

## **Specification of the AO Smith Heat Recovery System.**

### **System Description:**

The AO Smith Heat Recovery System utilises the waste heat from the chiller and freezer unit condensers to preheat the incoming mains water. This can provide a large portion of the domestic hot water energy requirements. Temperatures as high as 50C can be achieved with the heat recovery system and the primary heat source can be used to top up the water to 60C.

The waste heat is piped to the water heater to preheat it indirectly. This simplifies the requirements of the system with regard to the F-Gas requirements. The pipework fluid is Propylene Glycol which is a food grade antifreeze. All components used are suitable for glycol. Motorised valves are supplied with the condenser units so that flow can only pass through units whose compressor is running and has heat available.

The AO Smith SGE is a gas fired condensing water heater with an indirect coil in the bottom of the tank. This makes an ideal preheat vessel for heat recovery.

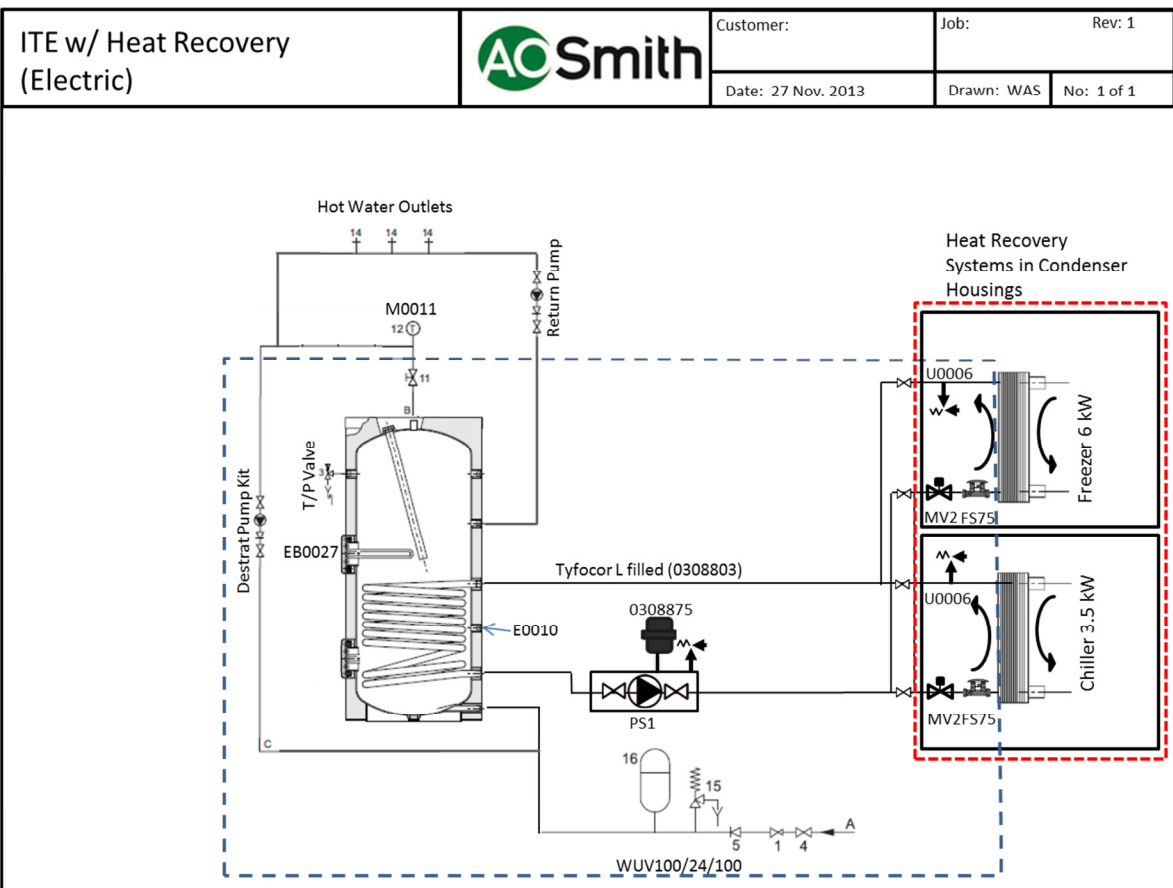
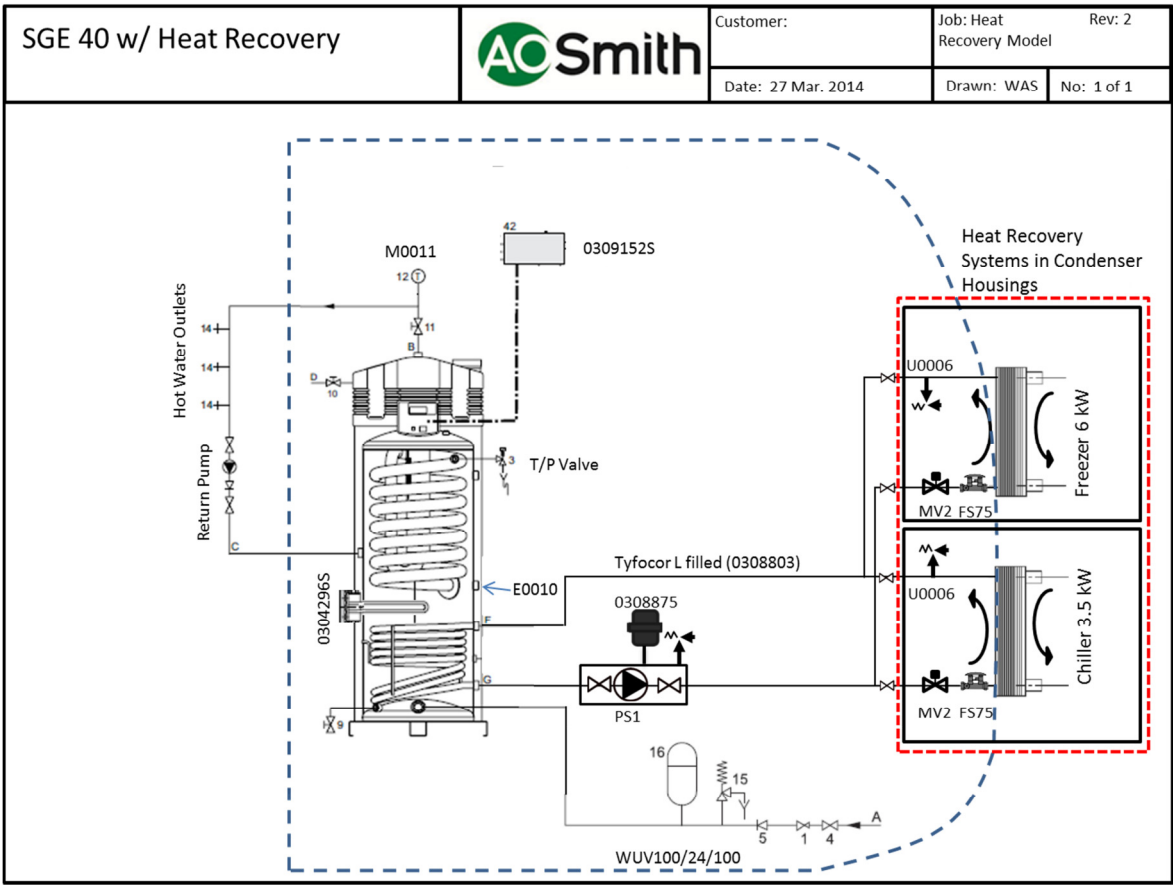
The AO Smith ITE is an indirect tank with an 18 kW immersion heater above the coil. This can be utilised when gas is not available on site.

AO Smith understand the value in a continuous source of hot water and therefore supply backup with both of these systems. The SGE has a 7.5 kW electric back up and the ITE has 6 kW. These are not designed to provide all of the hot water requirement of the building, but a limited emergency supply can be gained from them. In the case of the ITE both 18kW primary and 6 kW backup immersion heaters are mounted in the same flanged connection.

To limit the necessary involvement of site personnel in the hot water system the controls ensure that in the case of fault the system will automatically changeover from primary heat source to secondary heat source. There is no user involvement in this changeover.

In order that a fault is dealt with as quickly as possible the system is provided with a GSM modem device with SIM card. In the event of a failure of the primary heat source the GSM device will send a text message warning to as many as five mobile telephone numbers.

To simplify the installation both systems are provided with a pre wired control panel with all switchgear. The only site requirement for the electrician is to run cabling from each component to the labelled terminals within the panel.



Please refer to the Heat Recovery Schematics for the SGE and ITE.

All special components within the Blue dashed line can be supplied by AO Smith in kit form.

Key:

BMSI: BMS Interface Unit (optional)

42: Solar Heat Master

0309152S: Dummy Sensors

12: M0011: Temp and Press Gauge

11: Isolation Valve (not supplied by AOS)

14: Hot Water Outlets (not supplied by AOS)

10: Gas Isolation Valve

3: T&P Relief Valve 7 bar 90C

13: Condensate Trap

E0010: Control and Overheat Stat for Heat Reclaim System

0304296S: 7.5 kW Immersion heater for backup

9: Drain Valve

0308803: Tyfocor L Food Grade Antifreeze

PS1: Pump Station suitable for Antifreeze

0308875: 25L Expansion Vessel suitable for Antifreeze

WUV100/24/100 Unvented kit composed of:

4: Isolation valves (not supplied by AOS)

1: Pressure reducing valve preset to 3 bar, adjustable

5: Check Valve

15: 6 bar Pressure relief valve

16: 25 L Expansion vessel

U0006: 6 bar Pressure relief valve (1/2 inch)

MV2: Motorised 2 port valve

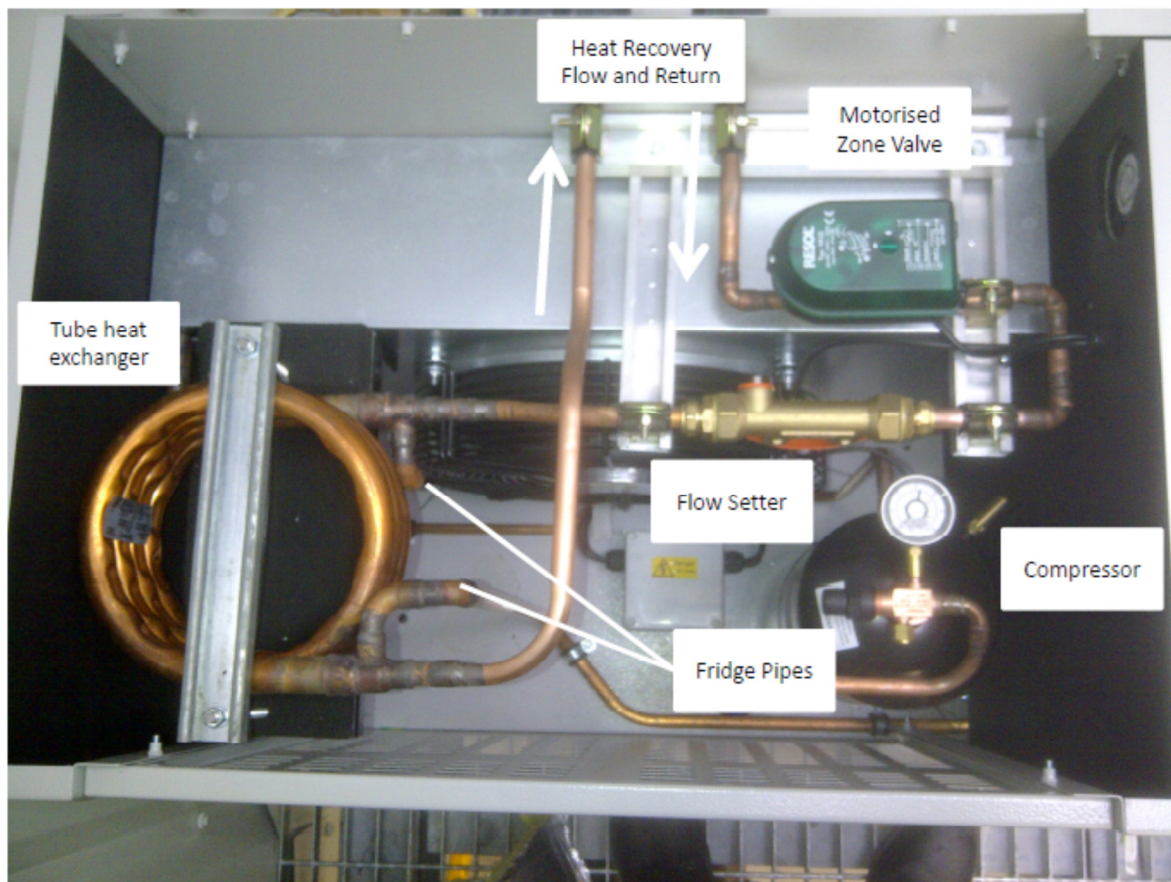
FS75: Flow Setter

EB0027: 18/6 kW Immersion Heater, Duty/standby elements each with built in control and overheat stats

Return Pump Kit: Circulating Pump, valves, check valve (not supplied by AOS)

Other Exclusions: fittings, pipework and all isolation valves.

## Fridge Work:



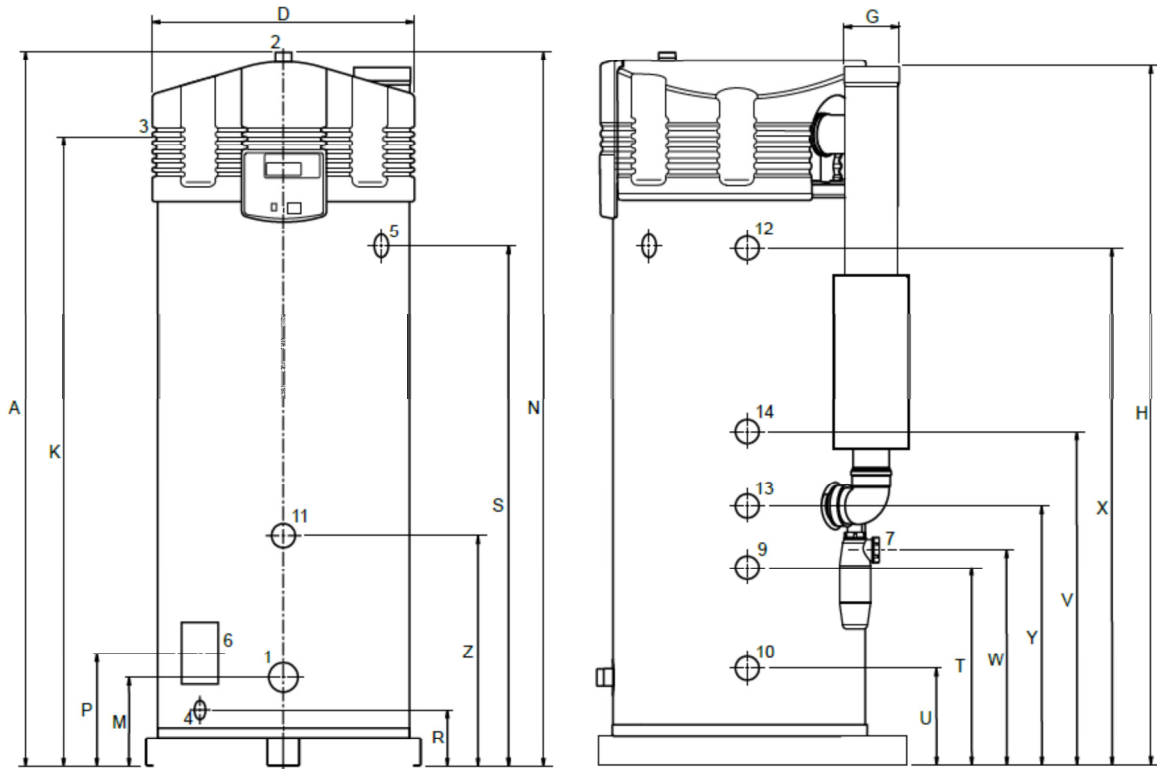
The interface between the heat recovery system and the fridge system is to be installed by the condenser unit manufacturer. The components within the dashed red line of the schematic on page 1 (U0006, MV2, and FS75) are supplied by AO Smith to the fridge contractor on quote reference: Generic Heat Reclaim Valves for free issue to the condenser manufacturer. The condenser manufacturer shall supply a refrigerant to water heat exchanger of suitable type and install it along with the components into the condenser unit box. Heat reclaim pipework to be brazed or soldered and flushed. The direction of flow for the heat reclaim is in the counter flow direction to the refrigerant. The MV2 motorised valve and FS75 flow setter shall be on the return side (cold side) with the MV2 coming before the FS75. Two 15mm tails shall extend through the housing for connection by the mechanical contractor. Each tail to have a full bore  $\frac{1}{4}$  turn lever ball valve supplied by the condenser unit manufacturer. The pressure relief valves shall be piped through the casing with an elbow to face the discharge downwards. All heat reclaim pipework inside the condenser housing to be pressure tested to 6 bar and insulated to a thickness of at least 19mm. The heat exchanger shall be insulated as well.

## **Plumbing Work:**

The mechanical contractor is responsible for ensuring the installation meets manufacturers requirements. The Mechanical contractor shall install the water heater and all other components shown within the building or a water proof housing. Any necessary frost protection for the water is the responsibility of the mechanical contractor.

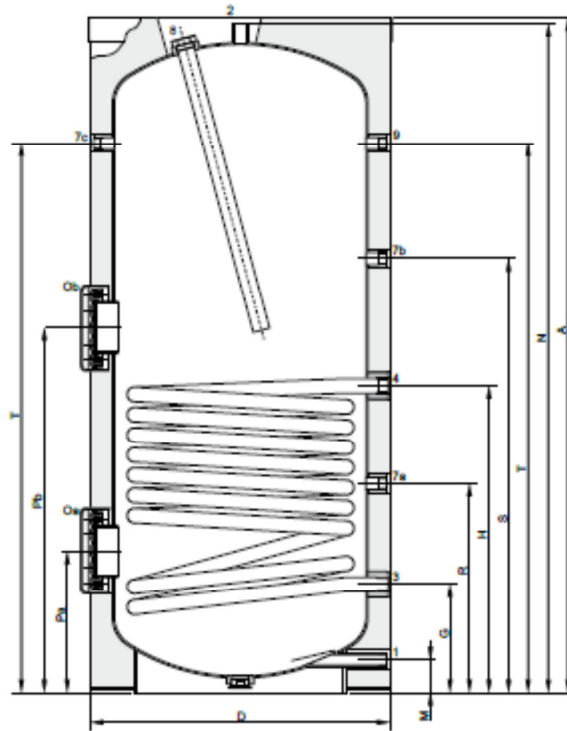
The mains water unvented kit is supplied by AO Smith with the heater. The contractor should supply and install an isolation valve upstream of the unvented kit. The installer must ensure that in the case that the water heater requires hydraulic isolation cold water will still be available to the building. The flow from the top of the heater should have an isolation valve supplied and installed and the secondary return shall be piped into the middle connection of the water heater. The secondary return pump and valves to be supplied by the contractor.

## SGE:



In the case of the SGE gas fired unit the secondary return goes into connection 14, 1035mm from floor level. The T&P Relief valve goes into connection 5, the highest side tapping. The immersion heater goes into connection 11 on the front of the unit and the combined control and overheat stat goes into connection 13.

**ITE:**



In the case of the ITE electric unit the secondary return goes into connection 7b. The T&P Relief valve goes into connection 9. The 18/6kW immersion heater goes into the top clean out opening. Connection 7a is for the combined control and overheat stat. The destratification pump goes from the hot outlet to the cold inlet with 22mm Copper pipework.

## **Heat Recovery Work:**

The mechanical contractor shall supply and install the pipework between the water heater and the condenser units. The pipework should be 15mm for distances less than 15m one way and can be either Copper or Stainless Steel Flex. The pipework must be insulated to at least 19mm and be weatherproof where external. The pump station (PS1) is to be mounted on the return from the bottom of the coil connection to the condenser connections with the MV2 and FS75. The pump station must be accessible for commissioning and maintenance and (where reasonably possible) should be mounted upright. The pressure relief valve should be piped to drain via a tundish or air break. The expansion vessel, which is solar rated, is piped to the pump station but can be located elsewhere as long as there is access to the Schroeder valve. Following installation the heat reclaim pipework shall be pressure tested to 6 bar with air. No chemical shall be used to flush the pipework.



### **Mechanical Contractor:**

The SGE System must have the BMS Interface Module and Solar Interface Module installed in a waterproof area near to the SGE.

All additional controls are prewired in an AO Smith Control Panel Box available for the ITE and SGE. The SGE panel is part number EB0025 and the ITE panel is part number EB0028. This should be wall mounted within 1m of the water heater in an accessible place.



Photo example of the SGE Control Panel EB0025  
The ITE Control Panel EB0028 looks similar

The control panel provides switchgear to automatically changeover from the primary heat source (gas or electric) to the backup source (typically electric) in the case of failure of the primary system. GSM telemetry is provided in the control panel box to send up to five text message alerts that the unit has gone into fault mode and is operating on the backup supply.

## Electrical Contractor:

The electrical contractor shall run a 3 phase and Neutral cable to the control panel suitable for 30A/ph. The electrical contractor shall run suitable cables from the Control Panel to all components. All cables shall be glanded through the bottom of the IP box by the electrical contractor.

All wiring should be done to 17<sup>th</sup> edition regulations. Responsibility for meeting the wiring regulations is held by the electrical contractor.

The control panel boxes include all necessary components to function as a wiring centre. It has a suitable Hot Water System Isolator on the front of the panel and interlocks the door. The only supply requirements of the contractor is cable, glands, cable tray / trunking, and cable ties. In the case that any component is too far from the control panel then a local isolator should be supplied by the contractor.

For cable sizing the following loads should be considered:

SGE:	L,N,E	3 A
Solar Interface Module	L,N,E	<1 A
SGE Backup 7.5kW Immersion heater	L1,L2,L3,E	10.5 A/ph
SGE Error Relay	L, SL	<1 A
ITE 18kW Immersion Heater	L1,L2,L3,E	28 A/ph
ITE 6kW Immersion Heater	L1,L2,L3,E	10 A/ph
Condenser Unit	L,N,SL,E (outdoor)	1 A
Control Stat	L, SL	<1 A
Control and Overheat Stat	L,SL	1 A
Heat Reclaim Pump Station:	L,N,E	1 A

Each control panel has an additional BMS fault connection which is volt free and closes on fault.

The SGE control panel also has a blocking contact that prevents it from switching to electric backup if it is open circuit.

For an SGE system:

The 240V supply to the water heater should also go to the Solar Interface Module. The supplied bus cable can be cut down and wired to the Solar Interface module along with the Dummy Sensors. The offcut of the bus cable can be used from the Solar Interface module to the BMS interface. No other cables besides 240V in, Bus in and Bus out should be wired to the terminals in the Solar Interface Module.

## **Commissioning:**

Commissioning and filling the system shall be carried out by AO Smith.