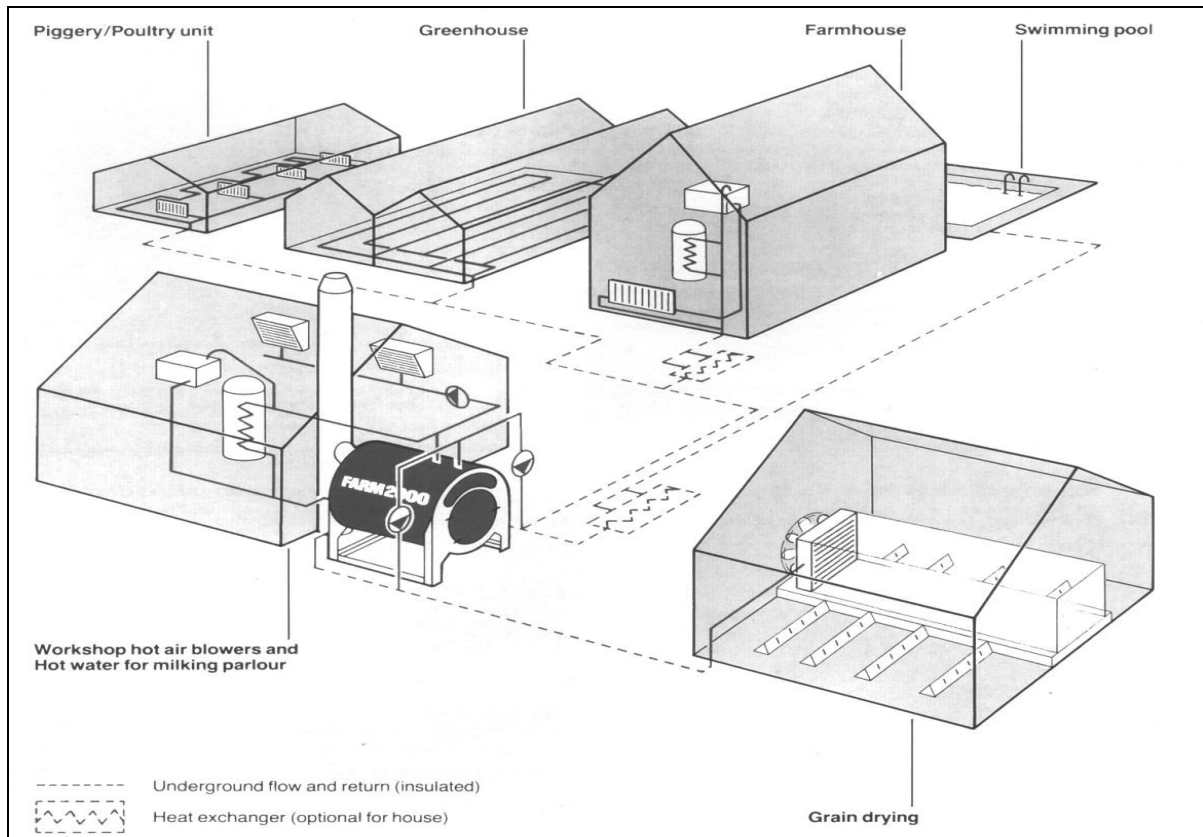


FARM 2000



INSTALLATION AND OPERATING INSTRUCTIONS FOR FARM 2000 BOILERS

A.	FUEL.	2.
B.	GENERAL NOTES ON SITING AND INSTALLATION.	2.
C.	CHIMNEY.	4.
D.	PLUMBING, INCLUDING ACCUMULATORS.	7.
E.	FAN CONTROL UNIT.	12.
F.	ASSEMBLING AND SETTING OF BOILER COMPONENTS.	14.
G.	COMMISSIONING AND ROUTINE OPERATION.	17.
H.	24 hr.THERMOSTATIC CONTROL WITH 5°C NIGHT SET-BACK.	18.
I.	SAFETY.	19.
J.	MAINTENANCE.	20.
K.	TROUBLE-SHOOTING.	21.
L.	WIRING DIAGRAM.	22.
M.	TEMPLATE FOR CONTROL BOX.	23.

TYPICAL BOILER AND ACCUMULATOR SYSTEM/REMOTE SYSTEM

IMPORTANT NOTE:

**DO NOT ASSUME THAT CORRECT AIR SYSTEM HAS BEEN PRE-SET AT FACTORY.
 FOLLOW CLOSELY INSTRUCTIONS IN SECTIONS E & F.
 DO NOT OPERATE THE BOILER WITHOUT FIRST READING THESE INSTRUCTIONS.**

**TEISEN PRODUCTS LIMITED, Bradley Green, Redditch Worcs. B96 6RP.
 Tel: 01527.821621 Fax: 01527.821665**

Your **FARM 2000 BOILER** is a sound investment which will provide low cost heat for many years. To ensure the best use of your boiler and long service, **we recommend that you follow these instructions.**

If you have any boiler problems that cannot be answered from this instruction book, please contact **Teisen Products** direct. **Teisen Products** also supply automatic stokers and chimneys.

These instructions apply to the following **FARM 2000** boiler models; A3.5F, A5F, A6F, A6PlusF, HT25, HT35, HT45, HT50, HT60, HT70, HT80, BB144/2V, BB244/2, BB154/2V, BB254/2, BB254H/2. Much of the information given is still applicable to previous designs of **FARM 2000** boilers.

A. FUEL

FARM 2000 boilers burn such fuels as wood and straw. Efficient operation can only be achieved with dry fuel. Outputs are based upon moisture contents of 16% for straw and 20% for wood. Levels above this reduce outputs and efficiency, cause incomplete combustion (producing excess smoke), and increase ash and deposits in the boiler and chimney. Excess moisture can also cause corrosion.

STRAW - When using cereal straw, best results are obtained if it is left for some days before baling. **Straw burns better if it has been rained on!** Rain washes the potash out of the straw, returning it to the soil. However, the straw must be baled when it is **dry without dew**, and stored under cover. Lightweight-to-medium density bales burn best. High density bales do not burn so well. The extra work involved in producing dry/seasoned straw pays huge dividends in the heating season.

Boiler models HT60, HT70, HT80, and BB154/2V are approved for use in smokeless zones provided dry cereal straw is used.

Linseed, bean and rape straw are also good fuels, and have lower ash content.

Rape straw can produce unacceptable smells and we recommend that it is not used if there are nearby houses. It burns best if a cereal straw bale is added.

WOOD - Wood should be felled before spring, stored for at least a year, and be under cover by September.

Untreated wood-waste, including pallets, off-cuts etc., can be used as fuel provided it is stoked **"little and often"** otherwise instability, blow-backs and excessive smoke may be produced. Sawdust or shavings should only be burned with automatic stoking or in small quantities mixed with off-cuts.

DO NOT BURN TYRES, PLASTICS, RUBBER OR SIMILAR MATERIALS.

B. GENERAL NOTES ON SITING AND INSTALLATION

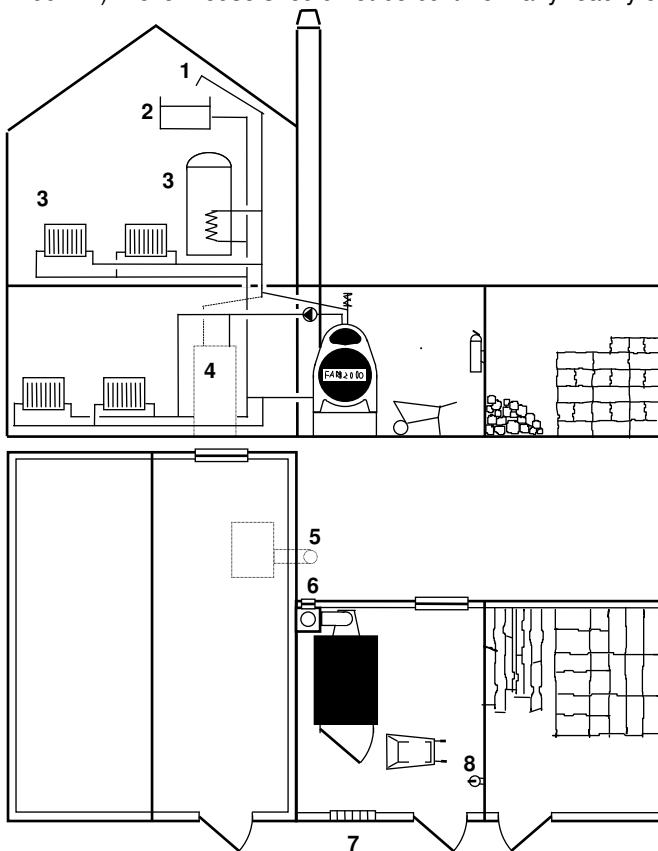
FOR DETAILS ON CHIMNEY AND PLUMBING, SEE SECTION C and D.

The following criteria apply when choosing a site for the boiler:

1. Ease and convenience of fuel handling. Fuel must be stored under cover **adjacent** to the boiler room, **not in it**.
2. The boiler should be installed external to the dwelling area.
3. Site the boiler where a suitable chimney can be erected, or an existing chimney utilised (*See Section C*)
4. The boiler should be positioned so the cold feed and open vent are protected from frost. It is preferable, but not essential in all cases, that there is a gravity heat leak (*See Section D*).
5. The boiler can be installed remote from the heated requirement, with insulated underground pipework (*See Section D*).

Boiler should be installed according to this booklet and the following;

- The boiler must be installed in a fire-proof boiler room, which should NOT be an integral part of a domestic dwelling.
- The boiler must only be installed by a competent person.
- The boiler, chimney and system should be installed in compliance with current relevant Building Regulations and B.S. Codes of Practice for solid fuel appliances, flues and chimneys
- All electrical work should be carried out to current I.E.E. Standards.
- The installation should conform to Local Authority and Water Board Regulations.
- There must be no valves in the cold feed or open vent.
- Except for exempted models, the boiler should not be installed without special dispensation in smoke control areas.
- The boiler should be under cover with adequate ventilation for the boiler at the rate of 1 sq. ft. per 250,000 BTU/hr. (0.12m² per 100 kW). Boiler house should not be built from any readily combustible materials.



1. Open Vent.
2. Cold feed and expansion.
3. Gravity circuit.
4. Existing oil/gas fired boiler (optional) (pumped circuit)
5. Separate chimney for existing boiler.
6. Access for chimney cleaning.
7. Ventilation at floor and ceiling level.
8. Fire extinguisher.

- The boiler must be on a level concrete or brick surface. Ensure the door **cannot** swing closed by gravity. For Big Bale Boilers arrange for the door to be secured whilst stoking.
- With the exception of Big Bale Boilers, the boiler should be raised by at least 300mm on a plinth to suit wheelbarrow. This makes stoking and de-ashing easier.
- There must be good access to the rear of the boiler for cleaning the flue box and chimney.
- Allow clearance in front of the boiler for tube cleaning (i.e. length of combustion chamber plus, at least 100 mm.)
- There should be no combustible material in the boiler room, which should be constructed from none-combustible materials.
- There should be a fire extinguisher and water hose accessible from the boiler and boiler room door.

NOISE LEVELS

The following airborne noise level data applies to FARM 2000 boilers; at 1m. from free blowing fan (A-weighted sound pressure level, dB(A) reading) This is given in order to comply with the European 'Machinery Directive'.

A3.5F, HT25, HT35 (G2E-120 fan)	53 dB(A),	A6plusF, HT70 (G2E-140[4μF] fan)	67 dB(A),
A5F, A6F, HT45, HT50 (G2E-120 fan)	53 dB(A),	HT80, BB144/2V, BB154/2V (G2E-160 fan)	72 dB(A),
HT60 (G2E-140[2μF] fan)	59 dB(A),	BB244/2, BB254/2, BB254H/2 ('Sodeca' fan)	64 dB(A).

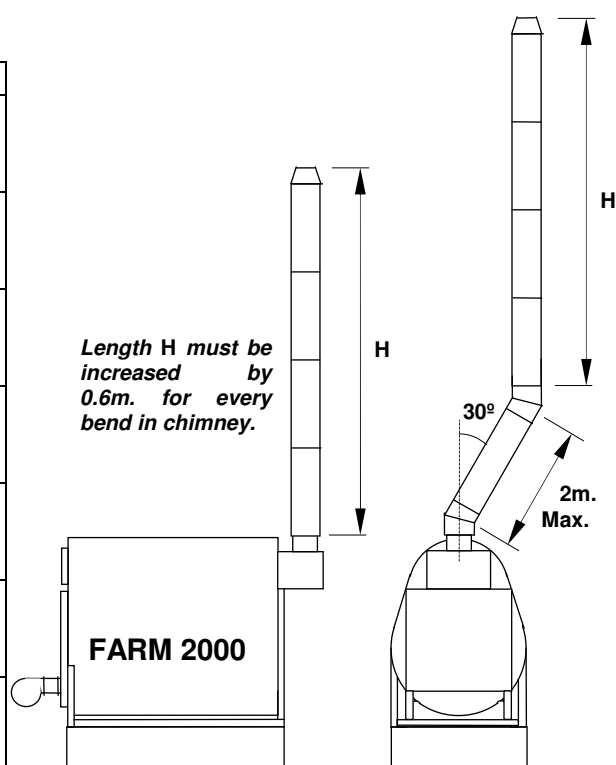
C. CHIMNEY

The boiler's efficiency and output are also dependent on a well designed chimney. The two functions of a chimney are to disperse the exhaust gases, **and** to provide adequate draught through the boiler. Failure to achieve this results in inefficient combustion, a dirty boiler and possible corrosion. It can also cause dangerous blow-backs during operation.

The chimney should rise vertically from the boiler flue spigot, with no bends or elbows, and its minimum height from this point for each boiler is shown below:

To test chimney draught (do this when boiler and chimney are warm), open the stoker door when there is a small fire in the boiler, and if smoke is emitted when the fan is switched off, then the draw is likely to be inadequate.

BOILER MODEL	MIN. LENGTH H (M)
A3.5F, A5F, HT25, HT35	5
A6F, HT45	5.5
HT50, HT60	6
HT70	7
BB144/2V, BB154/2V	8
HT80, BB244/2	9
BB254/2, BB254H/2	10



The Chimney must be higher than surrounding buildings and be insulated to the top, to prevent cooling of the flue gases.

There must be no horizontal lengths of flue pipe and, if the boiler is being connected to an existing brick chimney, this should be via a 30° elbow*; only if space does not permit should a 45° elbow* be used. If a chimney has to be routed round an obstruction use 15° or 30° elbows*. There must never be more than **two** elbows in a chimney.

Ensure that all of the chimney can be swept.

* all angles quoted to the vertical

The best chimney is sectional, insulated (min. 38mm thickness), twin wall stainless steel. This type of chimney provides a better draught than a brick chimney, and is easier and less costly to install.

If an existing brick chimney is to be used, ensure that its internal dimensions and height are adequate, it is properly insulated and can be easily swept. The connecting flue pipe should be insulated.

Chimney pots and chimney caps must not be fitted. The chimney must only serve one appliance.

STAINLESS STEEL INSULATED CHIMNEY
(can be supplied stove enamel coloured to suit)

This is not a working drawing and is for guidance only. Details of mast specification, foundation, supports and chimney should be checked by installer, taking local conditions and building regulations into account.

Ref: MIDTHERM CHIMNEYS - WIC/HT					
Internal Diameter (mm)		175	200	250	300
A	Maximum length of chimney boiler can support (m)	7	6	7	4
B	Maximum length of unsupported chimney (m)	1.7	1.7	1.7	1.7
C	Recommended max. distance between Brackets (m)	3	3	2	2
D	Maximum length of chimney above an intermediate vertical support (m)	8	8	7	6

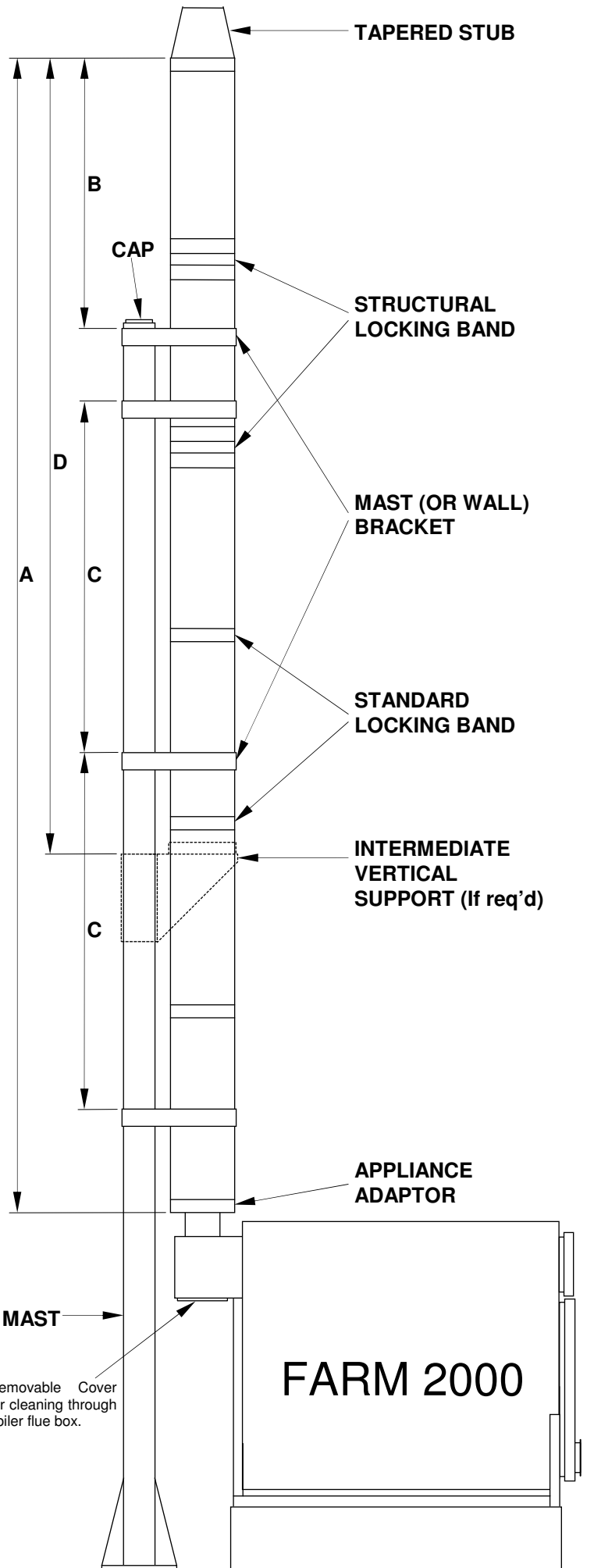
Chimney Diameter **must not be less** than the the boiler flue spigot diameter.

CHIMNEY MAST SECTION GUIDE	
Chimney Height above ground (m)	R.H.S. Section *
8.1m	150 x 150 x 8
9.1m	180 x 180 x 8
10.6m	200 x 200 x 10
11.3m	250 x 250 x 8
12.6m	250 x 250 x 12.5

*This section can be reduced in sheltered areas or if part of chimney is inside building.

If the 50 mm insulated chimney passes through a wall or ceiling, the outer skin must be at least 100 mm from any combustible material. For extra protection fit a stainless steel heat shield sleeve in front of any woodwork. **Uninsulated** (single wall) flue pipe must have at least 500 mm clearance **and** a heat shield.

Further information on chimney, mast and mast foundation available on request. See drg. 410/1

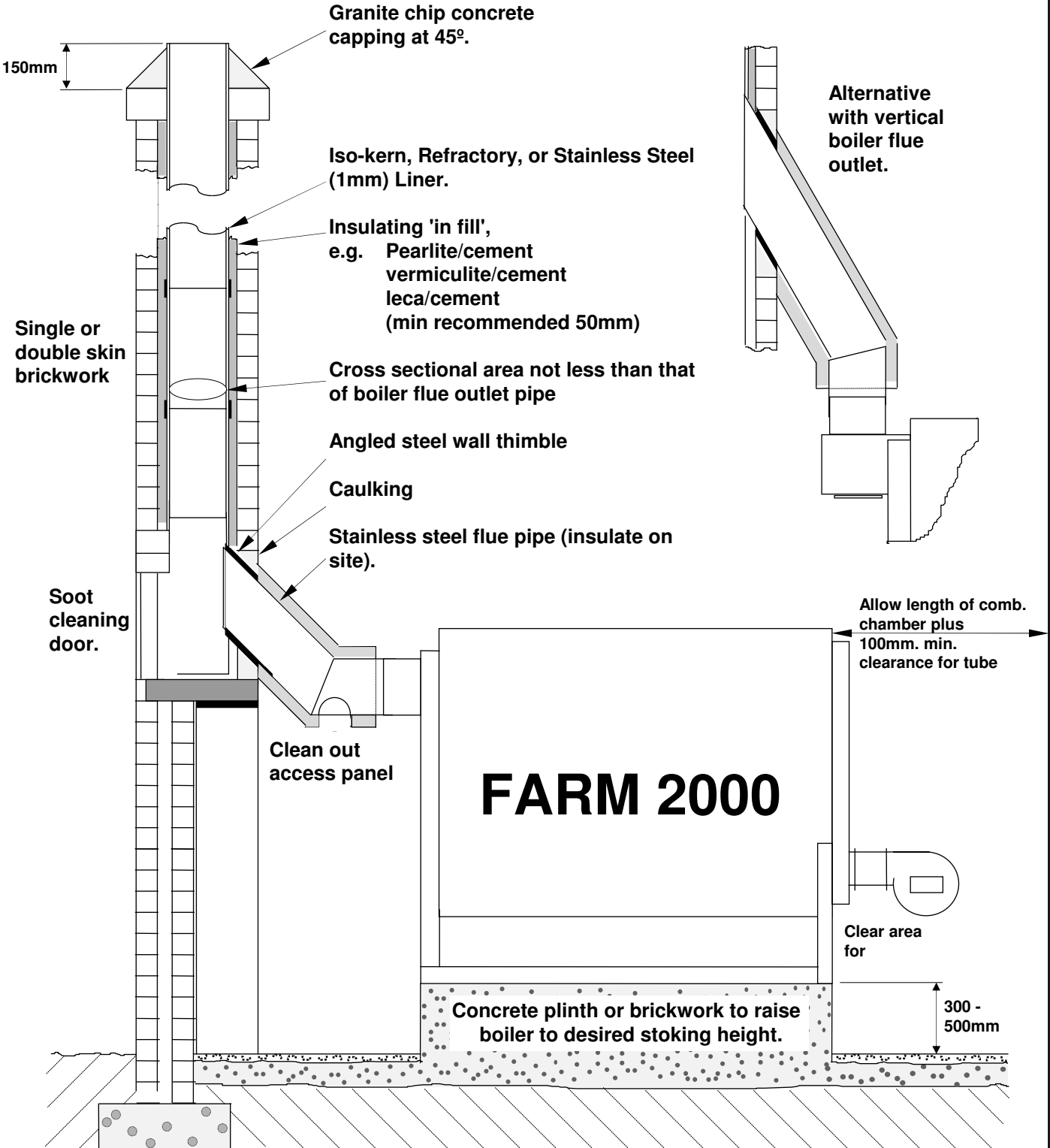
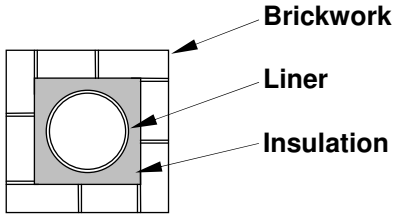


BRICKWORK CHIMNEY

NOTE:-

THIS DRAWING IS FOR REFERENCE ONLY.

FOR COMPLETE SPECIFICATION USE S.F.A.S. BOOKLET "DOMESTIC MASONRY CHIMNEYS" AND BUILDING REGULATIONS.



D. PLUMBING (Including Accumulators)

The **FARM 2000** Boiler is a Low Temperature Hot Water Boiler (LTHW), and should only be fitted to open vented, indirect heating systems. See data sheets for maximum system pressures.

In addition to the guidelines given under Section B, the following recommendations must be observed:-

- The boiler must always have its own separate cold feed and open vent pipes.
- The open vent, **which must have a continual rise**, should preferably discharge into the feed and expansion tank. In any case, the discharge height **must** be above the feed and expansion tank level.
- There should be no valves in the cold feed or open vent.

The table below shows minimum sizes of cold feed, open vent and overflow pipes.

BOILER MODEL	COLD FEED		OPEN VENT		OVERFLOW	
	Iron ¾"	Copper 22mm	Iron 1"	Copper 28mm	Iron 1"	Copper 28mm
A3.5F, A5F, HT25, HT35, HT45	¾"	22mm	1"	28mm	1"	28mm
HT50, HT60, HT70, A6F	1"	28mm	1¼"	35mm	1"	28mm
HT80, ALL BB BOILERS	1¼"	35mm	1½"	42mm	1¼"	35mm

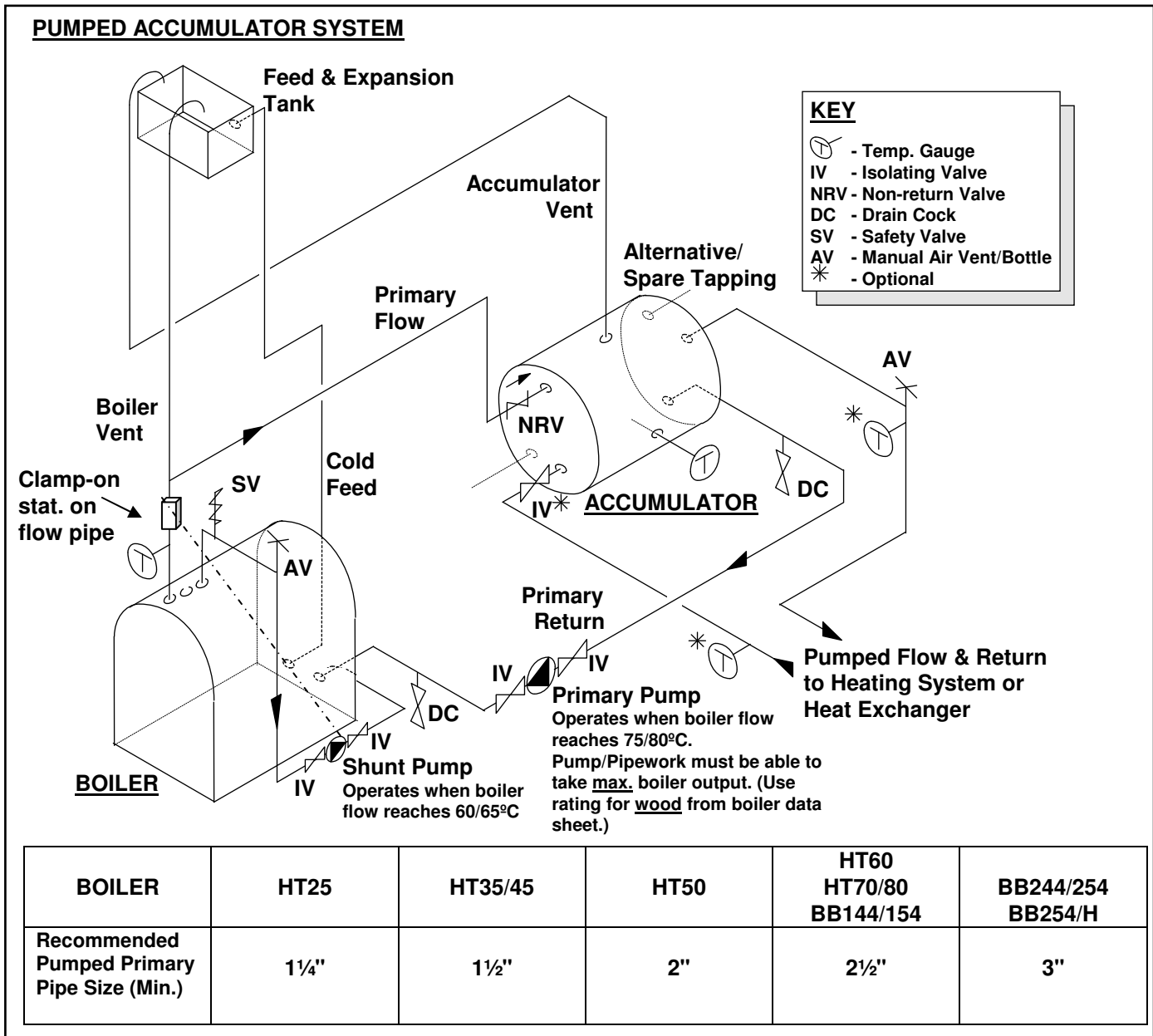
These sizes should be increased if no gravity circulation available.

- The feed and expansion tank should be capable of withstanding boiling water and preferably be of galvanised iron with sufficient capacity to allow the water in the system to expand by 3.5% **without** overflowing.
- The float valve should be fitted with a copper float to withstand the effects of overheating.
- The overflow pipe from the feed and expansion tank **must** be copper or iron.
- A safety valve must be fitted to suit the static head of water (refer BS759). The minimum discharge aperture should be 1½", and should be directed away from any passer-by. (Teisen Products can supply)
- A pumped shunt system should be included to prevent back-end corrosion, improve combustion and overall efficiency. A small domestic circulating pump can be used, controlled by a thermostat installed on the main return pipe. The thermostat should be wired to maintain the return temperature above 57°C. With accumulator systems the shunt is controlled by **flow** temperature (i.e. sensor adjacent to outlet).
- The thermostats and temperature gauge must be positioned in the boiler jacket, primary flow or shunt circuit if it is a fully pumped system. **Do not fit them in a "blind" pipe.**
- A gravity leak is not essential when straw is the main fuel. However, a heat leak is recommended when wood is the main fuel and is essential for models HT50 (290,000 BTU/hr) and upwards. The heat leak should be at least 5% of the maximum output of the boiler.

ACCUMULATOR SYSTEM **ESSENTIAL FOR ALL BIG BALE BOILERS**
Recommended for all larger boilers

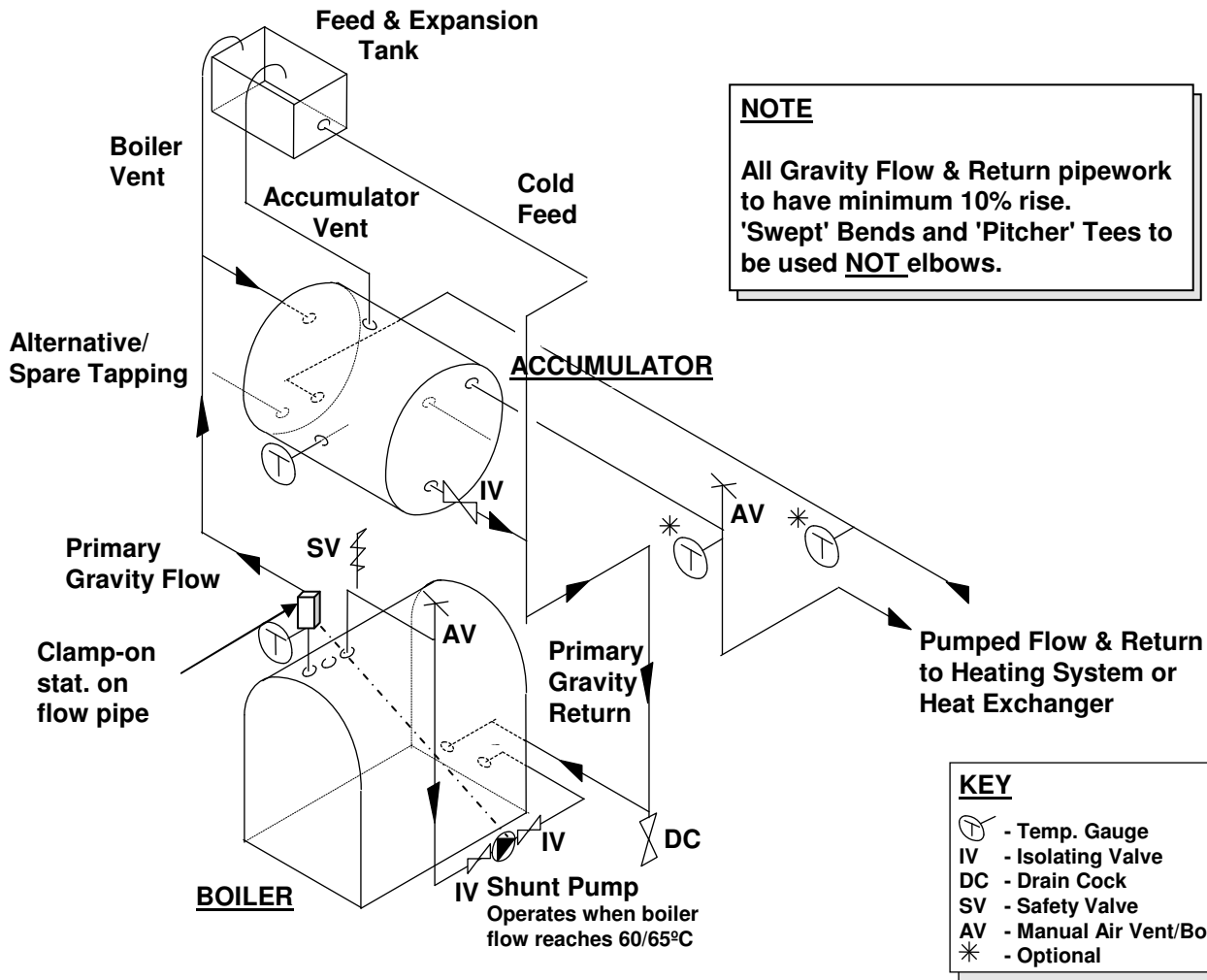
Accumulator system has the following advantages:-

- Enables boiler to operate at high combustion efficiency.
- Releases up to 25% more energy from fuel. (Thus a smaller boiler can be used.)
- Allows increased flexibility of stoking times with improved convenience i.e. you can stoke when you want to, rather than when you have to.
- Stores heat ahead of requirement (e.g. greenhouse, piggery night time heating)
- Can act as heat leak.
- Ensures cleaner combustion with lower maintenance and cleaning requirement.
- Allows possible twice per week stoking in summer.



See also Typical boiler and accumulator system/remote system (final page)

GRAVITY ACCUMULATOR SYSTEM



BOILER	HT25	HT35/45	HT50/60	HT70/80 BB144/244/154	BB254/254H
Recommended Gravity Primary Pipe Size (Min.)	2½"	3"	4"	5"	6"

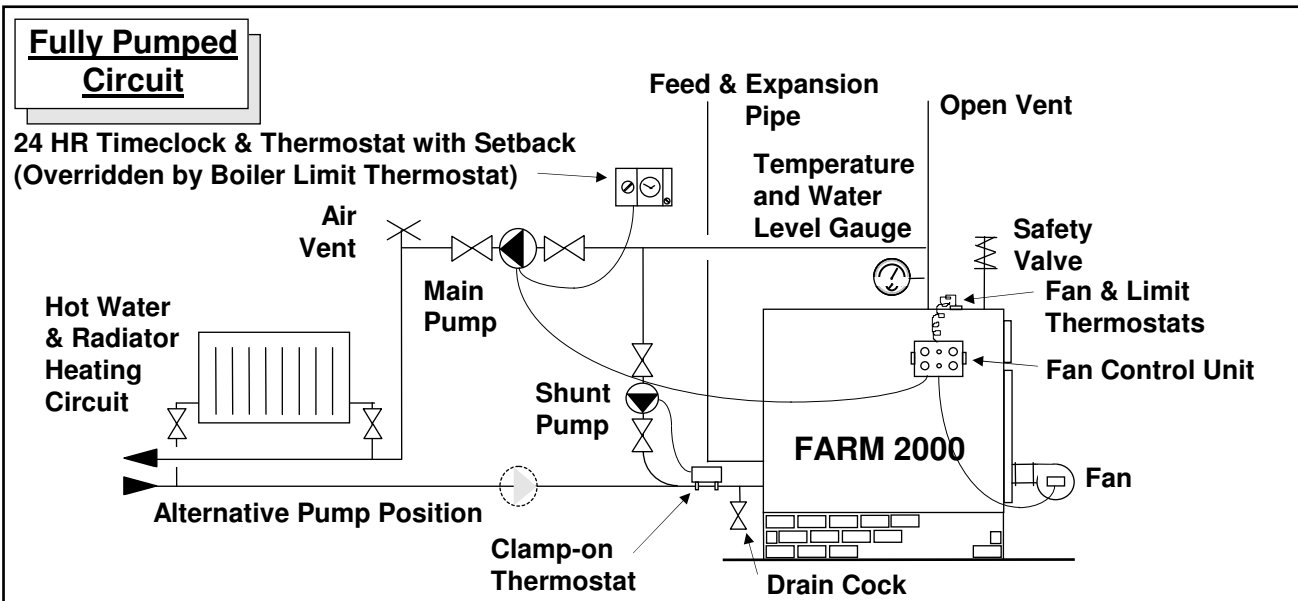
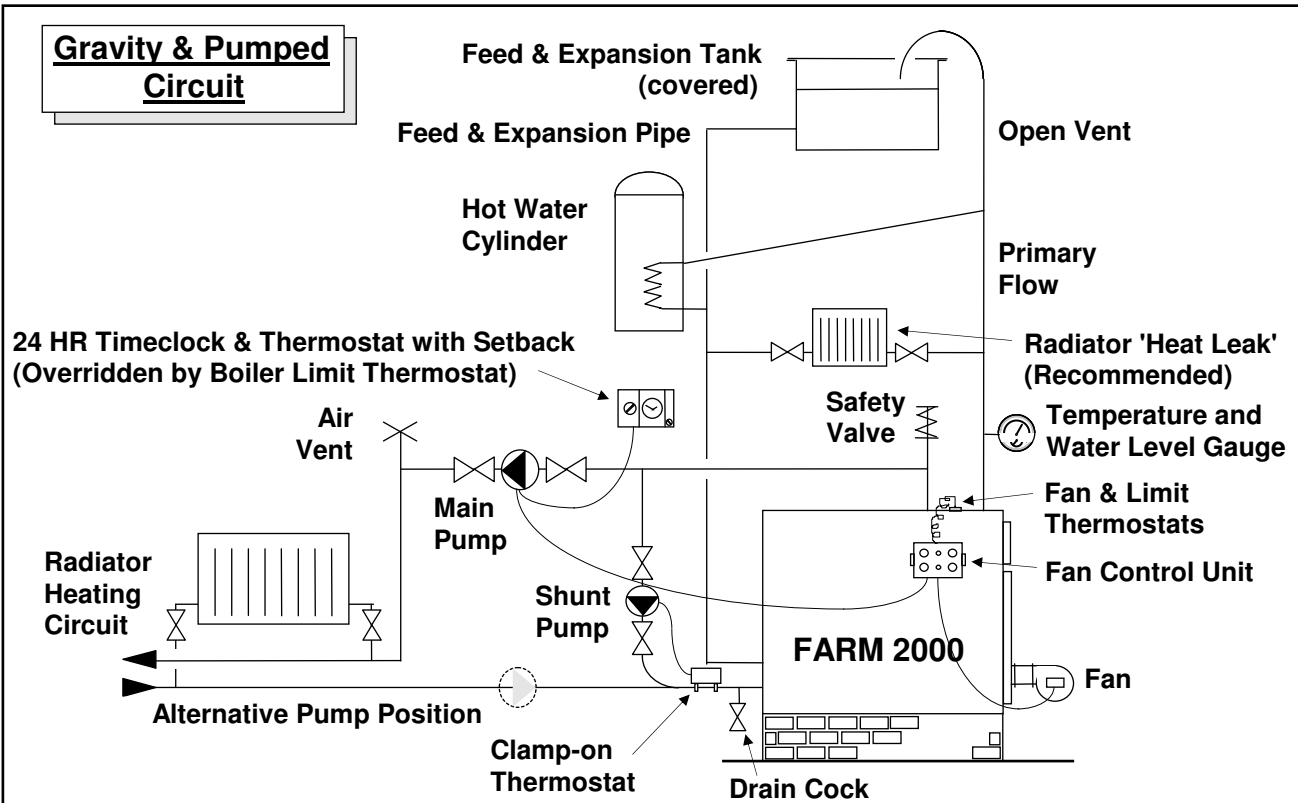
General Notes:

- Galvanised F. & E. tank capacity at least 6% of total water content. Cold fill to at least 50mm depth.
- Open vent at highest point. Boiler and accumulator **must have** open vent.
- Heat demand outlet to be at **opposite end** of tank from primary flow from boiler, and from opposite end of demand return. Return to boiler to be at **opposite end** of tank from primary flow.
- For gravity we recommend 2½" pipework for up to 400,000 BTU/hr and 3" or more for higher outputs. All pipes must be vertical or rise 10%.
- Accumulator to have minimum 150mm glass wool insulation or equivalent on all surfaces and underneath. Use wooden supports to prevent conduction.
- Recommended water capacity as big as possible. Sufficient to absorb at least half the fuel value in the boiler (1000 gallons/4500 litres stores 450,000 BTU's or 135 kWhs) e.g.
 - HT60 with 3 bales @ 50% equivalent to 200,000 BTU. Min. water capacity 500 gallons(2300 litres).
 - HT60 with wood. Min. water capacity 1000 gallons (4500 litres)
 - BB154 with straw @50% fuel capacity equals 900,000 BTU. Min. water capacity 2000 gallons (9000 litres).

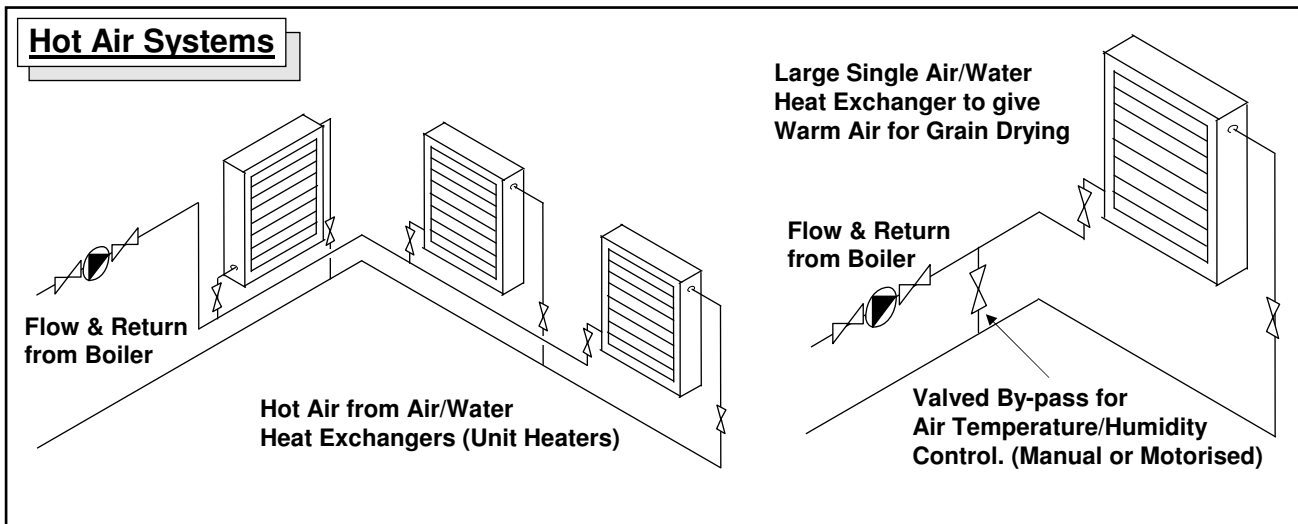
The above are min. capacities. For maximum efficiency and convenience, we recommend at least 50% larger.
- Accumulator must be raised above boiler if gravity circulation/heat leak is required.
- Boiler control thermostat should be set to approximately 85°C or above.

See also Typical boiler and accumulator system/remote system (final page)

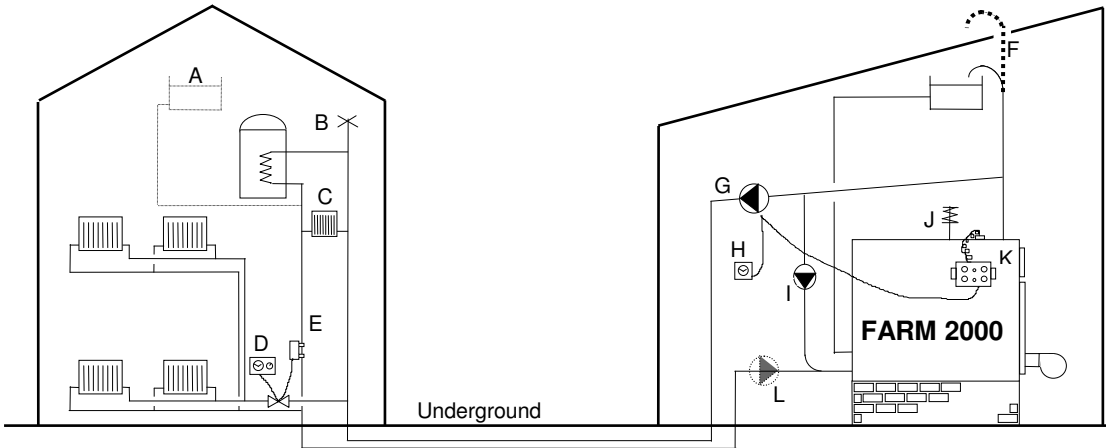
PLUMBING LAYOUTS FOR DOMESTIC HOT WATER AND CENTRAL HEATING (without Accumulator)



NOTE Thermostat & Temperature Gauge Pockets **MUST** be Fully Immersed in Water Flow.



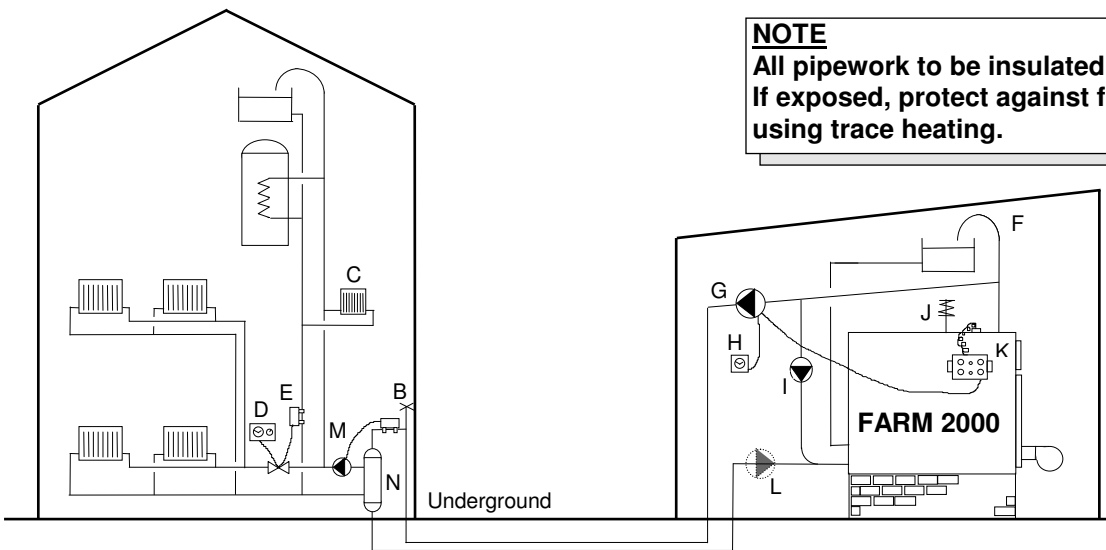
REMOTE BOILER INSTALLATION WITH SUFFICIENT HEIGHT FOR F & E TANK AT BOILER (without Accumulator)



- A.** Alternative position for feed and expansion (F & E) tank.
- B.** Air Vent.
- C.** Radiator 'heat leak'.
- D.** 24 Hr timeclock and room thermostat with set-back (Valliant) for central heating valve. (Set to heating times in H).
- E.** Limit thermostat, overrides D in the event of overheat. (Set at approx. 85°C). (May require a relay).
- F.** Open vent must be above the F & E tank.
- G.** Main pump operated by 24 Hr timeclock H, and boiler limit thermostat.
- H.** Set to run pump during normal heating times and for short periods outside heating time.

<i>e.g.</i>	01:00-01:30 Hot water circuit	05:00-10:00 Hot water and heating
	03:00-03:30 Hot water circuit	12:00-14:00 Hot water and heating
		16:00-22:00 Hot water and heating
- I.** Shunt pump.
- J.** Safety valve.
- K.** Boiler fan control unit.
- L.** Alternative position for main pump, on return provided cold feed is between pump and boiler.

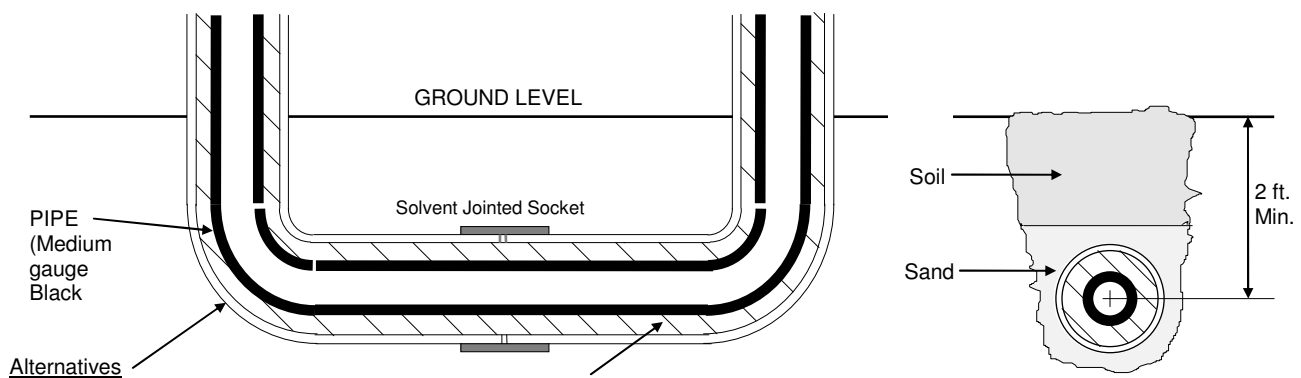
REMOTE BOILER INSTALLATION WITH INSUFFICIENT HEIGHT ABOVE BOILER



NOTE
 All pipework to be insulated.
 If exposed, protect against frost using trace heating.

- M.** Pump to operate when primary circuit temperature is above 60°C.
- N.** Heat Exchanger.

METHOD OF INSULATING AND LAYING UNDERGROUND PIPEWORK



- Alternatives**
1. Plastic Rainwater/Soil Pipes.
 2. Un-slotted plastic Land Drain Pipes. (2. will require swept bends to be used in the water pipework.)

Closed Cell Pipe Insulation.
 Type 'Armaflex AF' or 'Tubolit Plus'.
 Min Wall Thickness 19mm.

NOTE - Do **NOT** concrete in
 - Make allowance for expansion of pipes
 - Insulation **MUST** be kept dry

E. FAN CONTROL UNIT
(Wiring Diagram P.22, Fitting Template P.23.)

It is recommended that all electrical components (e.g. pumps, thermostats, control box etc.) are wired from the same source of supply.

FAN CONTROL UNIT (TS Control Box)

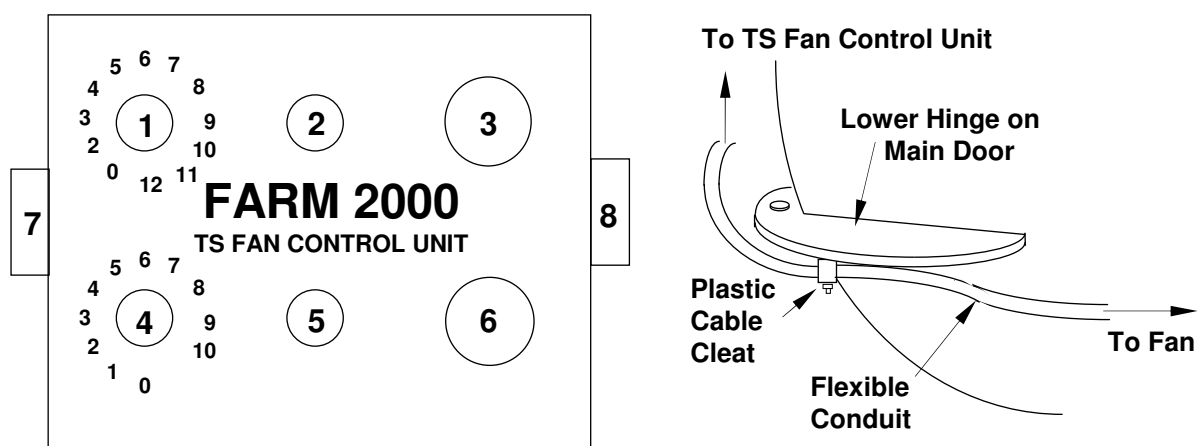
The TS control box should be fitted on the same side of the boiler as the door hinge. Use template provided (on back page) and drill four 3.5mm diameter holes through the outer casing.

Note: The control box should be located at least 30cms back from the boiler front plate.

The box must be positioned so that the uncoiled thermostat capillaries reach the ½" socket on top of the boiler. On BB models there are sockets on each side of the boiler, one for the thermostats, the other for the temperature gauge. See diagrams at bottom of page 13.

To attach the control box, open the lid, position the base over the four 3.5mm holes in the boiler casing and secure in place using four No. 8 self tapping screws provided.

With the control box in position, secure the conduit to the boiler casing using the cable cleats and No. 8 self tapping screws provided; drill the casing where required. Ensure that any excess conduit is kept clear of the floor using the fittings provided under the lower hinge as shown. Surplus conduit should be coiled on the side of the boiler.



1. MAIN TIMER (AND AUXILIARY TIMER) (See Section G)

This limits the total **accumulated running** time of the fan, and should be set to suit the type and quantity of fuel loaded. The operating range is from 2 to 12 hours and as an approximate guide it should be set to one hour for each standard bale of straw loaded. Set the main timer as **low** as possible to prevent cooling of the boiler. Depending on the fuel being used, the boiler will usually produce its output for at least twice as long as the main timer setting.

On most boilers there is also an auxiliary timer which is adjustable from 2-200 minutes. This unit is accessible inside the main box; it is normally set at approximately 30 minutes and cuts off or reduces the secondary air after a pre-set time, by operating a solenoid. See note on page 15 under 'HOW IT WORKS'. On BB models the timer is linked to the speed control and the specific instruction sheets should be consulted. On BB models with Sodeca fans the air volume is controlled manually with a damper.

2. TIMER OFF (GREEN LIGHT)

Illuminates when the time period set on the main fan timer has elapsed.

3. TIMER RESET

Resets both the main fan timer and 200 minute auxiliary timer (when fitted). This button must be held in for 2 seconds each time the boiler is stoked with fuel.

4. **FAN SPEED**

Enables the output of the fan to be adjusted to suit the different fuel types and ash level. On certain models this control only becomes operational after the auxiliary has 'timed out'. On straw fired boilers it is usually left on full speed. In general the fan should run at its highest speed but without pressurising the chamber. Usually for the first 3 -4 days after ash removal, speed is reduced.

5. **WATER TEMPERATURE (AMBER LIGHT)**

Illuminates when the temperature of the water reaches the level set on the control thermostat, and the fan switches off.

6. **FAN ON**

This switch should be on whenever the boiler is operating and **must** be switched off when the **main** door is opened. However, the fan must remain **on** if the **small door** is re-opened after light-up.

7. **CONTROL THERMOSTAT**

Controls the temperature of the water in the boiler - this must normally be set at approximately 82°C, or approximately 90°C with an accumulator system.

8. **LIMIT THERMOSTAT**

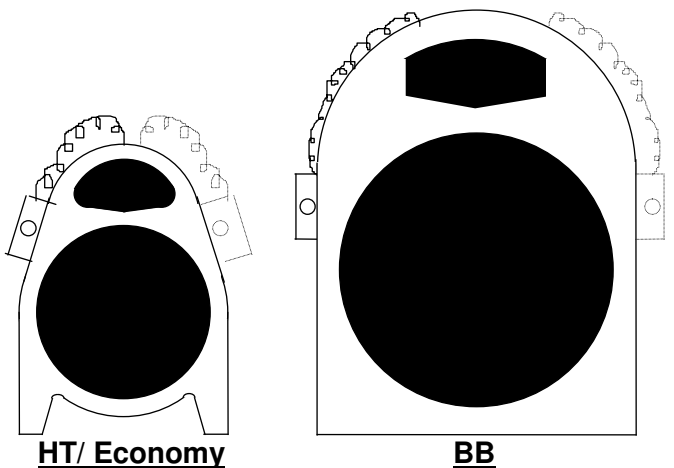
Limit Thermostat provides switched live output on connector block C when set temperature achieved.

- a) when used to operate circulating pump from accumulator, set at approx. 75°C
- b) when boiler used without accumulator, can be set at 60°C to operate central heating pump, or set at 90°C to operate as a heat dump if separate pump control fitted (i.e. programmer or thermostat etc)

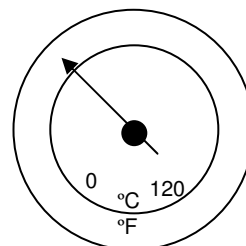
THERMOSTATS AND TEMPERATURE GAUGE

Remove the brass pocket from the thermostat probes and insert it into the ½" tapping on top of the boiler. On 'BB' Models a ½" tapping is provided on the side. When the pocket is in position, carefully uncoil the thermostat capillaries and insert the probes into the pocket .

Note *Capillaries must not be kinked or bent through a radius less than 5mm.*



The temperature gauge should be fitted into a ½" socket/ tapping on the primary flow pipework. The brass pocket with the gauge is screwed into the pipework, and the gauge fitted into this pocket.



F. ASSEMBLING THE BOILER COMPONENTS
(See Section E for the TS Fan Control Unit.)

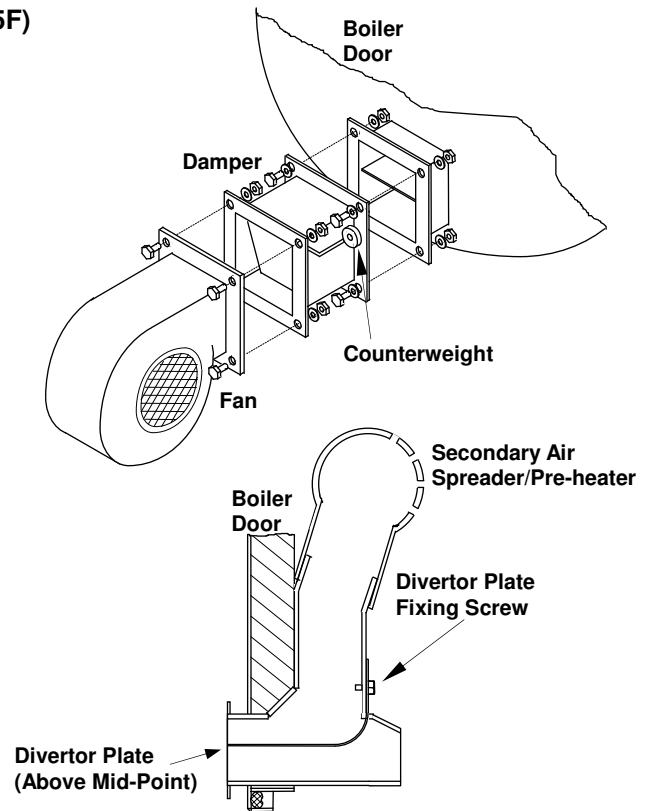
BOILERS WITHOUT SOLENOID MECHANISMS (HT25, HT35, A3.5F)

FITTING:

Using the M6 x 16mm screws, nuts and washers provided, attach the fan to the damper and fit the assembly onto the flange on the door.

Adjustments

1. Position the secondary air diverter plate slightly above the mid-point of the duct. The fixing screw, inside the door should be in the lower of the 3 holes in the diverter plate.
2. Position the counter-weight to ensure the damper closes when the fan is off (i.e. it is not lifted open by the draught of the chimney) .

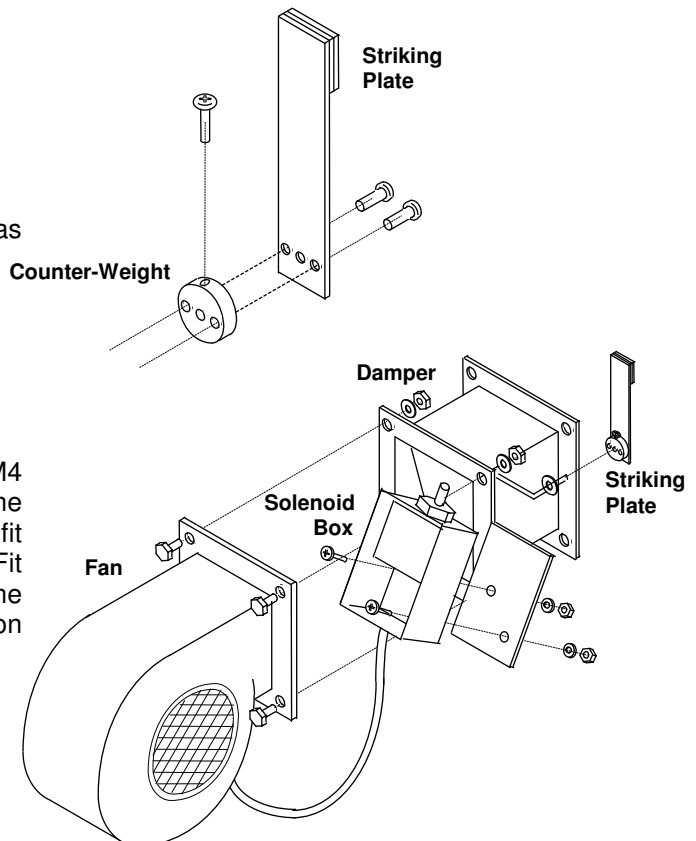


BOILERS WITH SOLENOID MECHANISMS (HT45, HT50, HT60, HT70, HT80, A5F, A6F)

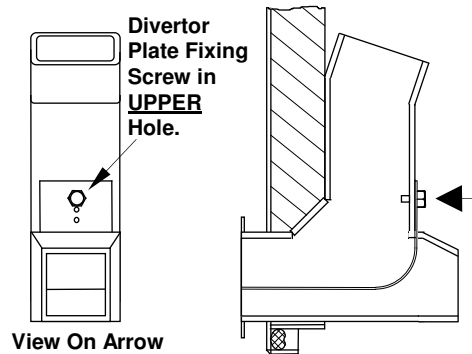
Generally to obtain good combustion with straw, the damper and diverter are set to give maximum initial secondary air but for a limited period, and for wood, less initial secondary air is required but for a longer period.

FITTING:

1. Assemble the striking plate and counter-weight as illustrated using the M4 screws provided.
2. Fit the solenoid box onto the damper using M4 screws, nuts and washers, and the fan onto the damper using M6 screws, nuts and washers. To fit the solenoid box, the lid will need to be removed. Fit the striking plate to the damper arm by tightening the M4 screw in the counter-weight onto the flat portion of the damper arm.



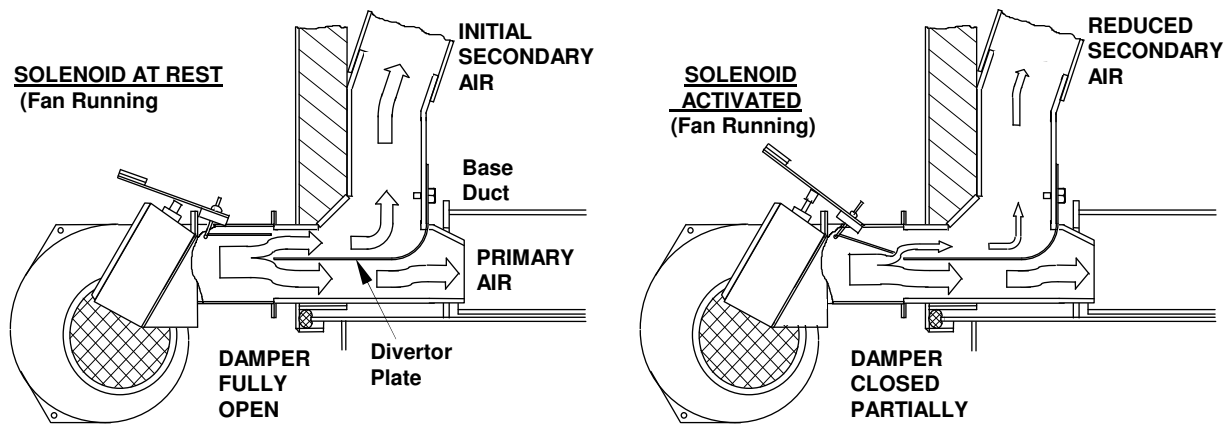
- Secondary air divertor plate to be fitted as shown.



- Fit the assembled fan system onto the flange on the door using the M6 screws, nuts and washers.

HOW IT WORKS

The function of the damper and solenoid mechanism is to reduce the volume of secondary air flow after a pre-set time. This time is set using the Auxiliary Timer inside the TS Control Box.

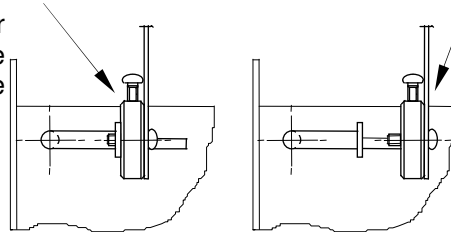


Adjustments :

- To adjust the flow of secondary air into the boiler after activation of the solenoid, position the striking plate on the damper arm as illustrated.

Against STOP on Arm

Flush with end of Arm



Generally, moving STRIKING PLATE assembly further from the STOP, allows more Secondary Air to flow after the Solenoid has activated.

STRAW

WOOD

- Approximate time * prior to activation of solenoid (Auxiliary Timer).
-

BOILER	STRAW	WOOD
HT45, HT50, HT60	40 mins.	60 mins.
HT70, HT80	60 mins.	100 mins.
A5F, A6F	40 mins.	60 mins.

* If smoke level is increased when the solenoid is activated, increase time setting.

Note – The auxiliary timer is set for 2 minutes when supplied, and must be re-set to the above settings at commissioning.

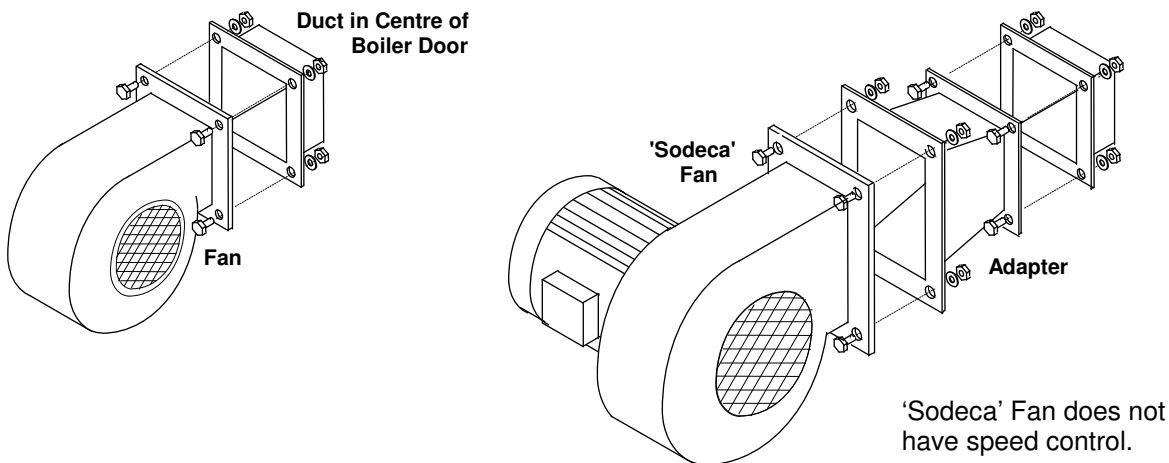
BIG BALE BOILERS WITH VEE DAMPERS e.g. (BB144/2V, BB154/2V, optional on BB244/254/H)

These boilers burn single round bales with a high level of efficiency. The BB154/2V is approved for use in smoke controlled areas.

A separate leaflet is included with boilers of this type and should be referred to in conjunction with this standard instruction. (Ref. BB154/2V 9/93, 16a, 16b, 16c, 16d. AUXILIARY INSTALLATION AND OPERATING INSTRUCTIONS FOR FARM 2000 BOILERS FITTED WITH VEE DAMPER SYSTEMS.)

DOUBLE BIG BALE BOILERS (BB244/2, BB254/2, BB254H/2)

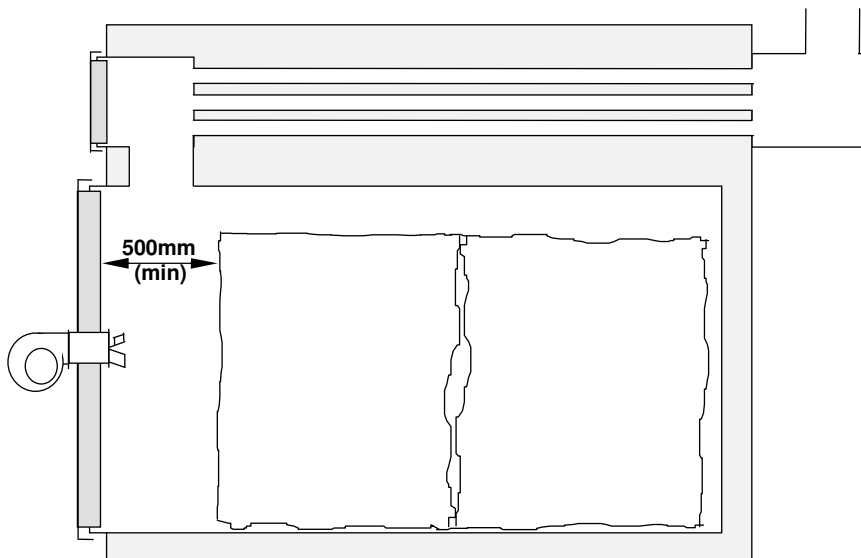
The fan should be fitted to the duct in the centre of the boiler door, using screws and nuts provided. If the boiler is supplied with a "Sodeca" fan (large blue fan with conventional external motor) then an adapter/transition duct is fitted between the fan and the boiler door.



On charging and lighting the boiler (and re-setting the Fan Control Box) the speed of the fan is variable for the period set on the auxiliary timer fitted inside the control box. To reduce the likelihood of 'instability' the speed is usually set slow (approx. 7- 8 on Speed Control) for the initial period of approximately 20 minutes. If maximum speed is required all the time, then simply leave the speed control on maximum. This will give better combustion provided there is adequate space between the boiler door and the bale.

BIG BALE BOILERS MUST BE FITTED INTO ACCUMULATOR SYSTEMS, OR SYSTEMS HAVING A HEAT LOAD WHICH CAN ABSORB THE TOTAL OUTPUT OF THE BOILER CHARGE.

BIG BALE BOILERS ARE NOT GENERALLY RECOMMENDED FOR BURNING WOOD.



G. COMMISSIONING AND ROUTINE OPERATION OF THE BOILER

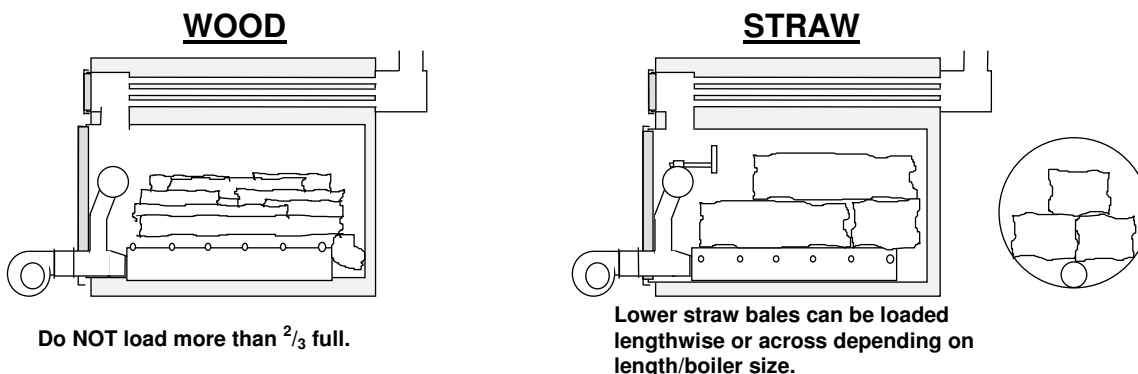
IMPORTANT NOTE: BEFORE FIRING BOILER, BLOW WARM AIR ONTO THE REFRACTORY SIDE OF THE DOOR FOR 3 – 4 HOURS. FOR FIRST “LIGHT-UP” CREATE SMALL FIRE AT THE BACK OF THE FIRE CHAMBER USING NATURAL DRAFT FOR APPROX. 30 MINUTES, (i.e. SMALL STOKER DOOR OPEN), i.e. do not expose door to intense heat at first light-up. See separate additional notes for operating Big Bale Boilers (BB)

The boiler should only be fired when there is sufficient heat demand to ensure that the fan runs for **at least** 60 minutes before reaching temperature and cutting out, even if this means allowing the boiler temperature to drop to 55°C. Insufficient initial fan running time causes condensation, tarring and possible corrosion. Straw should **ideally** only be re-loaded when there is **little or no** fire in the boiler. (This does not mean the boiler is cold, it should still be around 55/60°C). Even if the straw re-ignites from the back, always re-light at the front. This ensures that the straw burns from the front (provided it is re-lit) thereby producing clean combustion (i.e. minimal or no smoke).

1. The system must be completely filled with water and all pumps working correctly.
2. Check the base/air duct (where fitted) is correctly located in the combustion chamber.
3. Set the control thermostat to approx., 82°C. (When testing the system on the first day, set it to 65°C. When it reaches this temperature and all is well, turn it up to 82°C.)
4. Check that the fan damper operates freely and opens fully.
5. Set the boiler flue damper to fully open.
6. Before lighting the fuel in the boiler, check that sufficient primary and secondary air is available inside the combustion chamber (check through the little stoker door). On boilers fitted with solenoids (HT45/50/60/70/80, A5F/6F) set the auxiliary timer to its minimum and switch on the fan. There should be a good draught of air from the holes on the air spreader, and when the solenoid is activated by the timer, this air flow should be substantially reduced. On boilers without solenoids (HT25/35, A3.5F) there should be a good flow of secondary air at all times.
7. **IMPORTANT ! Reset the auxiliary timer from 2 minutes to required time. Guidance on page 15.**
8. When wood is used, the fan speed can be reduced to approximately 7 - 8. The fan should not supply more air than necessary - excessive air increases fuel consumption and cools the boiler. However, insufficient air (or poor chimney draught) will cause tarring. When using straw, **for the first 2 - 3 days after cleaning out, set at a slower speed, approximately 6 - 7**, before setting at full speed, 10.
9. Depending on fuel load, position the fan timer switch to the length of time the fan is required to operate. As a guide, when using the HT60, set to 1 hour for every standard bale of straw or 50lbs. of wood, whereas in a Big Bale boiler where high outputs are required it should be set to 4 - 5 hours for every 500lbs. of fuel. The aim is to ensure the fuel is burned away and the fan has stopped running for at least 2 - 3 hours before re-loading. The optimum setting is usually found within 2 - 3 days.
10. Having loaded the boiler (see drawing) with fuel, close the main door and start the fire at the front of the combustion chamber, through the small stoker door/flap. Do not burn straw and wood together. For maximum efficiency with wood, stoke 2 - 3 times/day. Do not overfill the boiler. This will cause 'smokey' combustion. Minimum clearance between straw and door 350mm (500mm on BB Boilers).

Maximum standard straw bale capacity:

HT50 - 2 bales, HT60 - 3 bales, HT70 - 4/5 bales, HT80 - 5/6 bales.



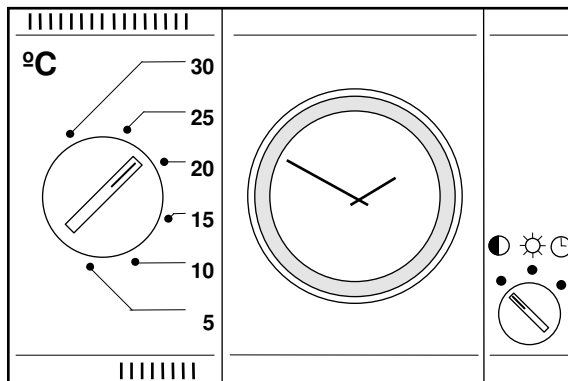
For summer use/periods of low output put less fuel in boiler. Do NOT allow to idle for long periods with boiler full of fuel.

11. Before starting the fan leave the small door open for a short time until the fire is established, then switch on the fan, press the timer reset button and then close the small door. ***It is essential to ensure good flame establishment before starting the fan.*** This may take longer with wood and with a cold chimney. Keep a check on the water temperature. For fuel that "gasifies" quickly make sure the fire is never starved of air to prevent blowbacks.
12. When the required water temperature is reached, the fan switches off and the 'water temperature' neon illuminates. As the boiler cools, the fan restarts and the fire is re-activated. (The boiler should not be fired unless a good initial burn period can be achieved. On boiler models HT25, HT35, HT45, HT50, HT60, A3.5F, A5F, and A6F, this should be ***at least 60 mins., preferably longer,*** and on models HT70, HT80, and all BB Boilers, this should be ***at least 120 mins., preferably longer.***) This cycle continues until the time period set on the main timer has elapsed. The fan then switches off and the 'timer off' neon illuminates. The temperature will gradually fall from 80°C to around 60°C.
13. The flue damper should remain fully open most of the time. It is possible to make fuel savings by throttling the damper down but this should only be done **after** the fuel has burned for at least 3 hours and must **not** cause pressurisation of the combustion chamber. The damper **must** be opened again when the boiler is reloaded. ***If in doubt leave it open all the time.***
14. **IMPORTANT** When stoking/re-lighting the boiler with fuel that quickly re-ignites, whether through the main door or small stoker door, it is advisable not to close the small stoker door before starting the fan, i.e. *open the small stoker door as you close the main door, allow the fire to establish with good flame formation, start the fan, press the green button to re-set the secondary air and then quickly close the small stoker door.*

SAFETY NOTE:

- ***Before opening the main door always switch the fan off.***
- ***HOWEVER, the small stoker door/flap should not be opened after firing unless the fan is running. Failure to do this can result in a sudden ingress of air which can cause blow-back.***

H. 24 HOUR THERMOSTATIC CONTROL WITH 5°C NIGHT SET-BACK



For every 1°C above 20°C that a house is heated, fuel consumption increases by 6%.

It is uneconomical (and uncomfortable) to overheat your house, particularly during the night and TEISEN PRODUCTS supply a controlling thermostat with time clock which is fitted in the house to regulate the required temperature by controlling the water circulation (**not the fan**).

The ideal temperature control is a room thermostat with 24hr. timeclock and set-back facility. This lowers the pre-set temperature by 5°C (or more) automatically at required times during the day or night. In this way the structure of the house does not cool and a comfortable temperature is quickly re-established.

The room thermostat should be wired to the main circulating pump, or if a fully pumped system is used, to a motorised valve (see lay-outs). The boiler will usually feed the domestic hot water and primary system, on a continuous timed system.

For additional savings at night, on a fully pumped circuit, the main pump and/or shunt pump can be wired to a separate time clock with intermittent operation (e.g. pump operated for 15 minutes every hour.)

I. SAFETY

1. The boiler room must be kept swept clean and free from fuel and combustible material. **A hose and fire extinguisher must be available at all times between the boiler and the exit from the boiler room.**
2. **NEVER** leave the boiler unattended when the combustion chamber door, stoker door or flap is open whilst it is alight.
3. Do not allow children into the boiler room.
4. Always take care when opening either the main or stoker door/flap. Stand back and to one side; **do not peer into the combustion chamber.**
5. Ensure that the **fan is operating** when opening the small stoker door. **Do not** open within one hour of stoking the boiler, and **do not** open if there has been a failure in the power supply.
6. **Always** switch the fan off when opening the main boiler door.
7. When the control thermostat switches off the fan, the output of the boiler is reduced to a minimum; this should prevent overheating and the limit thermostat should switch on the main pump if the boiler still produces too much heat. On boilers without a limit thermostat, where overheating occurs, turn on the heating system and/or turn on the hot taps to cool the system. If necessary extinguish the fire using sand, soil or damp gravel - **do not use water.**
8. If water is lost from the system and the boiler while it is still hot **DO NOT TOP IT UP** - this could result in an explosion. Wait until the boiler has cooled down and call in a heating engineer.
9. The boiler is designed to operate at a water temperature of 80/85°C. It can be operated at up to 90°C.
10. The boiler must be fully drained if left in an exposed frosty condition unlit.
11. When cleaning ash out of the boiler a suitable dust mask should be worn. Dampen down with water if necessary. Take care that hot ash is disposed of safely.
12. When loading a Big Bale Boiler an adequate water/fire hose should be available to extinguish any fire that may occur if, for example, the tractor stalls.
13. Make sure the door is fastened open during stoking, so it cannot swing closed inadvertently.
14. Ensure that the chimney, flue box, heat exchanger tubes and area above the combustion plate are always kept clean. Failure to do this can cause a build up of pressure and possible blow-back when the door or stoker door/flap is opened. In certain circumstances it could even lead to an explosion.

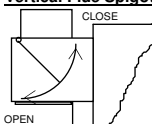
The illustrated safety advice label is fitted on the boiler. If it has been removed or is illegible or damaged, then contact **Teisen Products** for a replacement.

SAFETY NOTICE
(in compliance with European Machinery Directive)

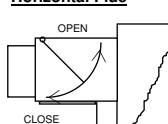
This boiler should only be operated by a competent person, familiar with the instruction book.

1. DO NOT leave boiler doors open if boiler is firing. This can cause a fire hazard.
2. Care should be taken when opening the boiler doors. Always open slowly.
3. DO NOT open small stoker door unless fan is operating. However, switch fan OFF when opening main door.
4. DO NOT open small stoker door in the event of power failure.
5. Beware of possible blow-back when opening small stoker door. DO NOT stand in front of stoker door when opening; stand back and to hinge side.
6. DO NOT peer closely into boiler.
7. Always close doors securely.
8. DO NOT STORE COMBUSTIBLE MATERIAL IN BOILER HOUSE.
9. Heat exchanger tubes, flue box and chimney must be kept clean.
10. Ensure flue damper is fully open when opening boiler doors.

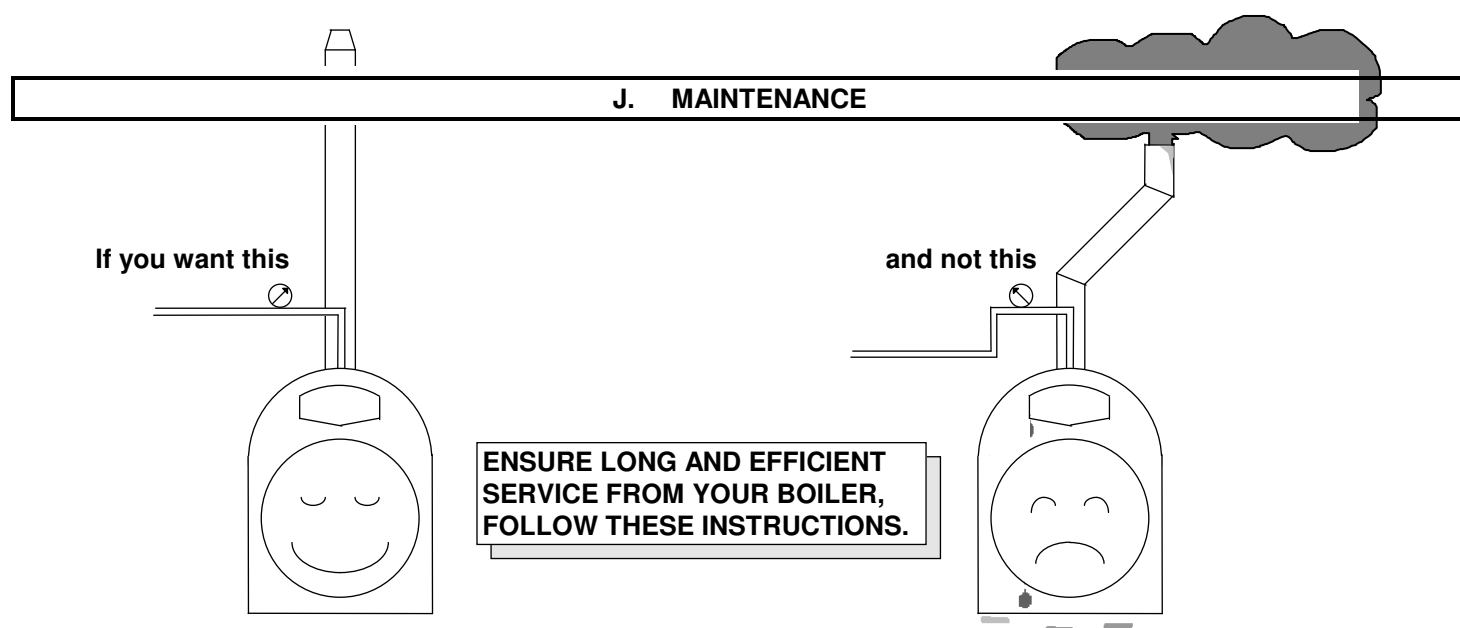
Vertical Flue Spigot



Horizontal Flue



CAUTION: Flue box can become very hot. Combustible material and electrical wiring must be at least 500 mm. from flue box.



Combustion Chamber

Ash should be removed regularly from the combustion chamber. Ash builds up at a decreasing rate, and with straw it should be totally cleared every 7-10 days; when using wood every 2-3 weeks is usually sufficient. A thin layer of **dry** ash can be left to improve combustion efficiency. When clearing the ash, check that there is no ash in the base and air duct (if fitted) and that all holes are clear. Clean any deposits from combustion chamber walls. Dampen any hot ash before removing it.

With Big Bale Boilers it is particularly important to remove **all** the ash regularly. Damp ash left in a boiler will cause corrosion.

When the boiler is operating, the temperature of the water jacket should always be kept above 60°C. The control thermostat should be set at 80/82°C. This will ensure minimal deposits within the combustion chamber and heat exchanger tubes. If the boiler operates at temperatures below this, condensation occurs leading to reduced efficiency, increased cleaning frequency and possible problems with boiler corrosion. The hotter the water temperature, the cleaner the boiler !

Combustion Plate (Economy Boilers only)

Where a combustion plate is fitted to the upper part of the combustion chamber it is important to ensure that the upper surface of this plate is kept clean. For cleaning purposes the combustion plate can be slid forward and removed.

Heat Exchanger Tubes

Inspect and clean the heat exchanger tubes regularly; the frequency of cleaning will vary from 1-3 weeks depending upon the fuel. Cleaning the tubes is easier if carried out at regular intervals and when the boiler water jacket is at 70°C or above.

Light deposits can be removed by the wire brush. For heavier deposits use the scraper, rotating it 180° to pull the deposits to the front where they will drop into the combustion chamber. When using the scraper, clean in stages working towards the flue box.

Flue Box & Chimney

The flue box must be inspected and cleaned out regularly - preferably at monthly intervals, using a vacuum cleaner. The chimney should normally be cleaned 2 - 3 times per year. Pay particular attention to the chimney after prolonged periods at low outputs, i.e. before the winter season begins. If the chimney is allowed to become dirty or partially blocked the resultant decrease in draught will impair combustion efficiency and can, in certain circumstances, cause blow-backs or even a small explosion!

Use a **stiff** polypropylene brush for cleaning stainless steel chimneys (available from **Teisen Products**.) If the chimney and flue box are not kept clean, corrosion can occur.

Fan and Fan Damper

Isolate the fan from the mains and inspect the fan impeller when required. To clean the blades remove the fan guard and carefully brush away deposits with a small brush. If the boiler is operating in a dusty environment the fan should be cleaned more frequently.

Inspect the inside of the fan damper and air ducting at regular intervals; remove any deposits and scrape the sides clean. It is essential that there is always adequate secondary air. Use a counter-sink drill occasionally to clear the holes on the air spreader.

Boiler out of operation (i.e. Summer)

If the boiler is not being used, thoroughly clean out the combustion chamber and heat exchanger tubes and switch off the mains supply to the control unit. Allow the combustion chamber to be ventilated by leaving the stoker door/flap slightly open and the flue damper fully open. If ash is allowed to lie in the boiler for too long, corrosion can occur.

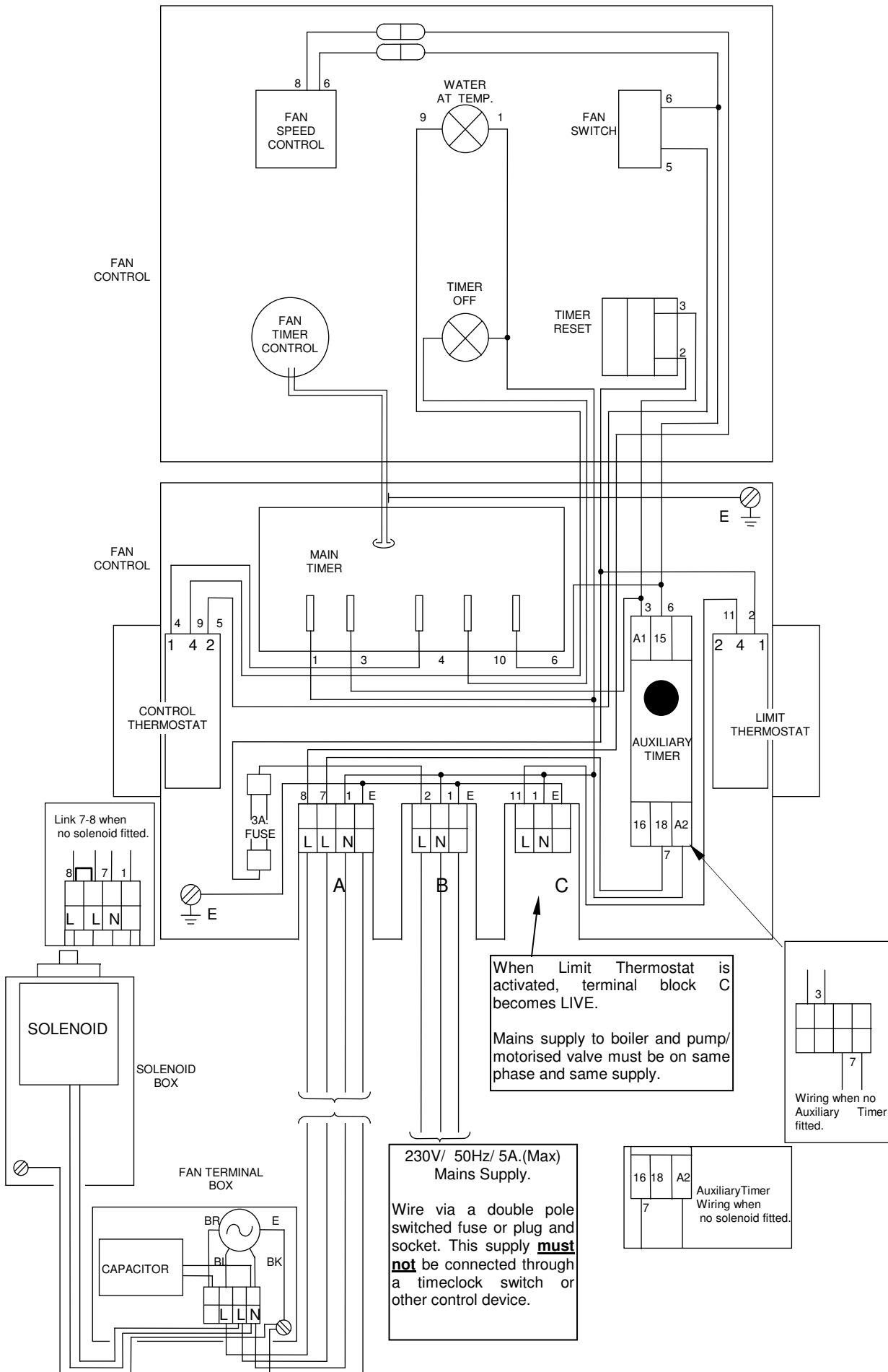
Make sure the boiler is isolated from any source of warm water when not in use.

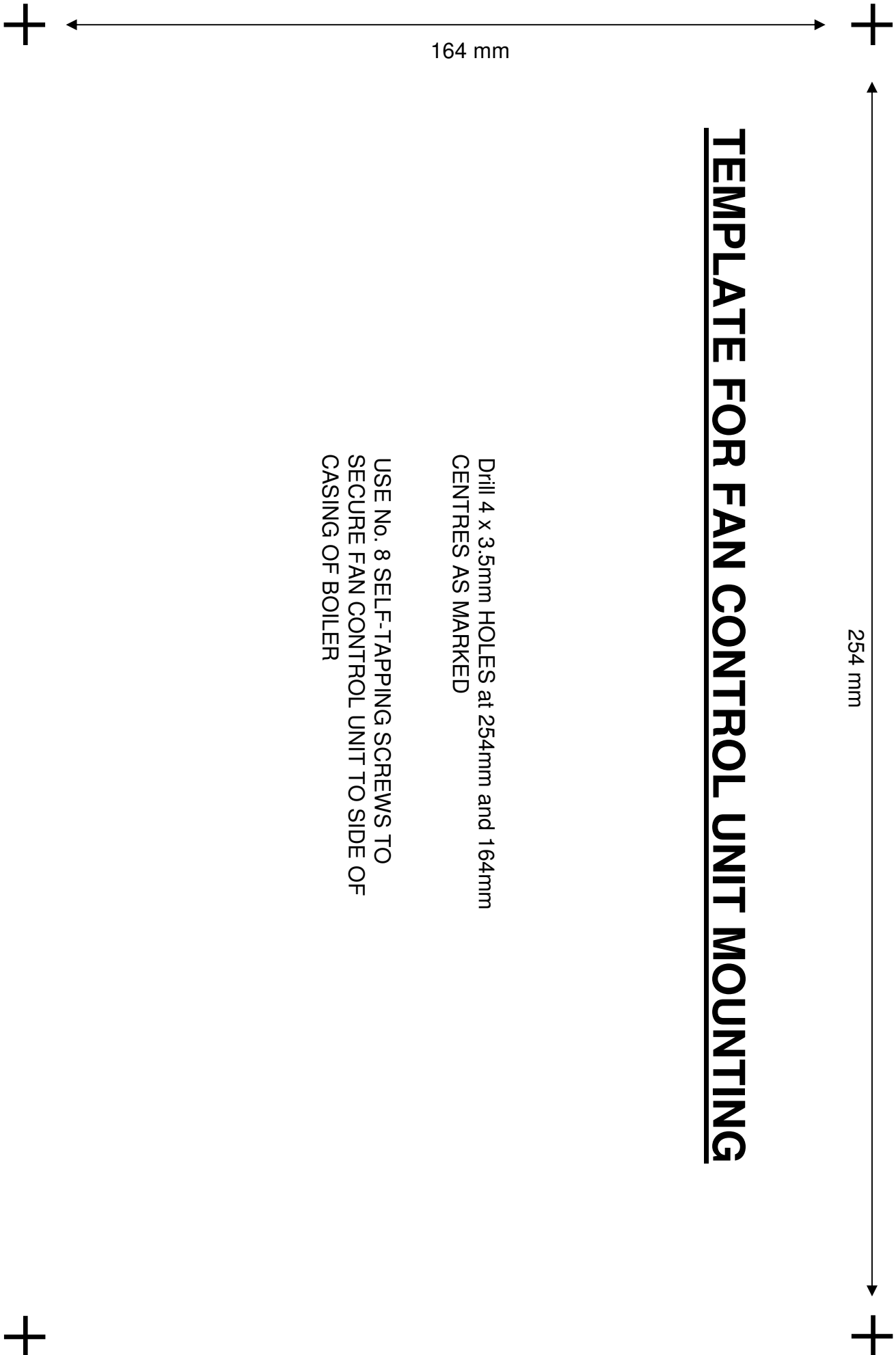
Seals

Inspect the seals on the flue access plate, manifold cover, main door and small stoker door/flap and check for wear; adjust the door catch if necessary to ensure an airtight seal. Replacements are available from **Teisen Products Ltd.**

K. TROUBLE-SHOOTING

<u>Problem</u>	<u>Probable Cause</u> (See notes in this booklet under appropriate heading)
Poor Combustion / excessive smoke / Tar Deposits/ Blow-backs	<ul style="list-style-type: none">(Insufficient secondary air(Chimney blocked, or too short, or of poor design(Excessive moisture in fuel(Boiler thermostat set too low(No pumped shunt circuit(Fan speed set too low or fan damper jammed(Too much fuel put into boiler(Tubes and flue box not cleaned sufficiently(Flue damper closed too much(Initial combustion period too short(Boiler too large for heat demand
Excessive fuel use	<ul style="list-style-type: none">(Excessive moisture in fuel(Main fan timer set too long(Inadequate thermostat control on system(Poor combustion due to points above
Boiler overheats	<ul style="list-style-type: none">(Open vent and cold feed incorrect(Air-locking in pipework system(Inadequate heat leak (wood)(Over-ride limit stat incorrectly set(Fan damper jammed open(Air leakage through door/flap seals(Boiler oversized (wood)(Control stat set too high(Poor water circulation by thermostat control





254 mm

TEMPLATE FOR FAN CONTROL UNIT MOUNTING

Drill 4 x 3.5mm HOLES at 254mm and 164mm
CENTRES AS MARKED

USE No. 8 SELF-TAPPING SCREWS TO
SECURE FAN CONTROL UNIT TO SIDE OF
CASING OF BOILER

164 mm

