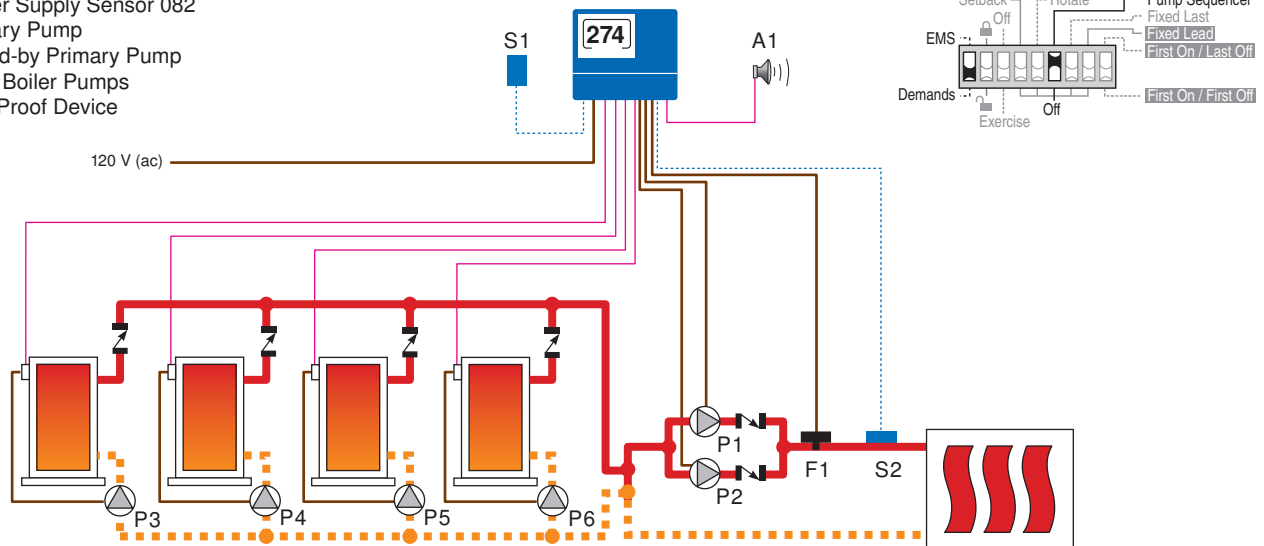## Application A 274-1

System Description: The Boiler Control 274 controls up to four On/Off boilers to provide outdoor reset for the space heating zones. The boilers are piped in primary-secondary and the primary pumps are controlled by the 274 to allow for redundant pumping capacity as well as equal run time rotation. The 274 has an alert contact which closes when a pump error occurs. A flow proof device is used to prove flow from the pumps to the 274.
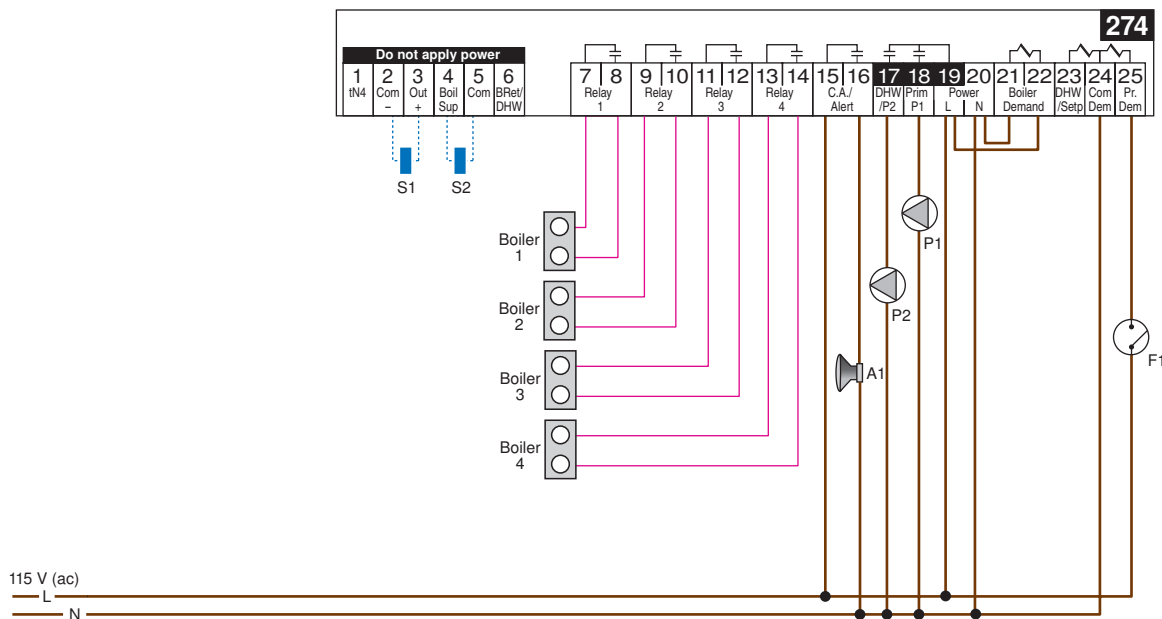
Mechanical

S1 = Outdoor Sensor 070
S2 = Boiler Supply Sensor 082
P1 = Primary Pump
P2 = Stand-by Primary Pump
P3,...,P6 = Boiler Pumps
F1 = Flow Proof Device
A1 = Alert

Essential Control Settings:
Mode = 1

274 Switch Settings:

Electrical

Concept Drawing: This is only a concept drawing, not an engineered drawing. It is not intended to describe a complete system, nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed, including additional equipment, isolation relays (for loads greater than the control's specified output ratings), and any safety devices which in the judgement of the designer are appropriate, in order to properly size, configure and design that system and to ensure compliance with building and safety code requirements.
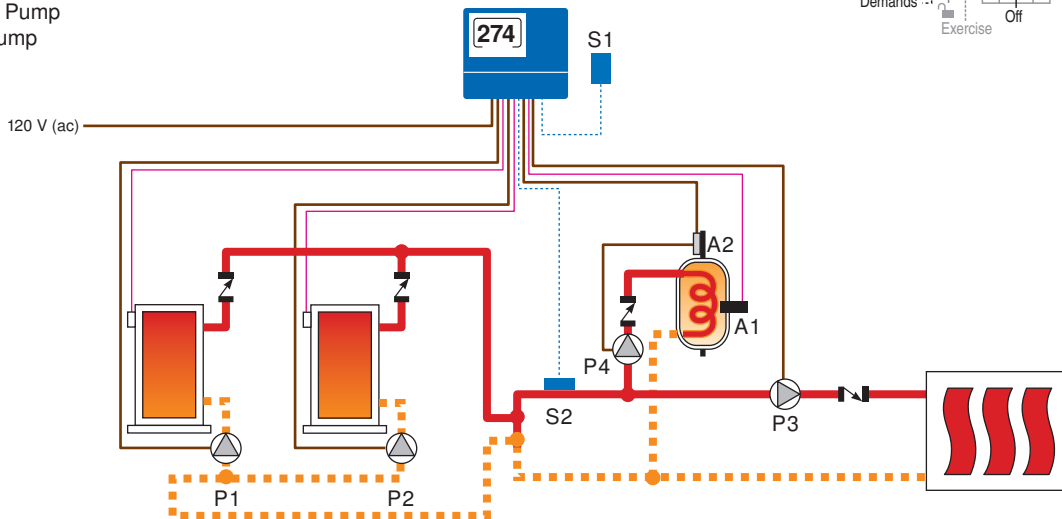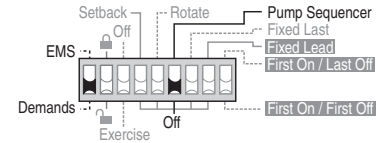
Application A 274-2

System Description: The Boiler Control 274 controls two On/Off boilers to provide outdoor reset for the space heating zones. The boilers are piped in reverse return, parallel primary-secondary and the boiler pumps are controlled by the 274 to allow post purging of the boilers after they have shut off. The 274 also controls a DHW pump. This system can provide DHW priority over space heating to provide faster DHW tank recovery.
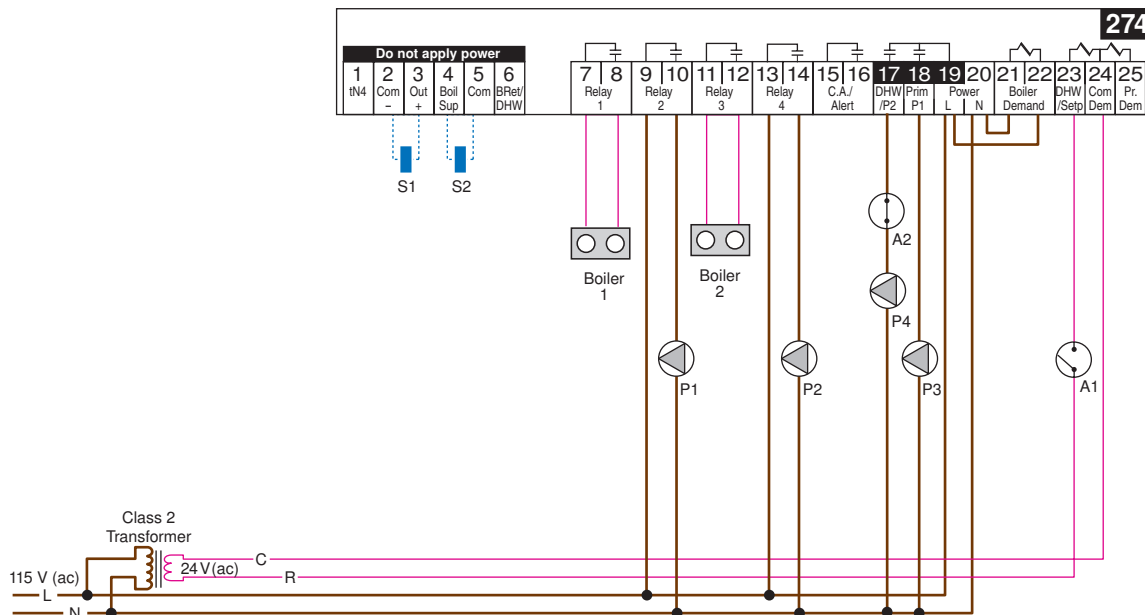
Mechanical

- S1 = Outdoor Sensor 070
- S2 = Boiler Supply Sensor 082
- A1 = DHW Aquastat
- A2 = High Limit Aquastat
- P1 & P2 = Boiler Pumps
- P3 = Primary Pump
- P4 = DHW Pump

Essential Control Settings:
Mode = 2

274 Switch Settings:

Electrical

Concept Drawing: This is only a concept drawing, not an engineered drawing. It is not intended to describe a complete system, nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed, including additional equipment, isolation relays (for loads greater than the control's specified output ratings), and any safety devices which in the judgement of the designer are appropriate, in order to properly size, configure and design that system and to ensure compliance with building and safety code requirements.
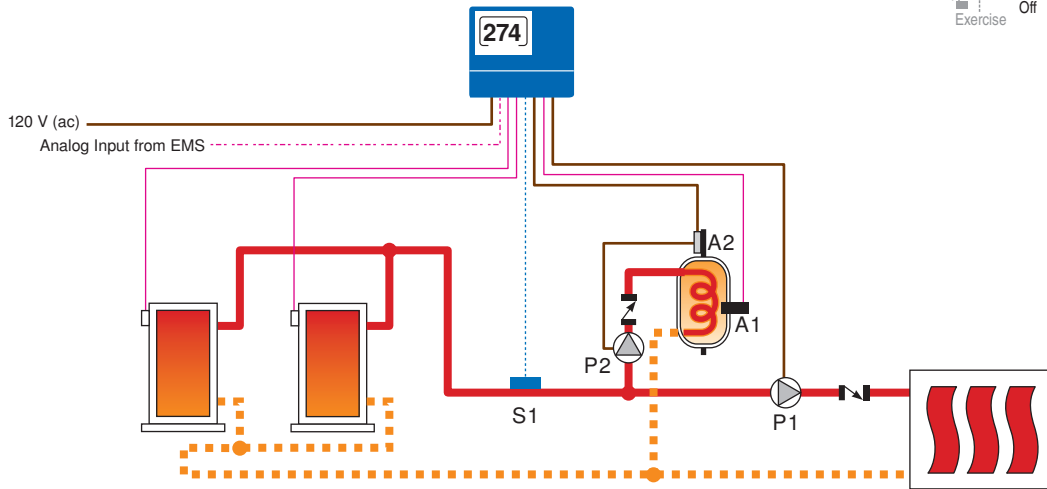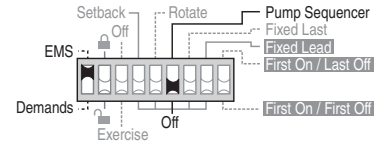
System Description: The Boiler Control 274 controls two On/Off boilers to provide DHW and outdoor reset operation for the space heating zones. The 274 receives a 0-10 V(dc) or 2-10 V(dc) signal from an EMS system which creates a target temperature for the control, which then stages the boilers as required. The 274 also controls a DHW pump. This system can provide DHW priority over space heating to provide faster DHW tank recovery.
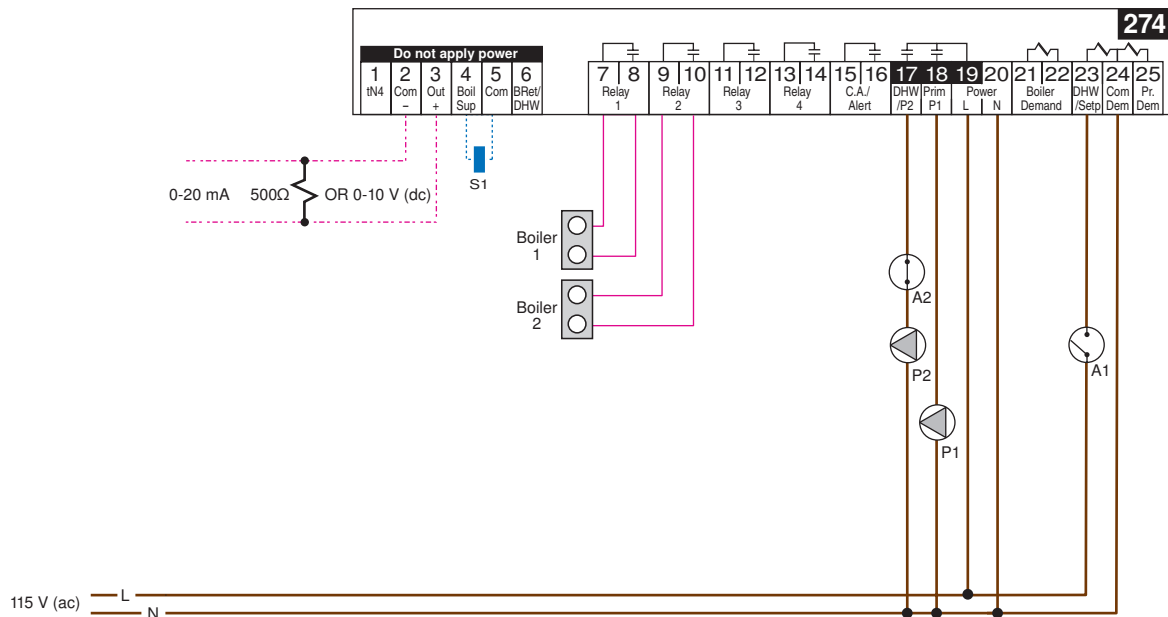
Mechanical

S1 = Boiler Supply Sensor 082
A1 = DHW Aquastat
A2 = High Limit Aquastat
P1 = Primary Pump
P2 = DHW Pump

Essential Control Settings:
Mode = 1

274 Switch Settings:

120 V (ac)
Analog Input from EMS

Electrical

1	2	3	4	5	6		7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
tN4	Com −	Out +	Boil Sup	Com	BRet/ DHW		Relay 1		Relay 2		Relay 3		Relay 4		C.A./ Alert		DHW /P2	Prim P1	Power L	N	Boiler Demand		DHW /Setp	Com Dem	Pr. Dem

Do not apply power

0-20 mA   500Ω   OR 0-10 V (dc)

S1

Boiler 1

Boiler 2

115 V (ac) L
N

Concept Drawing: This is only a concept drawing, not an engineered drawing. It is not intended to describe a complete system, nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed, including additional equipment, isolation relays (for loads greater than the control's specified output ratings), and any safety devices which in the judgement of the designer are appropriate, in order to properly size, configure and design that system and to ensure compliance with building and safety code requirements.

System Description: The Boiler Control 274 controls two, 2 stage boilers to provide DHW and outdoor reset for the space heating zones. The tN4 Gateway 483 allows for remote monitoring of the 274 and access to the tN4 system through a web browser. The 274 receives a boiler demand over the tN4 boiler bus from the tN4 thermostats. A 161 Setpoint control is used to create a DHW demand over the tN4 network. This allows for both DHW production and the use of the pump sequencer function.
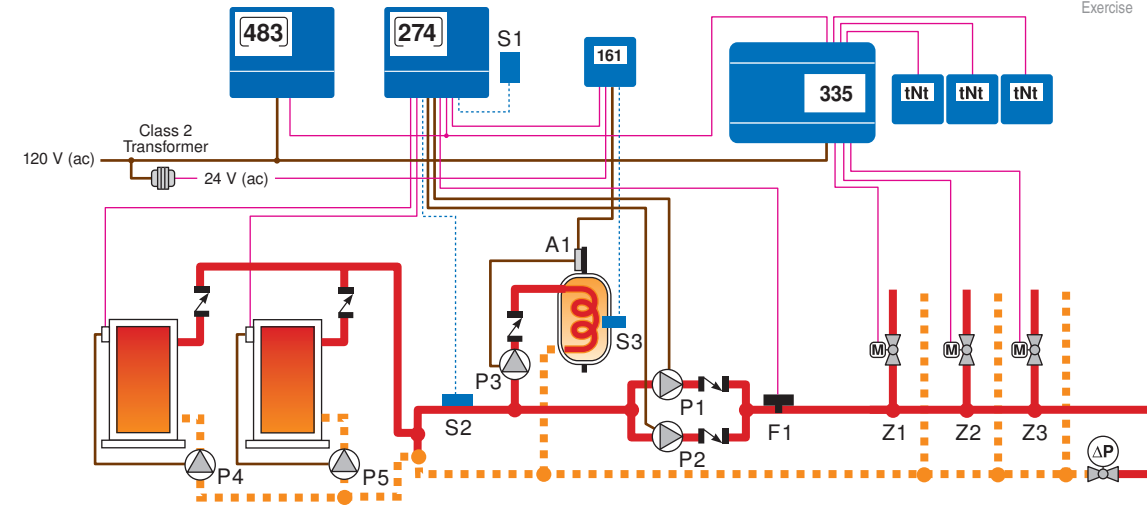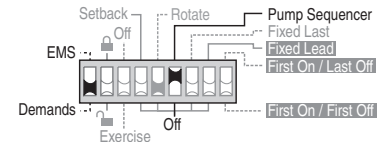
Mechanical

S1 = Outdoor Sensor 070
S2 = Boiler Supply Sensor 082
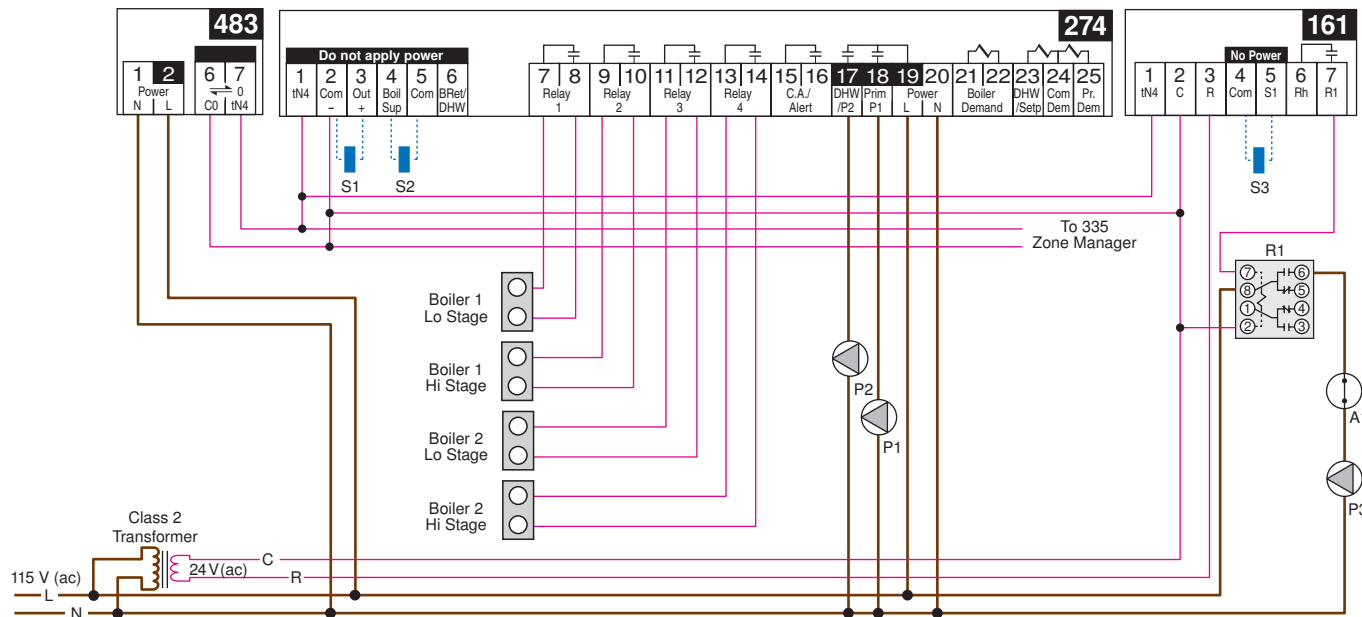S3 = DHW Sensor
A1 = High Limit Aquastat

P1 = Primary Pump
P2 = DHW Pump
Z1,...,Z3 = Zone Valves

Essential Control Settings:
Mode = 3

274 Switch Settings:

Electrical

Concept Drawing: This is only a concept drawing, not an engineered drawing. It is not intended to describe a complete system, nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed, including additional equipment, isolation relays (for loads greater than the control's specified output ratings), and any safety devices which in the judgement of the designer are appropriate, in order to properly size, configure and design that system and to ensure compliance with building and safety code requirements.
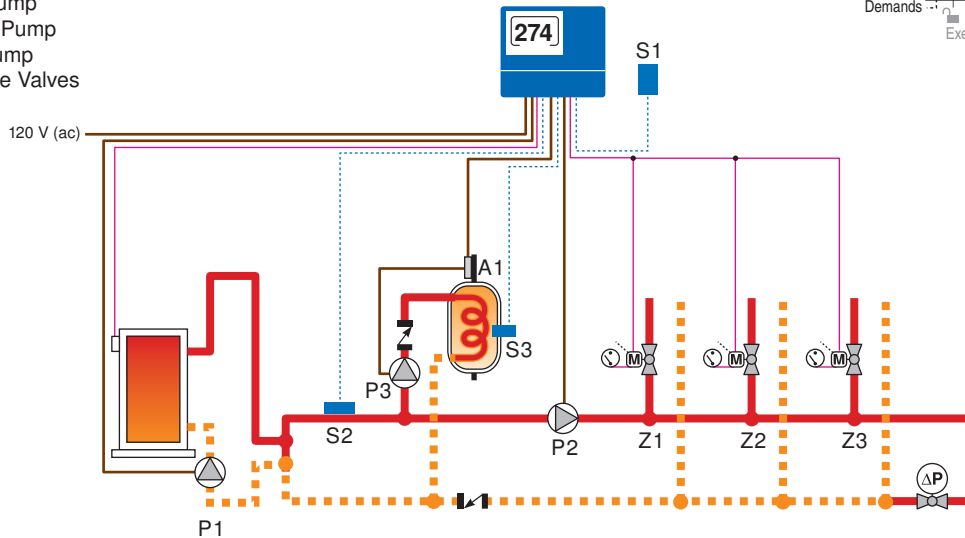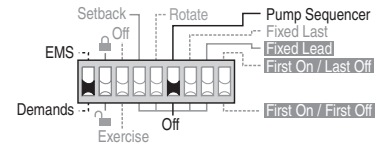
Application A 274-5

System Description: The Boiler Control 274 controls one 3 stage boiler and a pump to provide outdoor reset for the space heating zones. The boiler is piped in primary secondary and the 274 controls the boiler pump to allow post purging of excess heat from the boiler to the system. The zone valve end switches provide a 24V(ac) powered demand to the 274 control in order to create a call for heat. The 274 also controls a DHW pump. This system can provide DHW priority over space heating to provide faster DHW tank recovery.
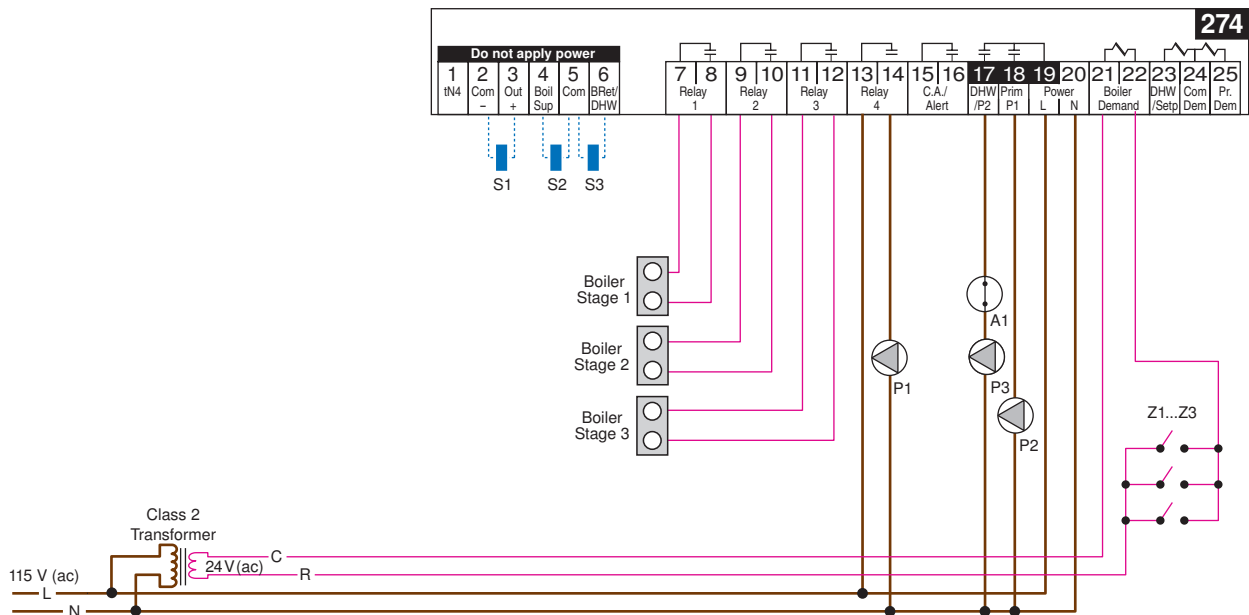
Mechanical

S1 = Outdoor Sensor 070
S2 = Boiler Supply Sensor 082
S3 = DHW Sensor 082
A1 = High Limit Aquastat
P1 = Boiler Pump
P2 = Primary Pump
P3 = DHW Pump
Z1...Z3 = Zone Valves

Essential Control Settings:
Mode = 5

274 Switch Settings:

Electrical

Concept Drawing: This is only a concept drawing, not an engineered drawing. It is not intended to describe a complete system, nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed, including additional equipment, isolation relays (for loads greater than the control's specified output ratings), and any safety devices which in the judgement of the designer are appropriate, in order to properly size, configure and design that system and to ensure compliance with building and safety code requirements.

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System Description: The Boiler Control 274 controls two, Lo/Hi fire boilers to provide setpoint operation for the dedicated DHW tank. When a valid DHW Demand is present from the DHW Sensor, the DHW pump relay turns on. The DHW relay in this mode is used as the DHW recirculation pump and operates continuously in the occupied period and cycles with the DHW demand in the unoccupied period. The boilers are sequenced based only on the DHW Sensor. The Boiler supply sensor is not required. Outdoor design is turned off. The 274 has a combustion air contact which opens and closes a damper when a boiler is to fire. A combustion air proof ensures the damper is open before firing a boiler.
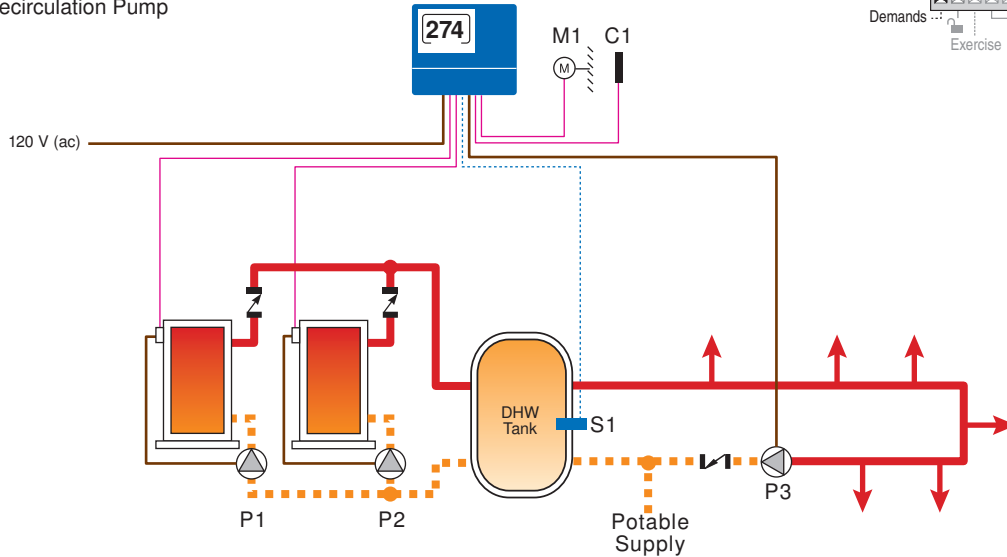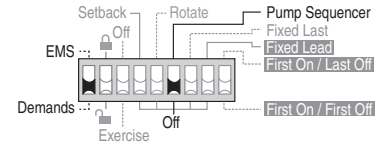
Mechanical

S1 = DHW Sensor 082
C1 = C.A, Proof
M1 = C.A. Damper Motor
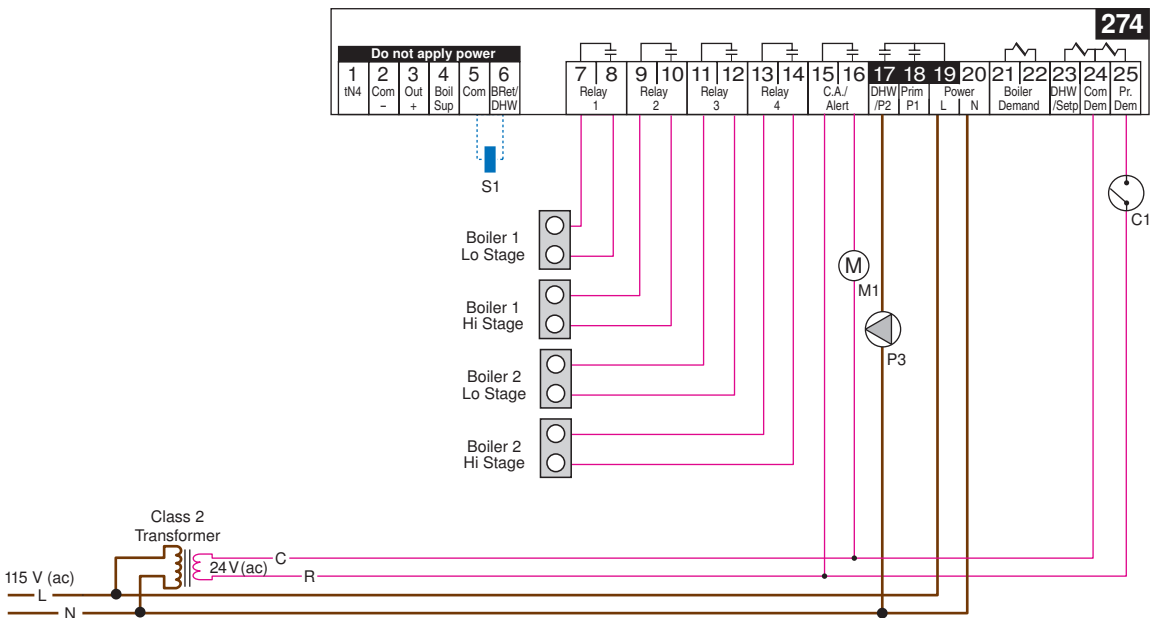P1 & P2 = Boiler Pumps
P3 = DHW Recirculation Pump

Essential Control Settings:
Mode = 3
DHW Mode = 6

274 Switch Settings:

Electrical

Concept Drawing: This is only a concept drawing, not an engineered drawing. It is not intended to describe a complete system, nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed, including additional equipment, isolation relays (for loads greater than the control's specified output ratings), and any safety devices which in the judgement of the designer are appropriate, in order to properly size, configure and design that system and to ensure compliance with building and safety code requirements.

System Description: The Boiler Control 274 operates two On/Off boilers and boiler pumps piped in primary-secondary, providing outdoor reset for the space heating zones. When a valid DHW Demand is present, the DHW pump P3 turns on. The boiler supply temperature for the indirect tank is measured by sensor S3. There are two boiler target temperatures, one for the heating system (Boil TARG) and one for the indirect DHW system (DHW TARG). DHW Demand is provided by an external aquastat or tN4 DHW control. The 274 has a combustion air contact which closes and opens a damper when a boiler is to fire. A combustion air proof ensures the damper is open before firing a boiler. The 274 receives a boiler demand from the regular thermostats through the external relays.
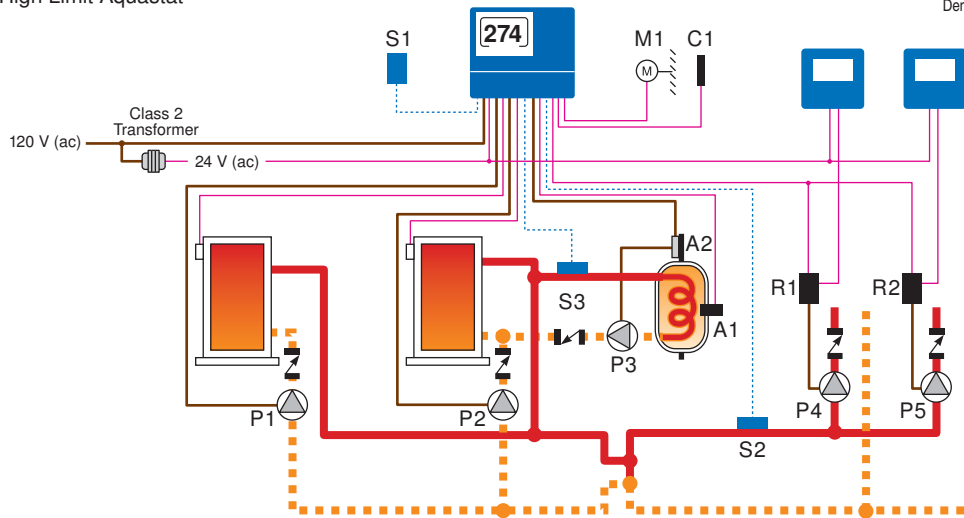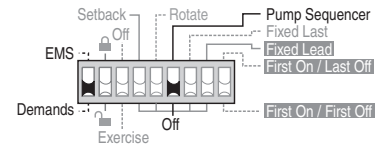
Mechanical

S1 = Outdoor Sensor 070
S2 = Boiler Supply Sensor 082
S3 = DHW Sensor 082
A1 = DHW Aquastat
A2 = High Limit Aquastat

C1 = C.A, Proof
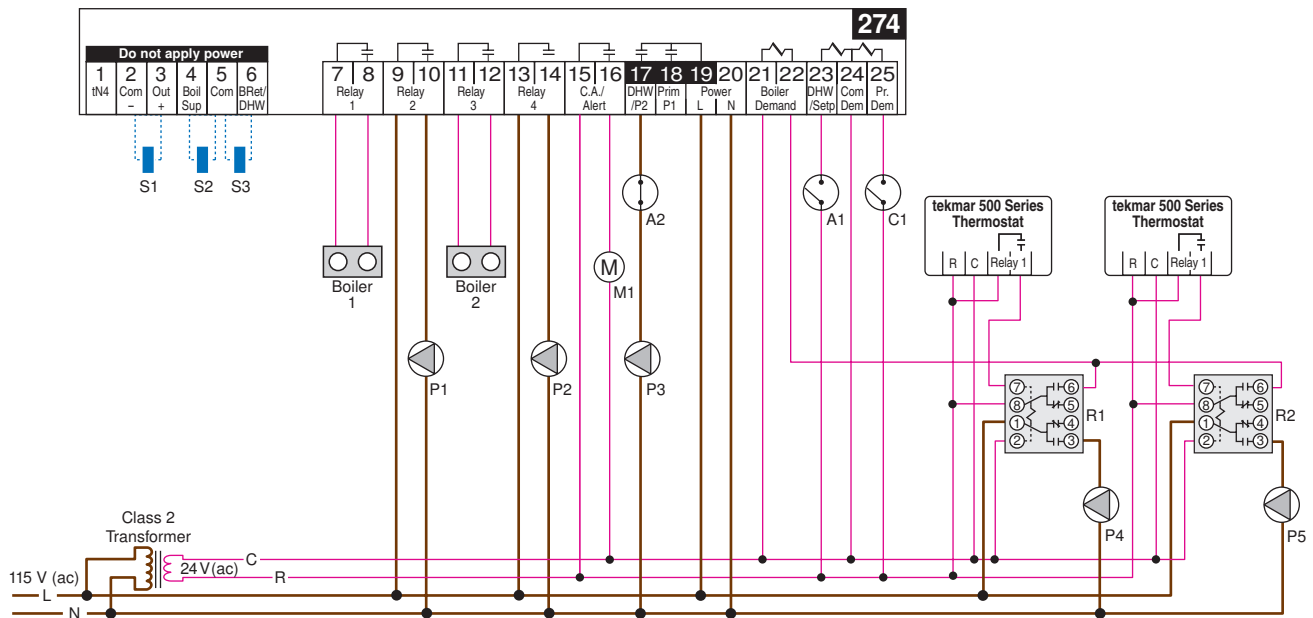M1 - C.A. Damper Motor
P1 & P2 = Boiler Pumps
P3 = DHW Pump

Essential Control Settings:
Mode = 2
DHW Mode = 5

274 Switch Settings:

Electrical

Concept Drawing: This is only a concept drawing, not an engineered drawing. It is not intended to describe a complete system, nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed, including additional equipment, isolation relays (for loads greater than the control's specified output ratings), and any safety devices which in the judgement of the designer are appropriate, in order to properly size, configure and design that system and to ensure compliance with building and safety code requirements.

Specifications:

The following are the recommended specifications for the Boiler Control 274

- The control shall be able to adjust the number of boilers required to operate during a call for domestic hot water heating.
- The control shall have the ability to calculate the boiler's target temperature based on outdoor reset.
- The control shall have the ability to set the boiler's target temperature using an adjustable setpoint.
- The control shall have an adjustable warm weather shut down applied to outdoor reset operation.
- The control shall be able to operate two primary pumps in standby mode.
- The control shall have a proof demand input to proof flow for the primary pump or prove the combustion air damper is open.
- The control shall be able to operate one primary pump and one domestic hot water pump during a domestic hot water call.
- The control shall have the ability to display the current temperature difference between the return temperature and the supply temperature, ΔT.
- The control shall have an option to rotate the boilers and optionally, the primary pumps based on the accumulated running hours.
- The control shall display the run time of the boilers and optionally, primary pumps.
- The control shall use proportional, integral and derivative (PID) logic when modulating the boilers.
- The control shall have an adjustable Minimum Supply water temperature setting to help prevent condensation of flue gases and subsequent corrosion and blockage of the boiler's heat exchanger and chimney.
- The control shall have the option of an automatic differential calculation in order to prevent short cycling of the boilers.
- The control shall have the ability to operate boiler pumps.
- The control shall have two separate adjustable post purge settings that allow the primary and boiler pumps to run for a set period after the boiler has been shut off.
- The control shall have the option for a fixed lead rotation and when this option is selected, the control shall have an option for either a first on / first off, or first on / last off modulating sequence.
- The control shall have the option for either an alarm output or a combustion air damper output.
- The control shall have an adjustable minimum inter-stage delay that can be set manually or calculated by the control.
- The control shall have the option of accepting a 0 – 10 V(dc) or 2 – 10 V(dc) input signal from an energy management system with an adjustable offset.
- The control shall have three separate lockable access levels (Advanced, Installer, User) to limit the number of setting adjustments available to various users.
- The control shall have a test button that activates a pre-programmed test sequence testing all the control's outputs.
- The control shall have the ability to show the current outdoor, boiler supply, and boiler return temperatures.
- The control shall continually monitor the temperature sensors and provide an error message upon a control or sensor failure.
- During extended periods of inactivity, all pumps shall be periodically exercised to prevent seizure during long idle periods.
- The control shall include a setback schedule that can be used by the control itself or shared with other tN4 devices.
- The control shall have the option to operate as a tN4 system control with a tN4 boiler bus.
- The control shall be able to adjust the amount of time Boost will take place to increase the supply water temperature when coming out of setback.
- The control shall be able to disable Zone Load Shedding if that feature is not desirable.
- The control shall include an adjustment for the cycle length if connected to a tN4 network.