas pressure at the inlet of gas train is reached.

Set the button on V-otomate on boiler service panel, and power the boiler system. Power the circulation pump of heating circuit, and ensure water is circulating within the delivery system.

If a P3 economy panel is installed, set economy panel to manual operation and start circulation pump. Set 3 way motor valve up to maximum delivery and ensure that it will stay at maximum rate. Set control thermostats on control panel to maximum degree in order to provide the burner fire at maximum gas delivery.

Check the phase signal from nr 1 terminal of ignition sequence control unit on service panel. If there is no signal is measured, check the electrical installation according to service panel wiring diagram. The burner will start. At this stage, the pressure gauge measured on U-manometer should be adjusted to desired value. For this reason, uncover item 1 on Pic 5-1, and adjust the pressure gauge to high input 1st+2nd stage pressure set using a screwdriver according to following set values given for different inlet pressures:

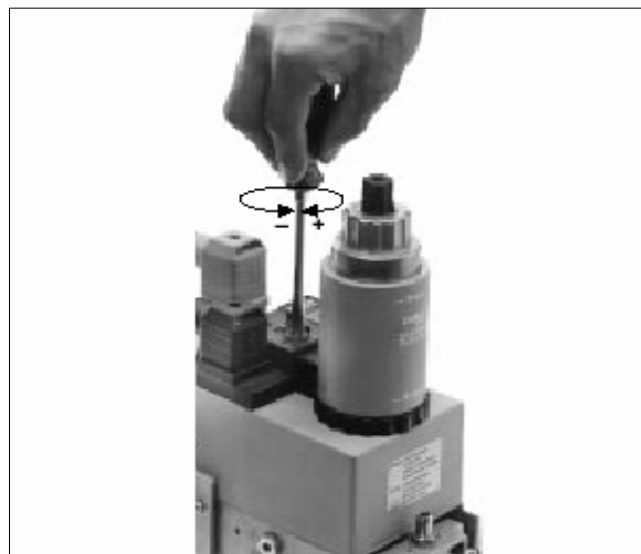
Gas type/ Inlet Pressure	High input 1st+2nd stage pressure set	Low input 1st stage (main stage) pressure set
--------------------------------	---	---

285 Natural gas/ # 300 mbar	12 (13*) mbar	9 (10*) mbar
--------------------------------	---------------	--------------

Natural gas/ 20 mbar	12 (13*) mbar	9 (10*) mbar
-------------------------	---------------	--------------

Propane/ 60 mbar	45 mbar	30 mbar
---------------------	---------	---------

*\* signed numbers refers to set pressures for installations carried out above sea level.*



Picture 5-5

Cut the mains from boiler service panel, and deatch the brown wire feeding electricity from nr 28 terminal of service panel to 2nd stage operation. Re-start the boiler, and check that the pressure gauges observed on U-manometer is maintained as adjusted. Set 1st stage adjustment ring (item 17 on Pic 5-1, Pic 5-4) down to desired pressure given in above table (low input), turning it in clockwise direction. At this stage, re-attach the brown wire into nr 28 terminal of service panel, and ensure that the pressure gauge increases up to high input level given in above table. Repeat the same operation once more to see that same pressure levels are maintained (If boiler temperature exceeds the knob settings of control panel during this control, the pressure guage will always be stayed at low input).

#### 5.4. RAPID STROKE ADJUSTMENT

Rapid stroke adjustment will allow to control first ignition of the burner either with intervals of small increase in flame length or with maximum flame length directly. For adjustment of rapid stroke, first uncrew the adjustment cap from the hydraulic brake (item 20 on Pic 5-1). Turn the adjustment cap upside down and use it as a tool (Pic 5-6).

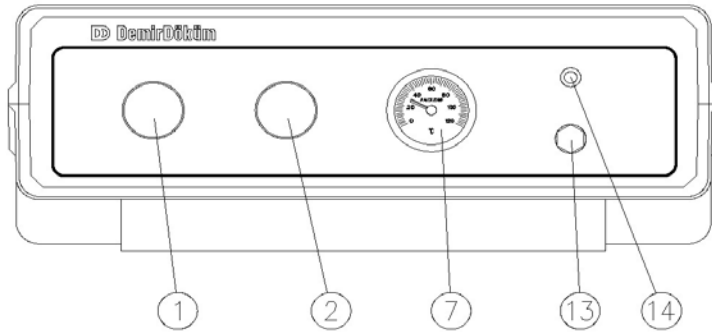
Attach the adjustment cap onto brass shaft where there is a red panited screw. To decrease the length of initial flame, turn the shaft in ( — ← ) direction, to increase turn the shaft in ( — → + ) direction.

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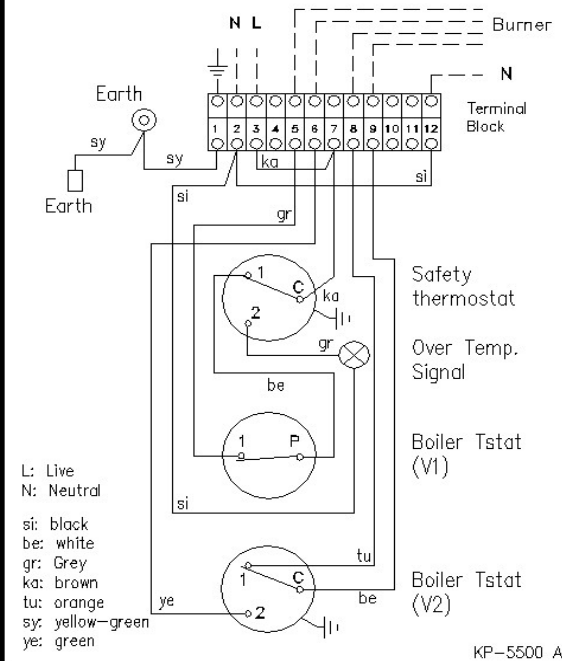
### 4.7. CONTROL PANELS

P2 is the standard panel of the boiler and suitable for two stage burners. Boiler thermostats can be adjusted between 30 and 90 °C, safety thermostat is set to 110 °C. In the case of P3 economy panel usage, refer to "P3 operating manual".

#### P2



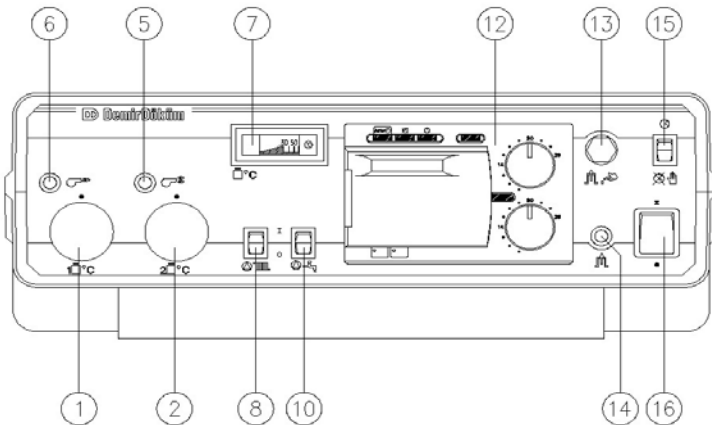
#### P2-A CONTROL PANEL WIRING DIAGRAM



285 stage of burner)

- # 2. Boiler thermostat (second stage of burner)
- 5. Burner led (first stage)
- 6. Burner led (second stage)
- 7. Boiler thermometer
- 8. Heating system circulation pump switch
- 10. Hot utility water circulation pump switch
- 12. Automatic control unit
- 13. Safety thermostat
- 14. Safety thermostat warning led
- 15. Automatic / manual switch
- 16. On / off switch

#### P3



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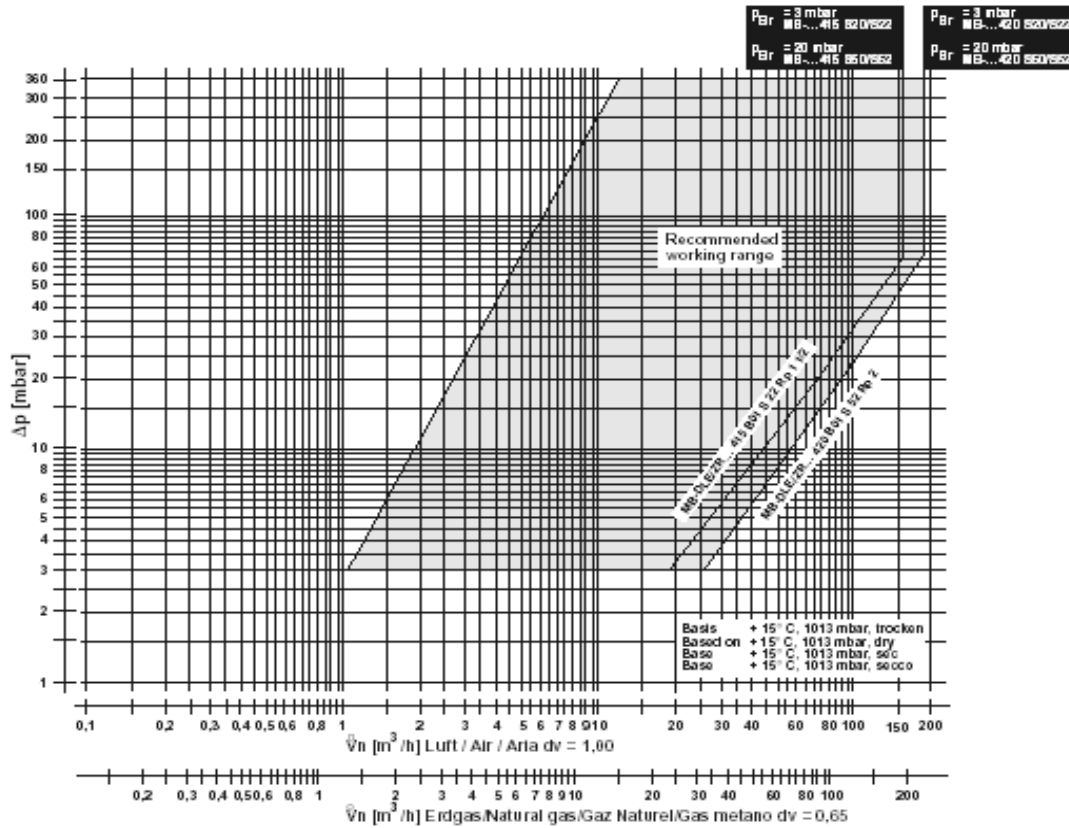
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The correction factors for other gas types used, refer to following information:

$$V_{gas\ used} = V_{air} \times f$$

where;

Gas type	f	density (kg/m3)	dv
Natural gas	1.24	0.81	0.65
City gas	1.45	0.58	0.47
LPG	0.77	2.08	1.67
Air	1.00	1.24	1.00

or

$$f = \sqrt{\frac{\text{specific weight of air}}{\text{specific weight of gas used}}}$$

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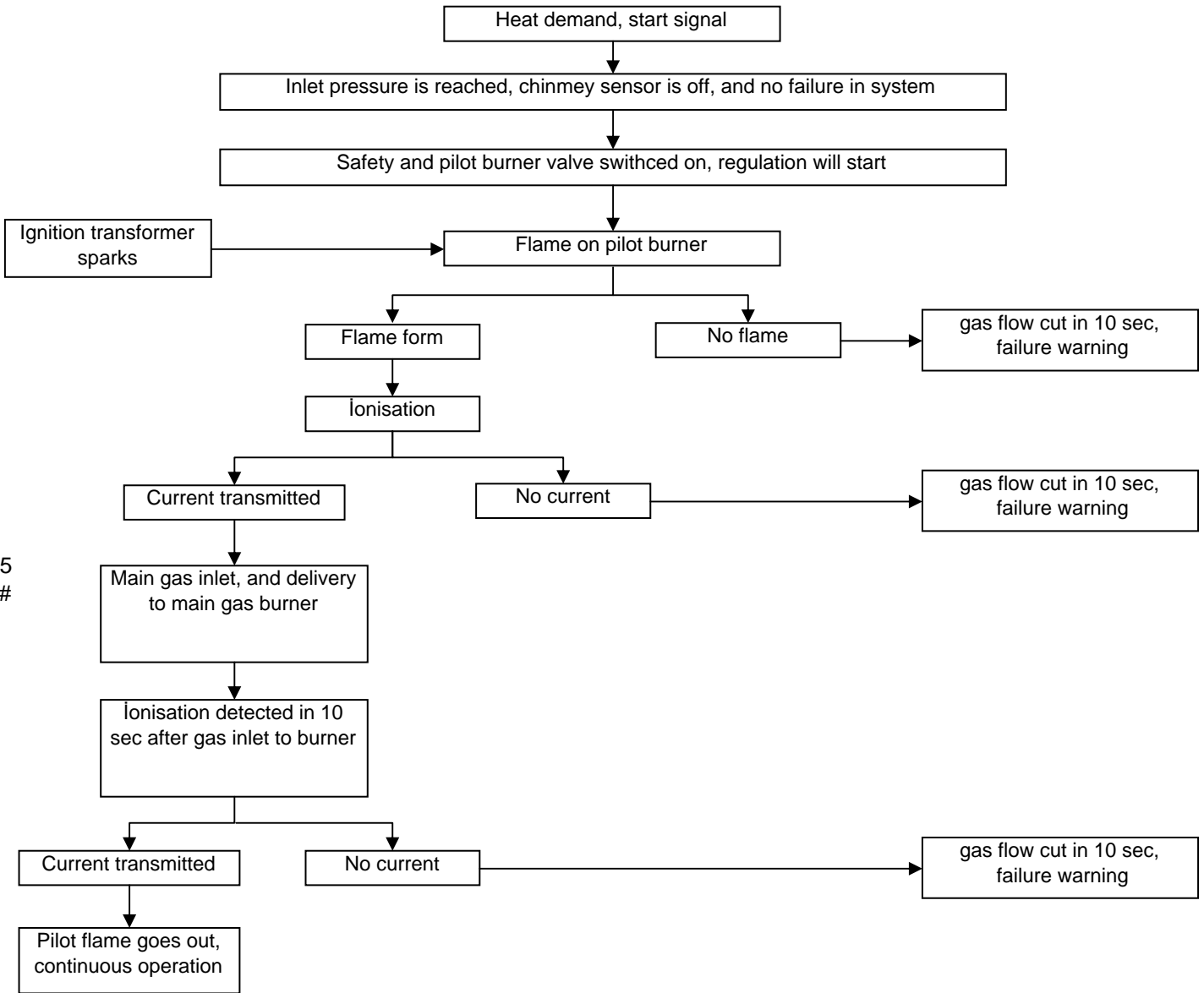
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### 5.6. GAS VALVE MULTIBLOCK OPERATIONAL SEQUENCE



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**6. MAINTENANCE AND CLEANING**

**6.1. PERIODIC INSPECTIONS**

The periodic inspections throughout boiler operating life should be provided for better and high efficient performance of boiler. Following inspections must be carried out:

- 1. Inspection of control accesories (thermostats etc..)
- 2. Fumes (odours) detect in boiler room
- 3. Flue gas leakage control

Additionally, following controls should not be forgotten before and after every heating season:

- 1. Control and cleaning heating system (pumps, gate valves etc), chimney, fixing of any irregularity.
- 2. Control and cleaning of water distribution pipe.

**6.2. BOILER CLEANING**

ices will result in  
# approximately 5% decrease in overall efficiency.

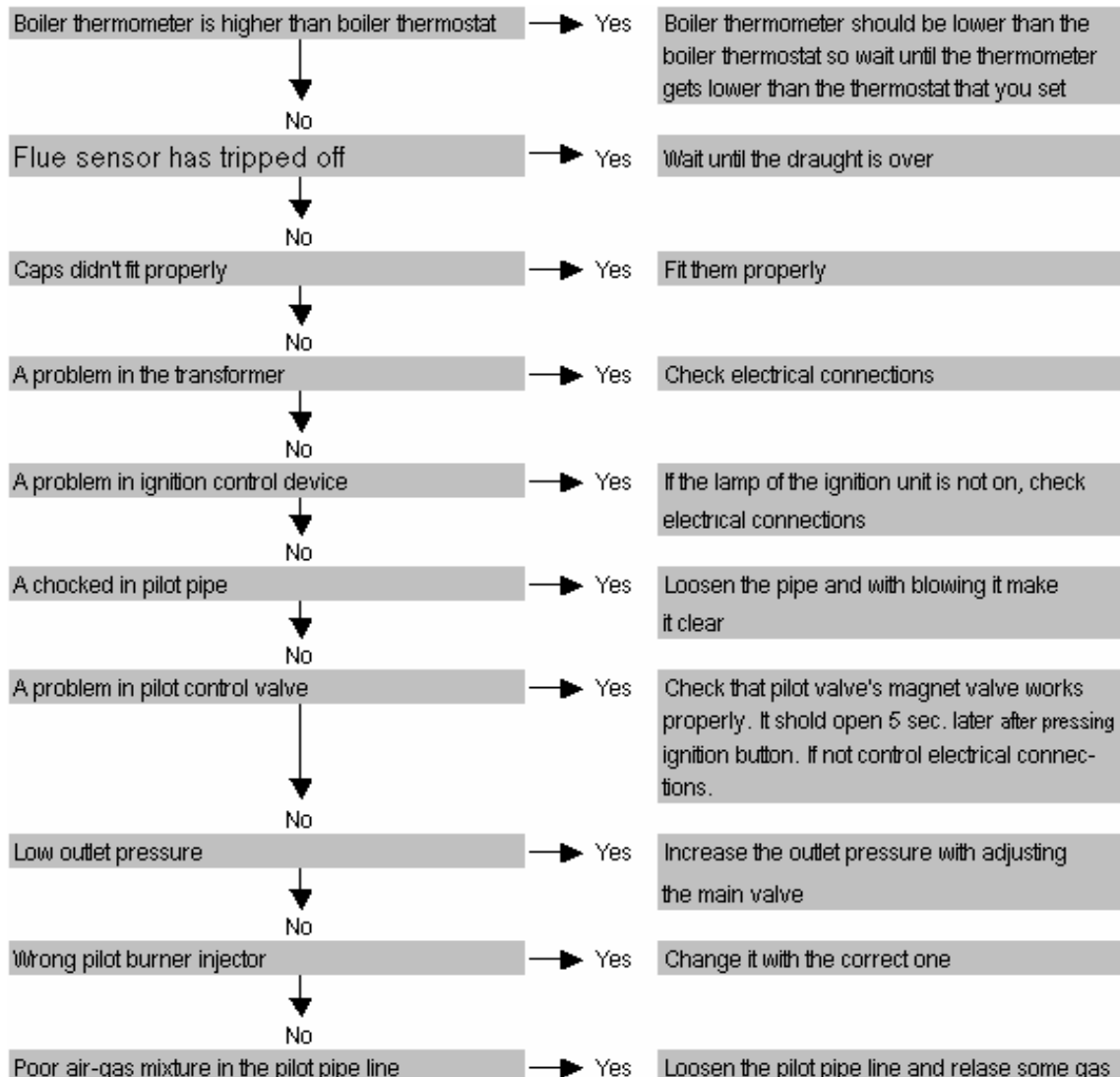
Before starting to clean boiler heating surfaces:

- 1. Isolate by switching off all electrical supplies at the mains.
- 2. Valve-off gas supplies.
- 3. Cover boiler control panel, service panel, and gas train aceessories.

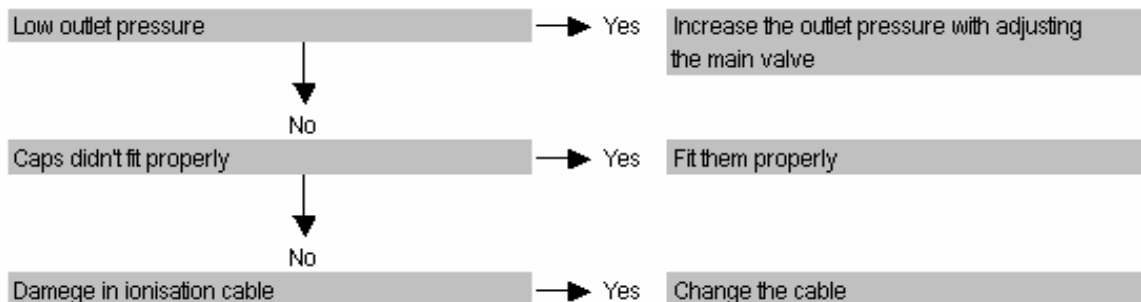
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### 7. TROUBLESHOOTING

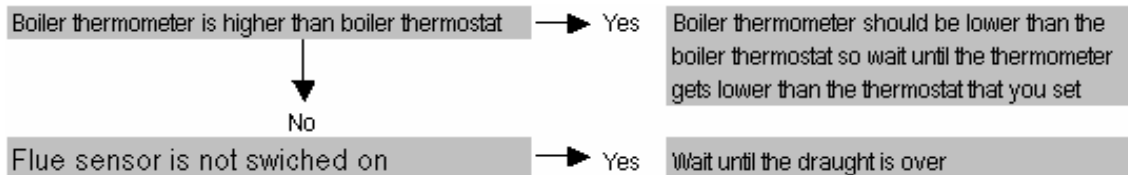
#### Pilot burner does not ignite



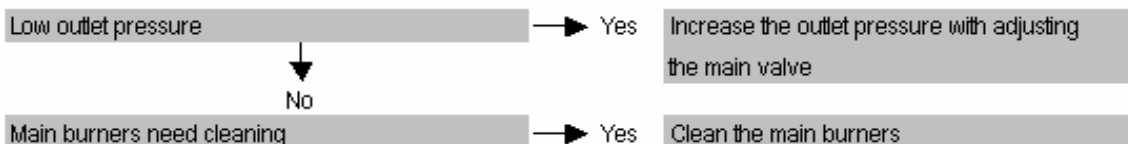
#### Main burner does not ignite



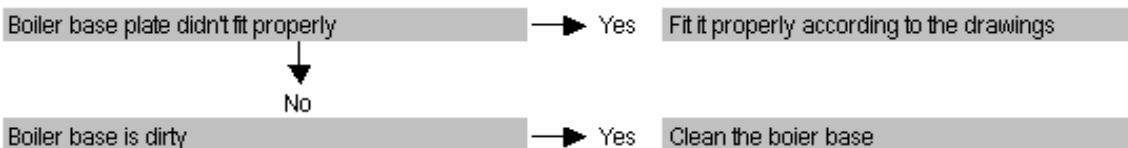
## Main burner occasionally stops



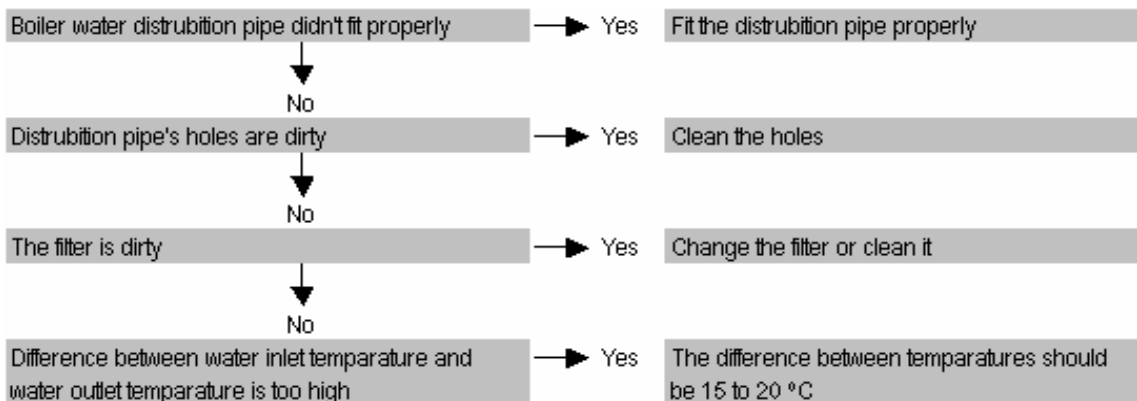
## Small flame length



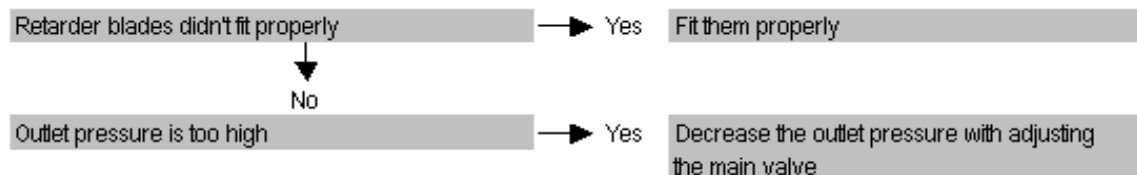
## Yellow flames detected



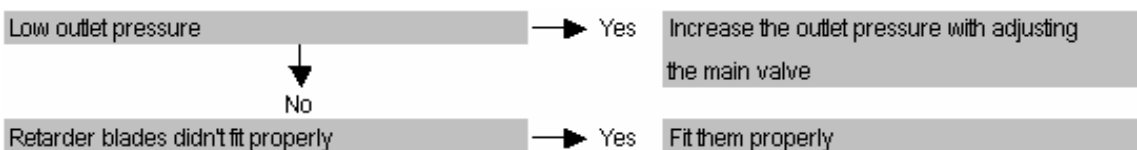
## # Boiling at low temperatures



## High flue gas temperature



## Low outlet temperatures



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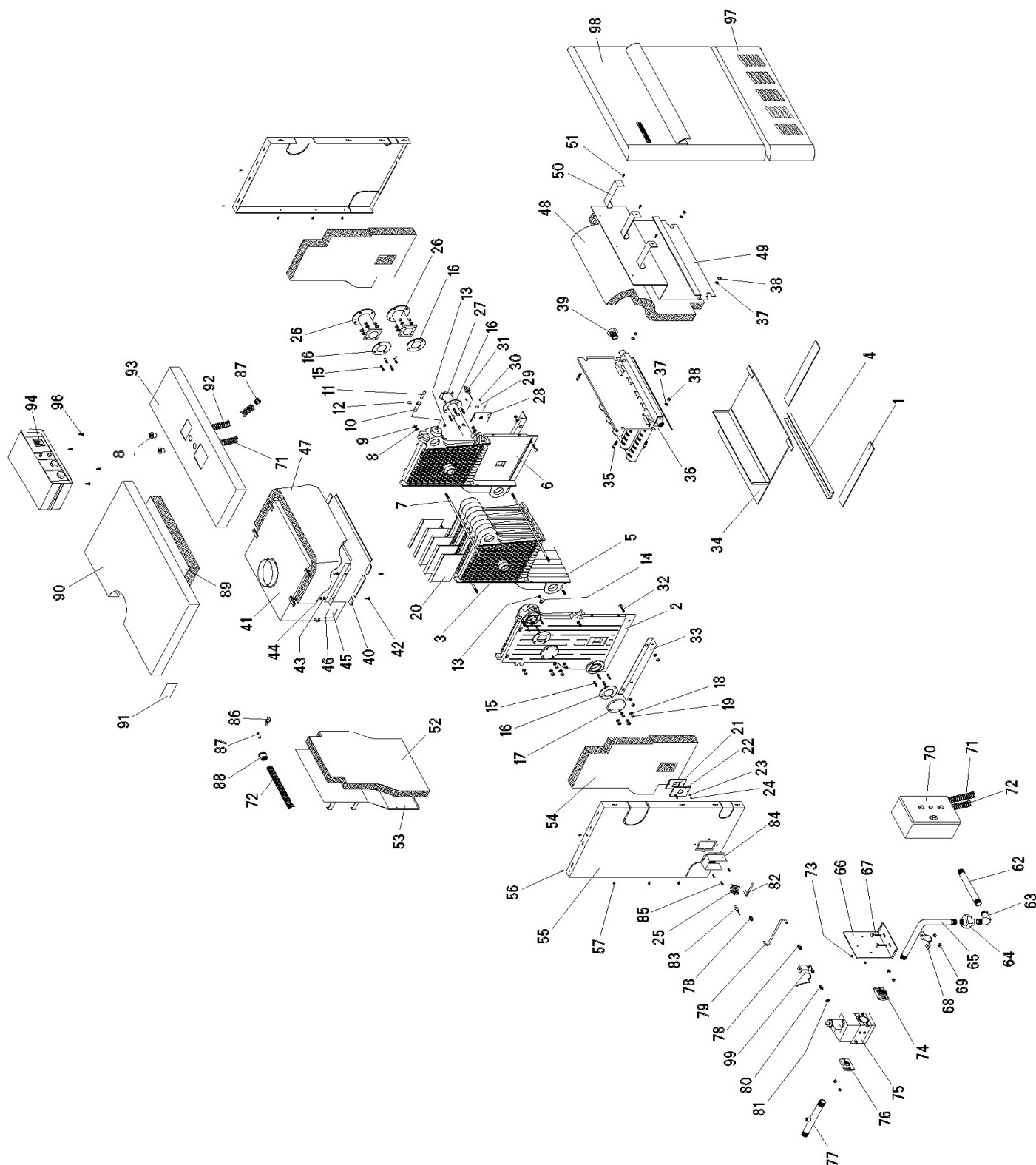
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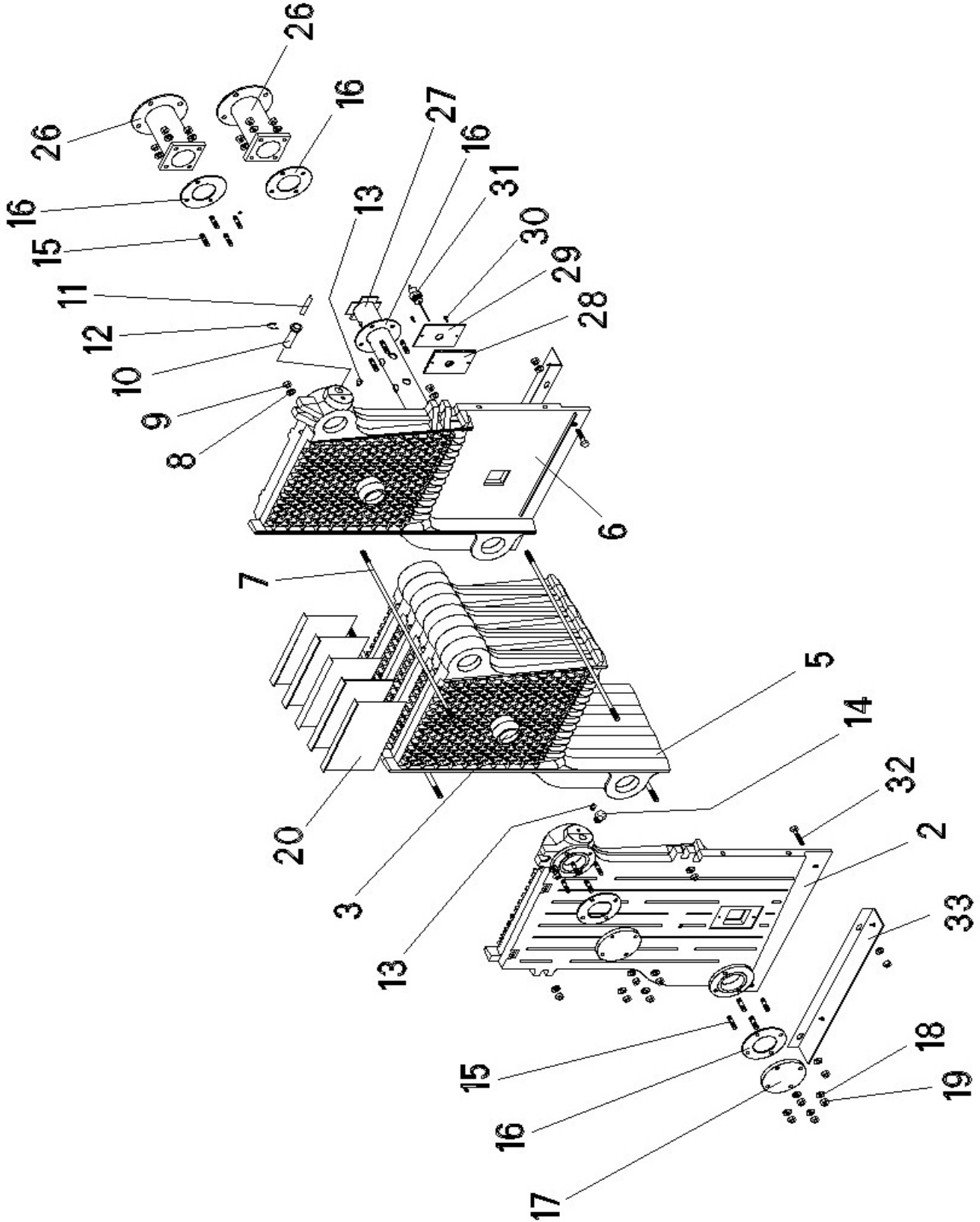
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**8.1. EXPLODED DRAWINGS - BOILER GROUP DETAIL**

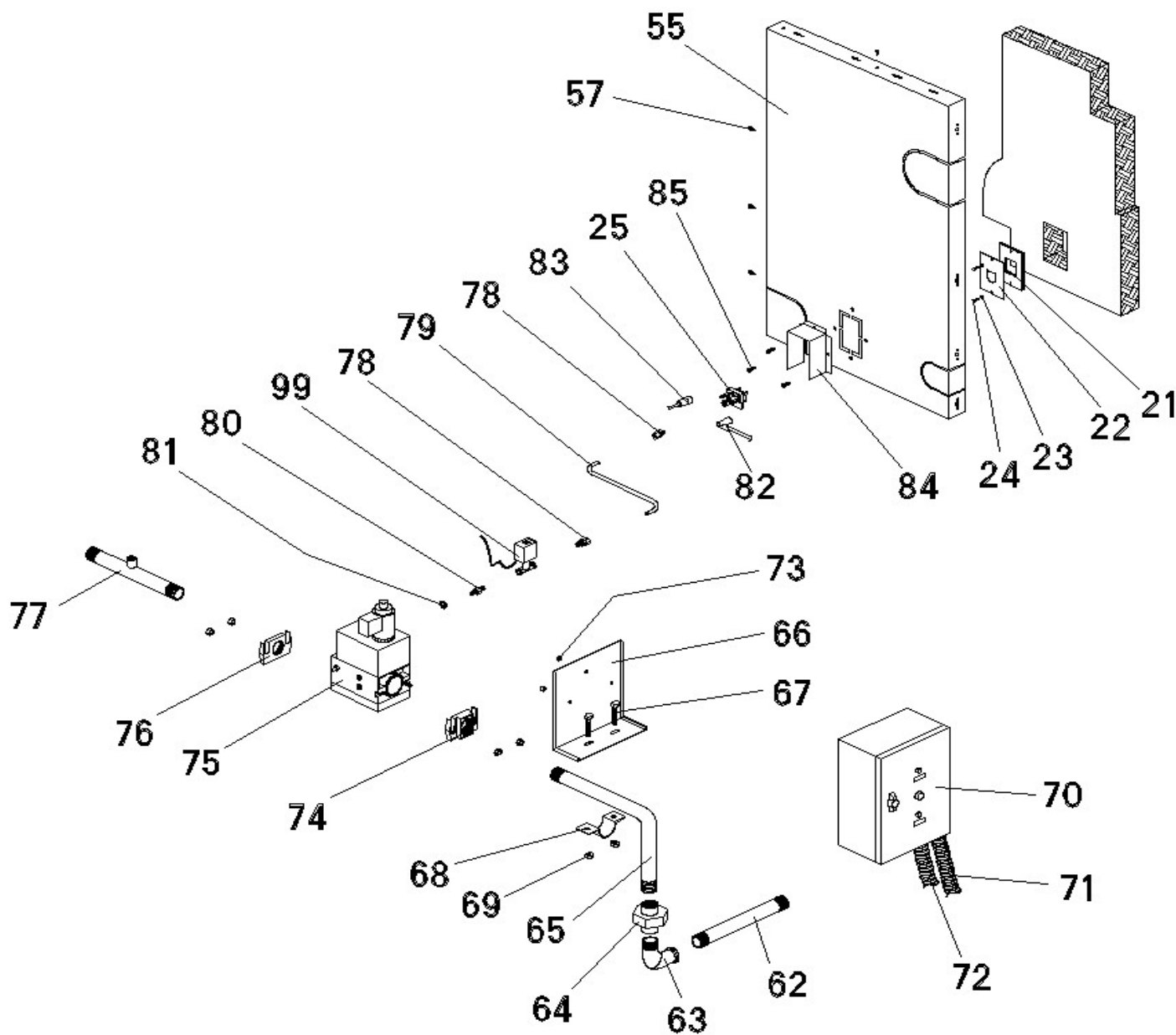


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**8.2. EXPLODED DRAWINGS - PILOT AND MULTIBLOCK DETAIL**



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### 9. SPARE PARTS LIST

ORDER CODE	PARTS NAME	AK 12	AK 13	AK 14	AK 15	AK 16	AK 17	AK 18	PRICE CODE
2001171010	INTERMEDIATE SECTION	5	5	5	5	5	5	5	91
2002145095	IGNITION TRANSFORMER ZAB 5000/13								82
2002194160	CHIMNEY SENSOR 65-45 C	86	86	86	86	86	86	86	27
2009007335	PILOT BURNER COVER INSULATION	21	21	21	21	21	21	21	7
2002187715	PILOT BURNER COPPER PIPE ø 8 mm	79	79	79	79	79	79	79	19
2001171000	RIGHT HAND SECTION	6	6	6	6	6	6	6	93
2001171020	LEFT HAND SECTION	2	2	2	2	2	2	2	93
2002145090	SEQUENCE CONTROLLER DUNGS ( DGA1 65F MOD.10 )								97
2001421109	BURNER TUBE ø 60 mm (POLIDORO)								49
2002082986	BURNER ASSEMBLY PLATE								17
2002082987	BURNER ASSEMBLY PLATE								19
2002082988	BURNER ASSEMBLY PLATE								19
2002082989	BURNER ASSEMBLY PLATE								21
2002082990	BURNER ASSEMBLY PLATE								23
2002082991	BURNER ASSEMBLY PLATE								23
2002082992	BURNER ASSEMBLY PLATE								25
2002082993	BURNER ASSEMBLY PLATE								25
2002082994	BURNER ASSEMBLY PLATE								27
2002082995	BURNER ASSEMBLY PLATE								27
2002082996	BURNER ASSEMBLY PLATE								29
2002082997	BURNER ASSEMBLY PLATE								29
2002082998	BURNER ASSEMBLY PLATE								31
2002024185	BURNER NOZZLE GASKET								5
2002183545	BURNER NOZZLE ø 3.50 mm - NATURAL GAS								19
2002183546	BURNER NOZZLE ø 1.90 mm - LPG								19
2002011535	SETSCREW - M 12 x 25	32	32	32	32	32	32	32	6
2002024460	SETSCREW - M 5 x 15								3
2002012125	CIVATA M 3x10 TS1020/6								3
2002011090	SECTSCREW - M 8x40								6
2002193366	STAYBOLT M 12 x 670								23
2002193367	STAYBOLT M 12 x 775								23
2002193368	STAYBOLT M 12 x 880								25
2002193369	STAYBOLT M 12 x 986								25
2002193370	STAYBOLT M 12 x 1092								27
2002193371	STAYBOLT M 12 x 1198								27
2002193372	STAYBOLT M 12 x 1304	7							29
2002193373	STAYBOLT M 12 x 1410		7						29
2002193374	STAYBOLT M 12 x 1514			7					29
2002193375	STAYBOLT M 12 x 1620				7				29
2002193376	STAYBOLT M 12 x 1725					7			31
2002193377	STALBOLT M 12 x 1831						7		31
2002193378	STALBOLT M 12 x 1936							7	31
2002010936	SETSCREW - M 6 x 20								3
2007600001	DRAUGHT DIVERTER (COMPLETED)								74
2007600002	DRAUGHT DIVERTER (COMPLETED)								76
2002195608	DRAUGHT DIVERTER (COMPLETED)								78
2007600003	DRAUGHT DIVERTER (COMPLETED)								78
2007600004	DRAUGHT DIVERTER (COMPLETED)								78
2007600005	DRAUGHT DIVERTER (COMPLETED)								80
2007600006	DRAUGHT DIVERTER (COMPLETED)	41							80
2007600007	DRAUGHT DIVERTER (COMPLETED)		41						82
2007600008	DRAUGHT DIVERTER (COMPLETED)			41					82
2007600009	DRAUGHT DIVERTER (COMPLETED)				41				84
2007600010	DRAUGHT DIVERTER (COMPLETED)					41			84
2007600011	DRAUGHT DIVERTER (COMPLETED)						41		84
2007600012	DRAUGHT DIVERTER (COMPLETED)							41	86
2002199390	INTERSECTION RETARDER BLADE	20	20	20	20	20	20	20	31
2002195901	SAFETY RING FOR THERMOCOUPLE HOUSING	12	12	12	12	12	12	12	3
2002195900	THERMOCOUPLE HOUSING	10	10	10	10	10	10	10	29

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# AK GAS FIRED BOILERS WITH ATMOSPHERIC BURNERS

NO : UGM-AK-03/04

PAGE : 40

ORDER CODE	PARTS NAME	AK 12	AK 13	AK 14	AK 15	AK 16	AK 17	AK 18	PRICE CODE
2002194168	THERMOCOUPLE HOUSING G 1/8"								27
2002058096	SAFETY RING FOR THERMOCOUPLE HOUSING G 1/8"								1
2002145020	FLANGE RP: 3/4" - GAS MULTIBLOCK INLET								43
2002145035	FLANGE RP: 1" - GAS MULTIBLOCK INLET								49
2002145050	FLANGE RP: 1 1/4" - GAS MULTIBLOCK INLET	76	76	76	76	76			49
2002145065	FLANGE RP: 1 1/2" - GAS MULTIBLOCK INLET						76	76	45
2002145010	FLANGED TEST NIPPLE 3/4" - GAS M.BLOCK OUTLET								45
2002145025	FLANGED TEST NIPPLE 1" - GAS M.BLOCK OUTLET								51
2002145040	FLANGED TEST NIPPLE 1 1/4" - GAS M.BLOCK OUTLET	74	74	74	74	74			51
2002145055	FLANGED TEST NIPPLE 1 1/2" - GAS M.BLOCK OUTLET						74	74	49
2002195005	GAS INLET PIPE 1 - 3/4"								23
2002195010	GAS INLET PIPE 1 - 1"								25
2002195015	GAS INLET PIPE 1 - 1 1/4"	62	62	62	62	62			27
2002195020	GAS INLET PIPE 1 - 1 1/2"						62	62	27
2002195025	GAS INLET PIPE 2 - 3/4"								25
2002195030	GAS INLET PIPE 2 - 1"								29
2002195035	GAS INLET PIPE 2 - 1 1/4"	65	65	65	65	65			31
2002195040	GAS INLET PIPE 2 - 1 1/2"						65	65	31
2002195045	GAS INLET PIPE 3 - 3/4"								27
2002195050	GAS INLET PIPE 3 - 1"								27
2002195055	GAS INLET PIPE 3 - 1 1/4"	77	77	77	77	77			27
2002195060	GAS INLET PIPE 3 - 1 1/2"						77	77	29
2002188006	GAS MANIFOLD (COMPLETED WITH BURNERS)								45
2002188007	GAS MANIFOLD (COMPLETED WITH BURNERS)								47
2002188008	GAS MANIFOLD (COMPLETED WITH BURNERS)								47
2002188009	GAS MANIFOLD (COMPLETED WITH BURNERS)								49
2002188010	GAS MANIFOLD (COMPLETED WITH BURNERS)								51
2002188011	GAS MANIFOLD (COMPLETED WITH BURNERS)								53
2002188012	GAS MANIFOLD (COMPLETED WITH BURNERS)	36							53
2002188013	GAS MANIFOLD (COMPLETED WITH BURNERS)		36						55
2002188014	GAS MANIFOLD (COMPLETED WITH BURNERS)			36					57
2002188015	GAS MANIFOLD (COMPLETED WITH BURNERS)				36				57
2002188016	GAS MANIFOLD (COMPLETED WITH BURNERS)					36			59
2002188017	GAS MANIFOLD (COMPLETED WITH BURNERS)						36		59
2002188018	GAS MANIFOLD (COMPLETED WITH BURNERS)							36	61
2009007495	GAS MANIFOLD INSULATION								64
2002145015	GAS VALVE M.BLOCK - MB ZRDLE 407 B01 S52								115
2002145030	GAS VALVE M.BLOCK - MB ZRDLE 410 B01 S52								117
2002145045	GAS VALVE M.BLOCK - MB ZRDLE 412 B01 S52	75	75	75	75	75			117
2002145060	GAS VALVE M.BLOCK - MB ZRDLE 415 B01 S22						75	75	119
2002083130	FLANGED STUB PIPES - 4 BAR	26	26	26	26	26	26	26	50
2002115080	FLAME INSPECTION WINDOW 5 x 26 x 66								25
2002025050	FLAME INSPECTION WINDOW GASKET 3 x 26 x 66								6
2002206025	FLAME INSPECTION FRAME								6
2002145075	GREY PLUG - HRS-GDMW 301 1/G								31
2009007340	IONISATION ELECTRODE COVER INSULATION	28	28	28	28	28	28	28	7
2002199310	IONISATION ELECTRODE COVER	29	29	29	29	29	29	29	11
2003105155	IONISATION ELECTRODE FZ E 100	31	31	31	31	31	31	31	64
2002170265	CONICAL PIPE UNION 3/4"								29
2002170270	CONICAL PIPE UNION 1"								31
2002170275	KONIK RAKOR 1 1/4"	64	64	64	64	64			35
2002170280	CONICAL PIPE UNION 1 1/2"						64	64	37
2002089035	BLANK FLANGE	17	17	17	17	17	17	17	37
2002024515	GASKET FOR BLANK FLANGE	16	16	16	16	16	16	16	13
2002162220	KÖR TAPA 1/8"	13	13	13	13	13	13	13	5
2002170245	ELBOW 3/4"								29
2002170250	ELBOW 1"								31
2002170255	ELBOW 1 1/4"	63	63	63	63	63			33
2002170260	ELBOW 1 1/2"						63	63	35

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[illegible]



## BOILER ASSEMBLY CERTIFICATE

Form Nr. : 2.009 F 14 R2

BOILER DATA	MODEL	:	BOILER GROUP NR.1	:
	RATED OUTPUT	:	BOILER GROUP NR.2	:
	FUEL TYPE	:	DATE OF MANUFACTURE	:
	SERIAL NR.	:		

END USER	CONTACT PERSON	:	
	ADDRESS	:	
	TELEPHONE	:	

DEALER	COMPANY NAME	:	
	ADDRESS	:	
	TELEPHONE	:	

ERECTOR	COMPANY NAME	:	
	ADDRESS	:	
	TELEPHONE	:	

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04/09/2006	Assembled ..... Boiler group tested at
	$P_s = 1.5 \times P_{max} = 1.5 \times \dots = \dots$ Bars
	where $P_{max}$ is the maximum operating pressure of heating system;
	for a duration of 30 minutes, and
	<input type="checkbox"/> No leakage detected
	<input type="checkbox"/> Leakages detected and corrected on following points:
	1.
	2.
	3.
	4.
	5.

COMMENTS	OTHER FAULTS OR DEFICIENCIES DETECTED
----------	---------------------------------------

TESTED BY:

DATE and SIGNATURE

THIS BOILER ASSEMBLY CERTIFICATE SHALL BE BROUGHT TO THE AUTHORISED DEALER