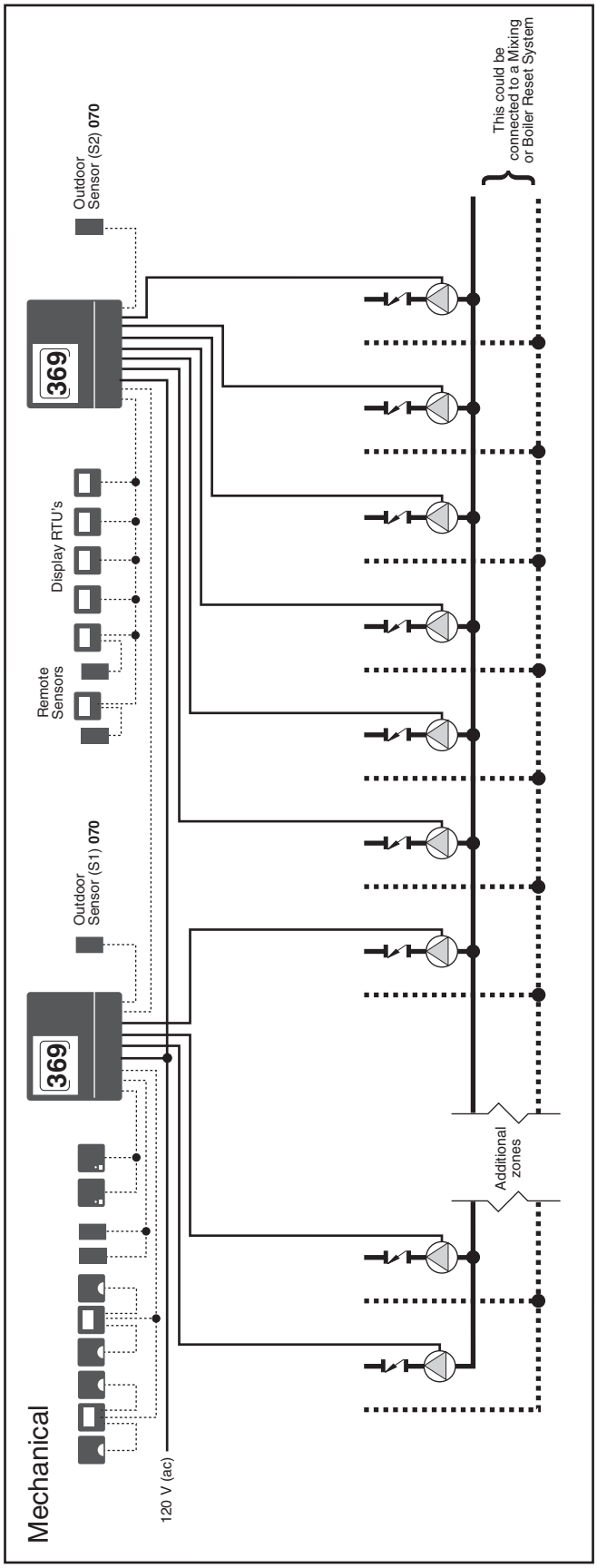
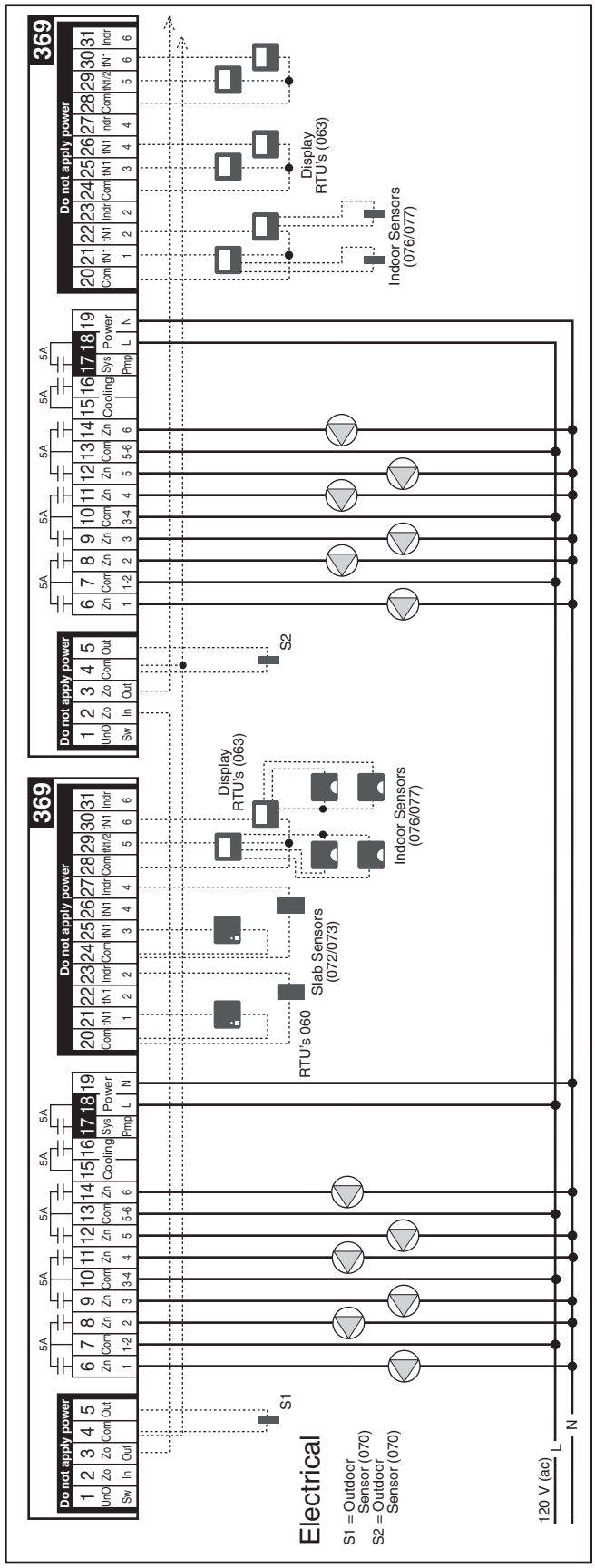
tekmar® - Application

2 x Zone Control 369

A 369-1

10/00





Note: This is only a concept drawing. The designer must determine whether this application will work in his system and must ensure compliance with code requirements. Necessary auxiliary equipment, isolation relays (for loads greater than the specified tekmar internal relay ratings), and other safety and limit devices must be added.

System Operation

Two Zone Control 369's combine to provide twelve zones of heating with indoor temperature feedback.

Piping Details Room Temperature Unit (RTU) controlled zone pumps are piped in a parallel arrangement. A check valve is required after each pump in order to prevent uncontrolled flow through the zone when the pump is turned off.

Heating Zones The 369's vary the on time of each zone based on a cycle length. The controls stagger the operating times of the zones in order to achieve a steady load on the boiler and prevent boiler cycling. If the cycle length for each 369 is the same, each 369 synchronizes its zoning operation with the zoning operation of the other 369.

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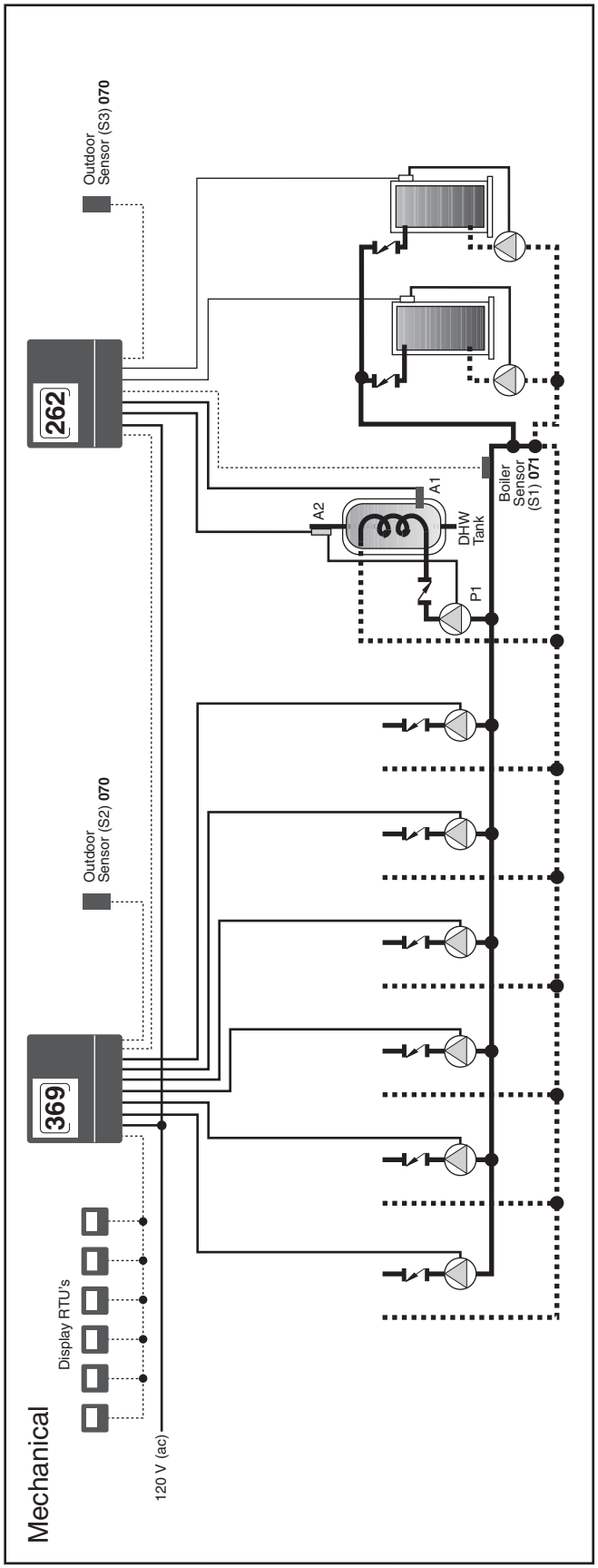
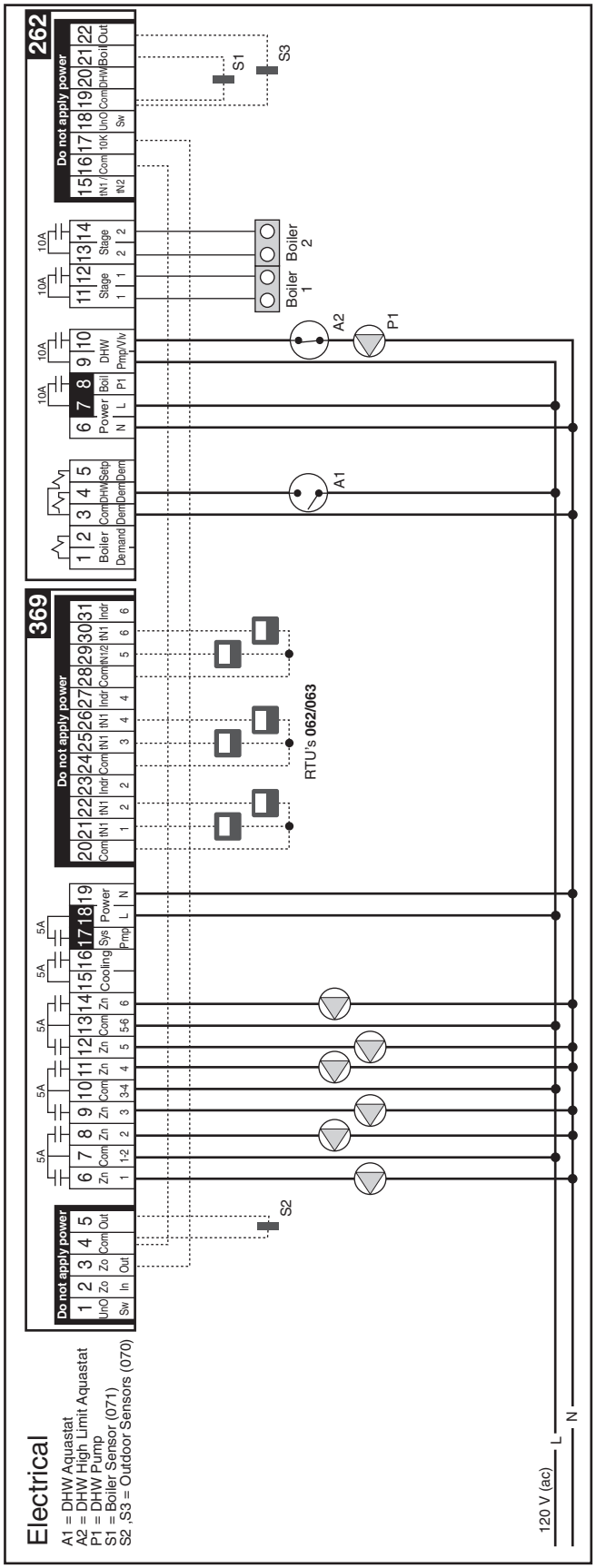
Zone Control 369 & Boiler Control 262

A 369-2

10/00





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System Operation

The Zone Control 369 and Boiler Control 262 combine to provide partial outdoor reset to six boiler zones. The 262 also controls the supply of heat to an indirect Domestic Hot Water (DHW) tank. The boilers are staged as required to provide the supply water temperature that satisfies all loads.

Heat Source Details The heat source can be either high mass or low mass non-condensing boilers.

Piping Details Room temperature Unit (RTU) controlled zone pumps are piped off the boiler loop as a secondary loop. Heat is supplied to the DHW tank through a DHW pump (P1). The boilers are piped using parallel primary / secondary in order to provide equal and isolated flow through each boiler.

Heating Zones The air temperatures in the boiler zones are controlled using display RTUs. The 369 uses PID (proportional, integral, derivative) air temperature control and synchronizes the operation of the zones to provide more even loading of the system. The 369 uses its Zo Out to send an internal *Boiler Demand* to the 262 when the boiler zones require heat. The same Zo Out terminal provides an indoor temperature feedback signal from the 369 to the 262. This signal allows the 262 to provide more accurate control of the boiler supply water temperature.

DHW Demand When the DHW aquastat (A1) calls for heat, the 262 turns on the DHW pump (P1) and raises the boiler water temperature to at least the DHW XCHG setting. Once the DHW demand is removed, the 262 performs a DHW Post Purge and possibly a DHW Mixing Purge.

Boiler Demand When heat is required in the boiler zones, the Zone Control 369 provides an internal *Boiler Demand* (through the Zo Out / 10K connection) to the 262. The boiler supply water temperature is based on the *Characterized Heating Curve* settings and indoor temperature feedback from the Zone Control 369. The boilers are staged to satisfy the required boiler supply water temperature. Whenever the boilers are fired, the 262 aims to increase the boiler supply water temperature to at least the BOIL MIN setting.

All control functions and specifications are listed in the Product Catalog I 000 and Data Brochures D 369 and D 262.

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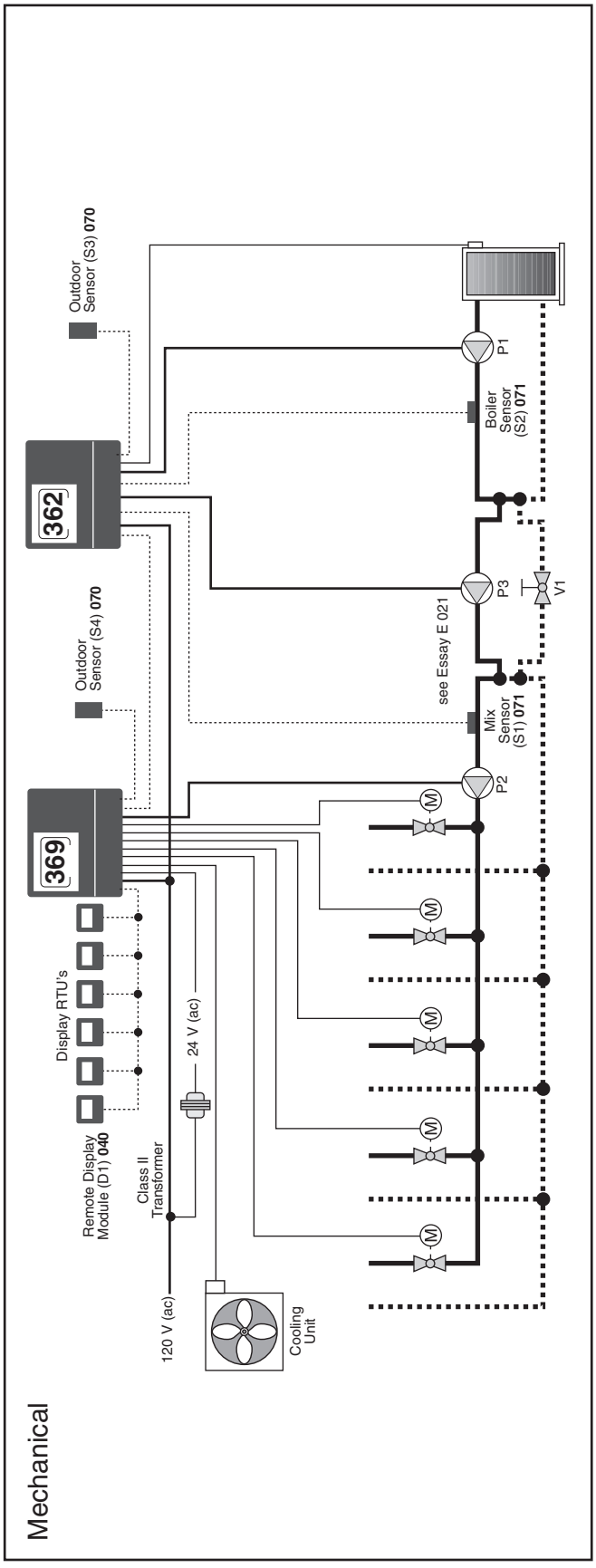
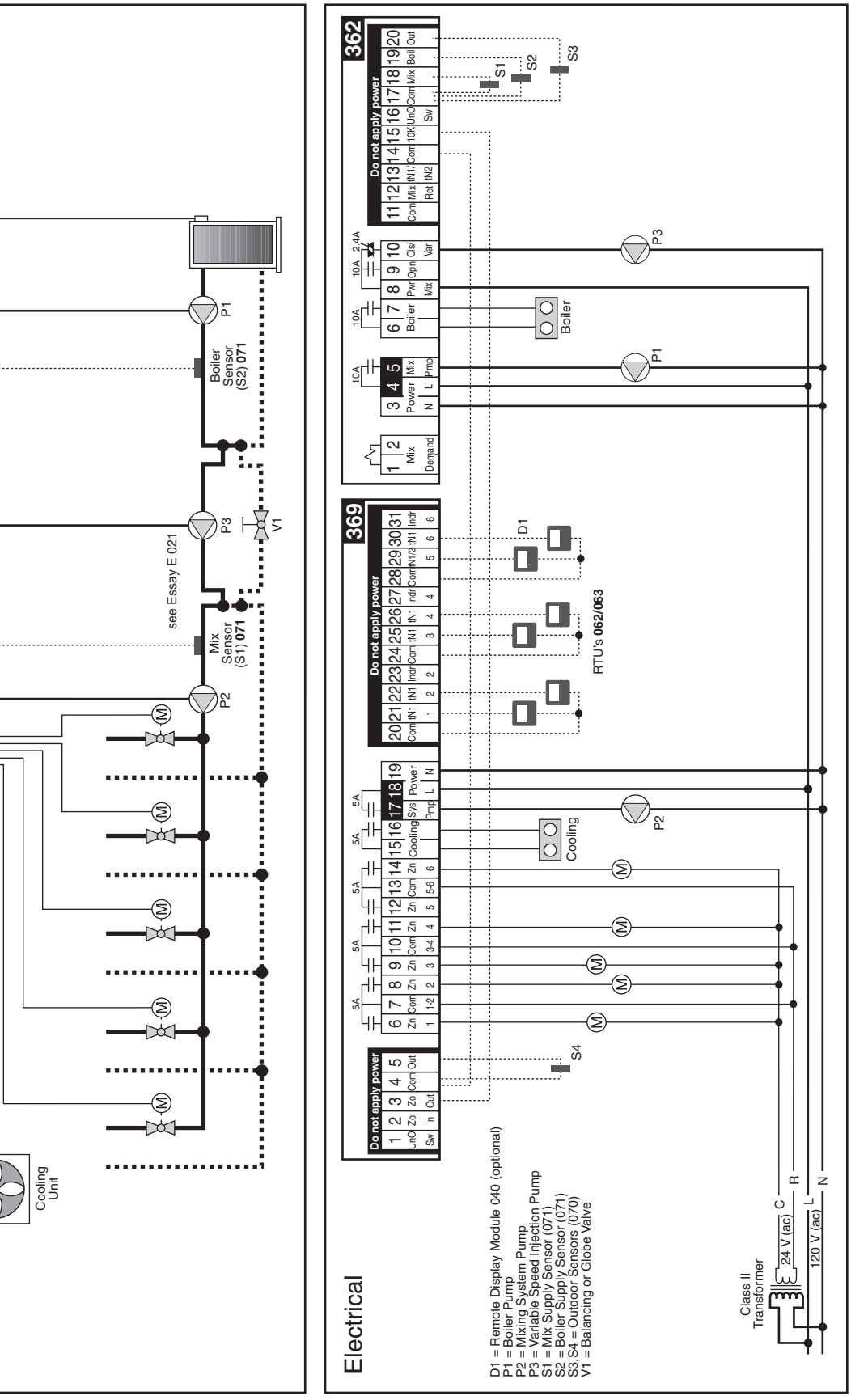
tekmar® - Application

Zone Control 369 & Mixing Control 362

A 369-3

10/00





Note: This is only a concept drawing. The designer must determine whether this application will work in his system and must ensure compliance with code requirements. Necessary auxiliary equipment, isolation relays (for loads greater than the specified tekmar internal relay ratings), and other safety and limit devices must be added.

System Operation

The Zone Control 369 and Mixing Control 362 combine to provide full outdoor reset to five mixed zones. The 362 controls the output of the variable speed injection pump to provide a mixed supply water temperature to the mixed zones and protect the boiler from flue gas condensation. The boiler operates at the required temperature in order to satisfy all loads. The boiler operates at the required temperature in order to satisfy all loads. When cooling is required, the 369 operates a cooling output.

Heat Source Details The heat source can be either a high mass or low mass non-condensing boiler.

Piping Details Room temperature Unit (RTU) controlled zone valves are piped into the mixed loop. The variable speed injection pump (P3) is piped in primary / secondary in order to isolate the boiler loop flow rate from the mixed loop flow rate. The boiler pump (P1) provides flow through the boiler and ensures flow past the variable speed injection pump take off.

Heating Zones The air temperatures in the mixed zones are controlled using display RTUs. The 369 uses PID (proportional, integral, derivative) air temperature control and synchronizes the operation of the zones to provide more even loading of the system. The 369 uses its Zo Out to send an internal *Mix Demand* to the 362 when the mixed zones require heat. The same Zo Out terminal provides an indoor temperature feedback signal from the 369 to the 362. This signal allows the 362 to provide more accurate control of the mixed supply water temperature.

Mixing Demand When heat is required in the mixed zones, the Zone Control 369 turns on the mixing system pump (P2) and provides an internal *Mix Demand* (through the Zo Out / 10K connection) to the 362. The 362 turns on the boiler pump (P1). The mix supply water temperature is based on the *Characterized Heating Curve* settings and indoor temperature feedback from the Zone Control 369. The variable speed injection pump is then controlled to supply the required mixed supply water temperature. As the variable speed injection pump ramps up and requires more heat from the boiler, the boiler is fired to a temperature that is sufficient to satisfy the requirements of the variable speed injection pump. Whenever the boiler is fired, the 362 aims to maintain the boiler temperature above the BOIL MIN setting. While the boiler is firing, the variable speed injection pump is also modulated to protect the boiler from excessively low water temperatures.

Cooling Operation The 369 can operate a single cooling output to provide Cooling Control or Cooling Enable (refer to section B of the Data Brochure D 369). The change over between heating and cooling can be achieved automatically or manually. If automatic heat / cool change-over is selected, the 369 provides a cooling interlock which prevents simultaneous heating and cooling. Heating zones assigned to the cooling group have to be satisfied for the cooling interlock time before cooling is allowed.

All control functions and specifications are listed in the Product Catalog I 000 and Data Brochures D 369 and D 362.

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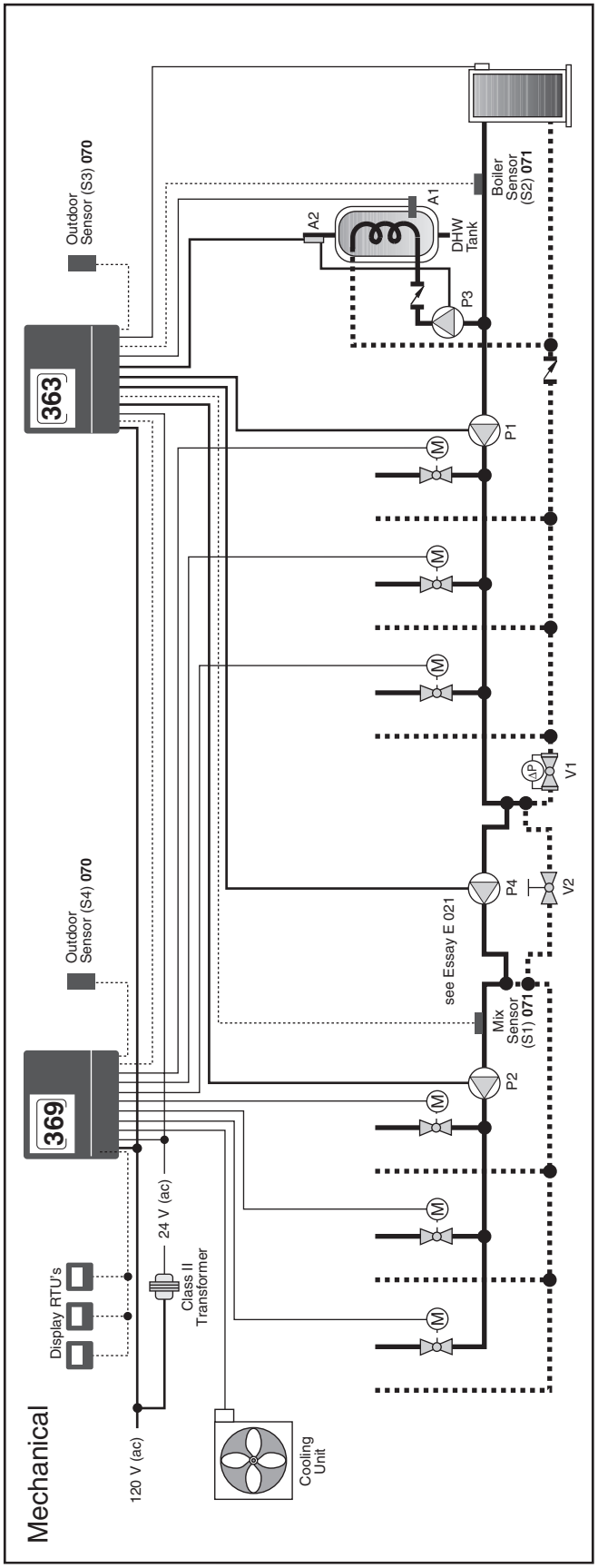
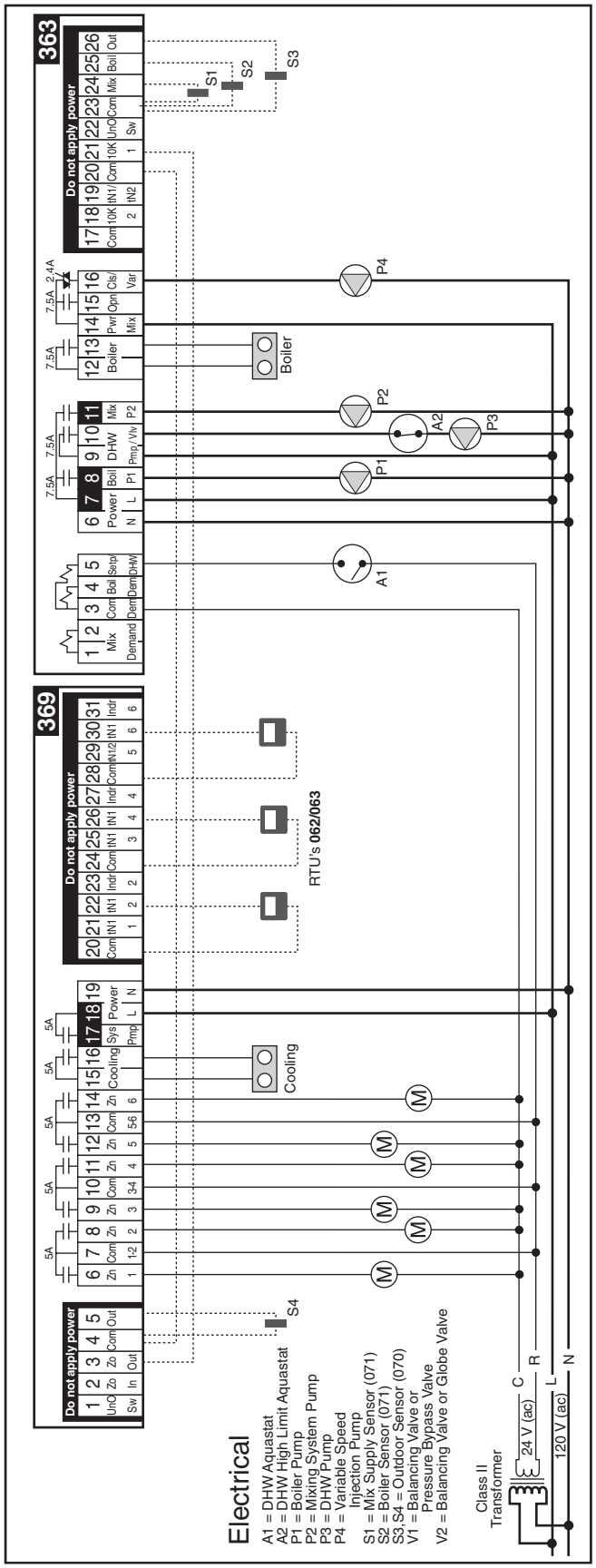
Zone Control 369 & Mixing Control 363

A 369-4

10/00





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System Operation

The Zone Control 369 and Mixing Control 363 combine to provide full outdoor reset to three two stage zones. The 363 controls the output of the variable speed injection pump to provide a mixed supply water temperature to the zones and protect the boiler from flue gas condensation. The 363 also controls the supply of heat to an indirect Domestic Hot Water (DHW) tank. The boiler operates at the required temperature in order to satisfy all loads. When cooling is required, the 369 operates a cooling output.

Heat Source Details The heat source can be either a high mass or low mass non-condensing boiler.

Piping Details Room temperature Unit (RTU) controlled zone valves are piped into the mixed loop. The variable speed injection pump (P4) is piped in primary / secondary in order to isolate the boiler loop flow rate from the mixed loop flow rate. The boiler pump (P1) provides flow through the boiler, the second stage zones, and ensures flow past the variable speed injection pump take off. A balancing valve (V1) creates a pressure differential so that flow will occur through the second stage zones.

Heating Zones The air temperatures in the mixed zones are controlled using display RTUs. The 369 uses PID (proportional, integral, derivative) air temperature control and synchronizes the operation of the zones to provide more even loading of the system. The 369 uses its Zo Out to send an internal *Mix Demand* to the 363 when the mixed zones require heat. The same Zo Out terminal provides an indoor temperature feedback signal from the 369 to the 363. This signal allows the 363 to provide more accurate control of the mixed supply water temperature.

DHW Demand When the DHW aquastat (A1) calls for heat, the 363 turns on the DHW pump (P3) and raises the boiler water temperature to at least the DHW XCHG setting. The 363 can provide DHW priority (refer to sections C2 and C3 of the Data Brochure D 363) by turning off the boiler pump (P1) and ramping down the variable speed injection pump (P4). Once the DHW demand is removed, the 363 performs a DHW Post Purge and possibly a DHW Mixing Purge.

Mixing Demand When heat is required in the mixed zones, the Zone Control 369 provides an internal *Mix Demand* (through the Zo Out / 10K 1 connection) to the 363. The 363 turns on the mixing system pump (P2). The mix supply water temperature is based on the *Characterized Heating Curve* settings and indoor temperature feedback from the Zone Control 369. The variable speed injection pump is then controlled to supply the required mixed supply water temperature. As the variable speed injection pump ramps up and requires more heat from the boiler, the boiler is fired to a temperature that is sufficient to satisfy the requirements of the variable speed injection pump. Whenever the boiler is fired, the 363 aims to maintain the boiler temperature above the BOIL MIN setting. While the boiler is firing, the variable speed injection pump is also modulated to protect the boiler from excessively low water temperatures.

Cooling Operation The 369 can operate a single cooling output to provide Cooling Control or Cooling Enable (refer to section B of the Data Brochure D 369). The change-over between heating and cooling can be achieved automatically or manually. If automatic heat / cool change-over is selected, the 369 provides a cooling interlock which prevents simultaneous heating and cooling. Heating zones assigned to the cooling group have to be satisfied for the cooling interlock time before cooling is allowed.

All control functions and specifications are listed in the Product Catalog I 000 and Data Brochures D 369 and D 363.

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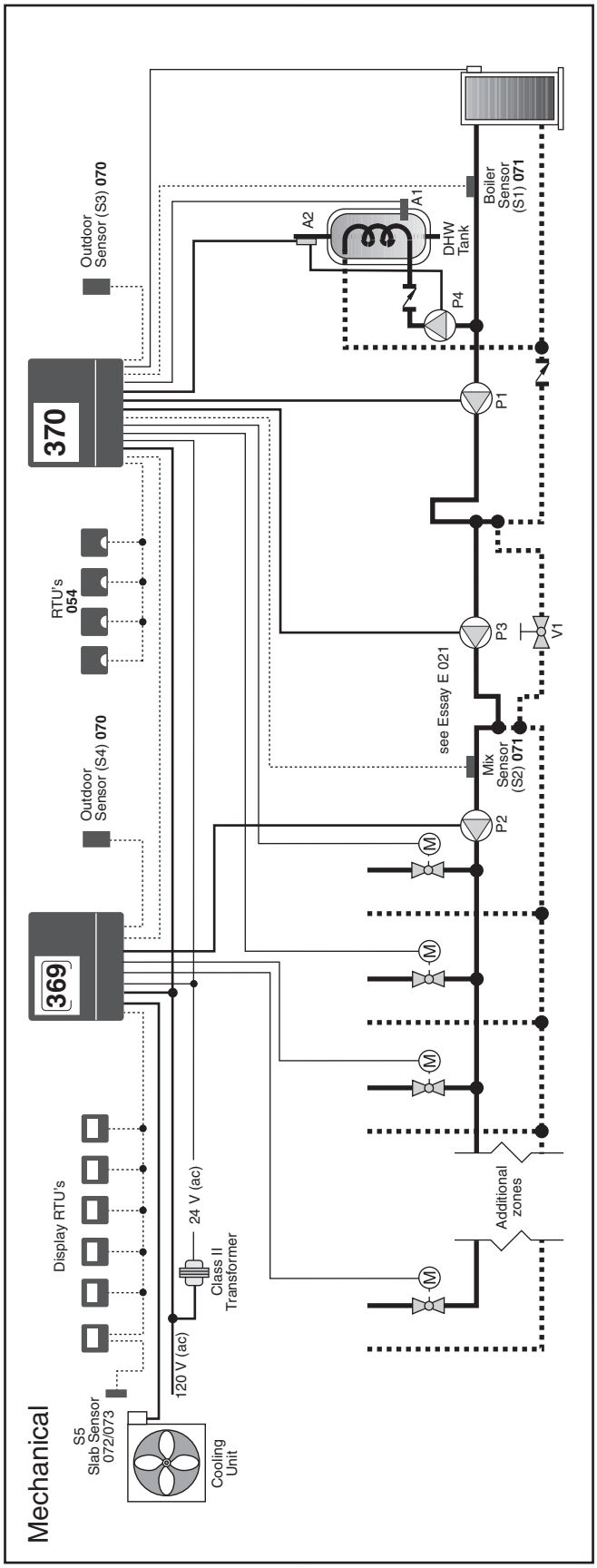
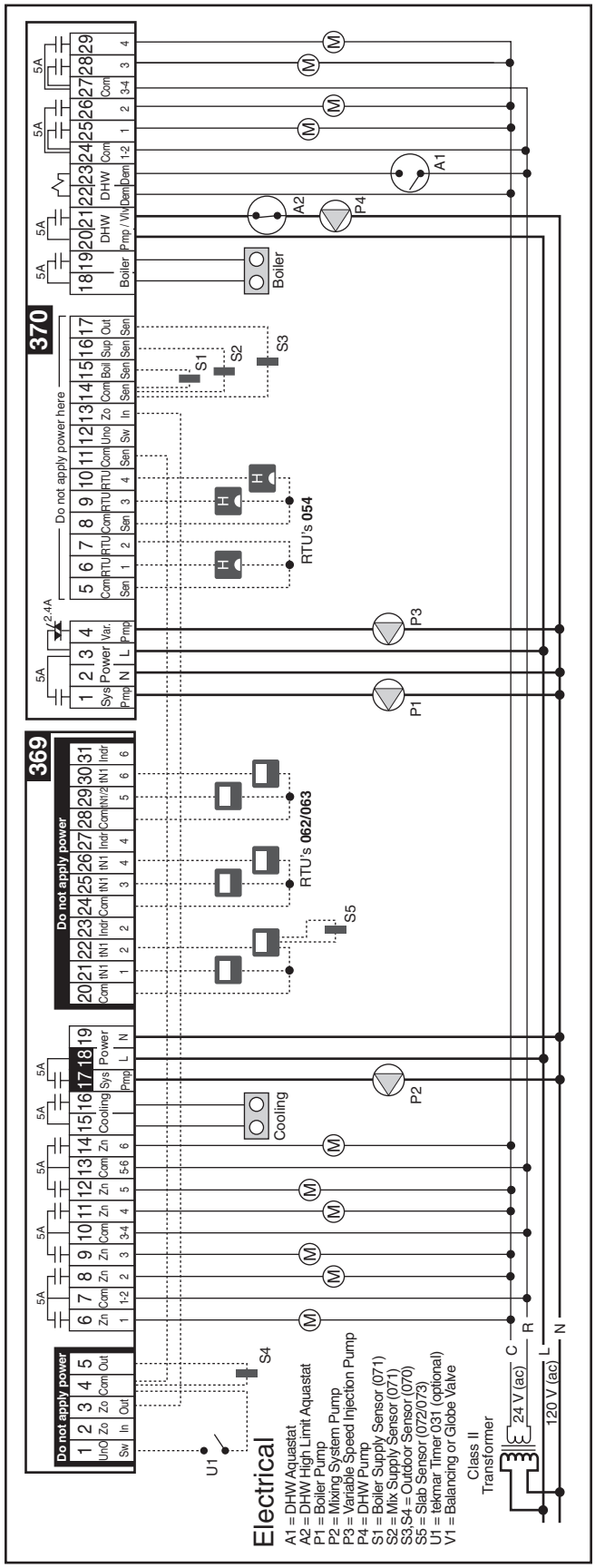
Zone Control 369 & House Control 370

A 369-5

10/00





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System Operation

The Zone Control 369 and House Control 370 combine to provide full outdoor reset to ten mixed zones. The 370 controls the output of the variable speed injection pump to provide a mixed supply water temperature to the zones and protect the boiler from flue gas condensation. The 370 also controls the supply of heat to an indirect Domestic Hot Water (DHW) tank. The boiler operates at the required temperature in order to satisfy all loads. When cooling is required, the 369 operates a cooling output.

Heat Source Details The heat source can be either a high mass or low mass non-condensing boiler.

Piping Details Room temperature Unit (RTU) controlled zone valves are piped into the mixed loop. The variable speed injection pump (P3) is piped in primary / secondary in order to isolate the boiler loop flow rate from the mixed loop flow rate. The boiler pump (P1) provides flow through the boiler, and ensures flow past the variable speed injection pump take off.

Heating Zones The air temperatures in the mixed zones are controlled using RTUs. The 369 and 370 uses PID (proportional, integral, derivative) air temperature control and can synchronize the operation of the zones to provide more even loading of the system.

DHW Demand When the DHW aquastat (A1) calls for heat, the 370 turns on the DHW pump (P4) and raises the boiler water temperature to at least the 180°F (82°C). The 370 can provide *DHW Priority* by turning off the variable speed injection pump (P3). Once the DHW demand is removed, the 370 performs a DHW Post Purge and possibly a DHW Mixing Purge.

Mixing Operation The 370 uses an outdoor reset strategy together with indoor temperature feedback from the RTUs to adjust the mixed supply water temperature. When heat is required in the mixed zones, the 370 turns on the boiler pump (P1) and mixing system pump (P2). The variable speed injection pump is then controlled to supply the required mixed supply water temperature. As the variable speed injection pump ramps up and requires more heat from the boiler, the boiler is fired to a temperature that is sufficient to satisfy the requirements of the variable speed injection pump. Whenever the boiler is fired, the 370 aims to maintain the boiler temperature above the *Min. Boiler Supply* dial setting. While the boiler is firing, the variable speed injection pump is also modulated to protect the boiler from excessively low water temperatures.

Cooling Operation The 369 can operate a single cooling output to provide Cooling Control or Cooling Enable (refer to section B of the Data Brochure D 369). The change-over between heating and cooling can be achieved automatically or manually. If automatic heat / cool change-over is selected, the 369 provides a cooling interlock which prevents simultaneous heating and cooling. Heating zones assigned to the cooling group have to be satisfied for the cooling interlock time before cooling is allowed.

All control functions and specifications are listed in the Product Catalog I 000 and Data Brochures D 369 and D 370.

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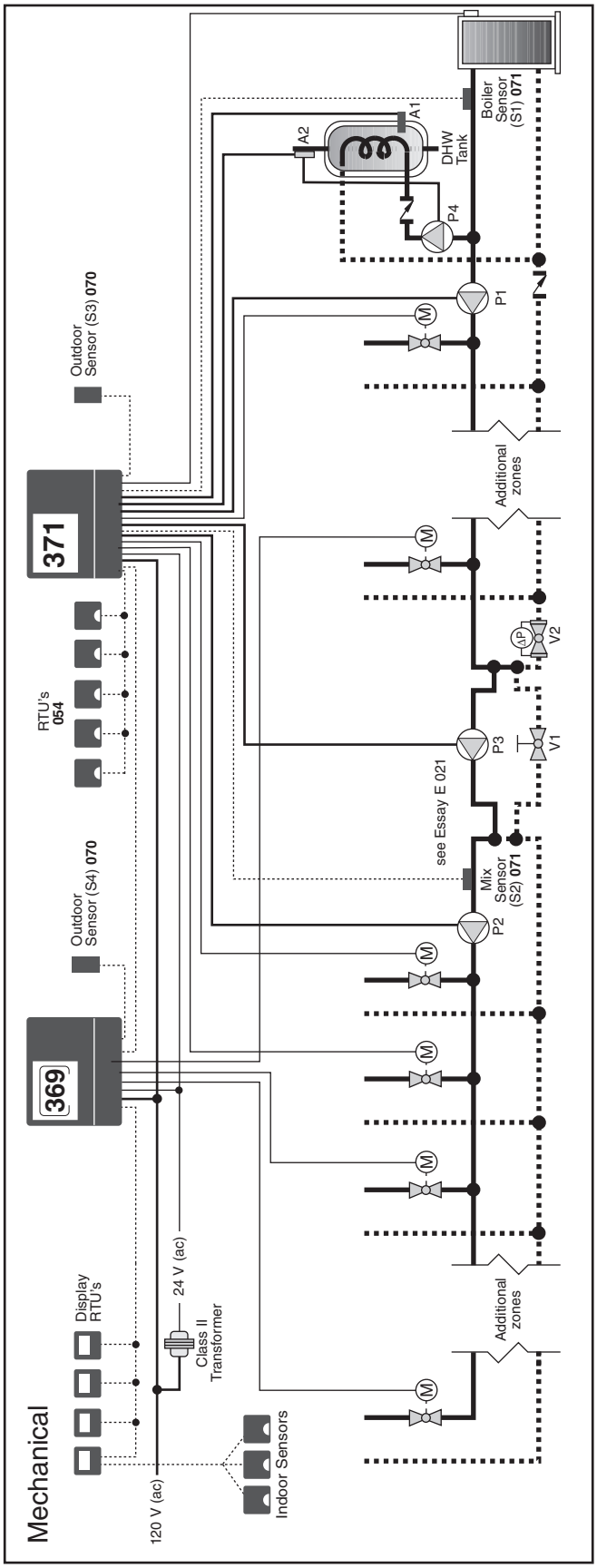
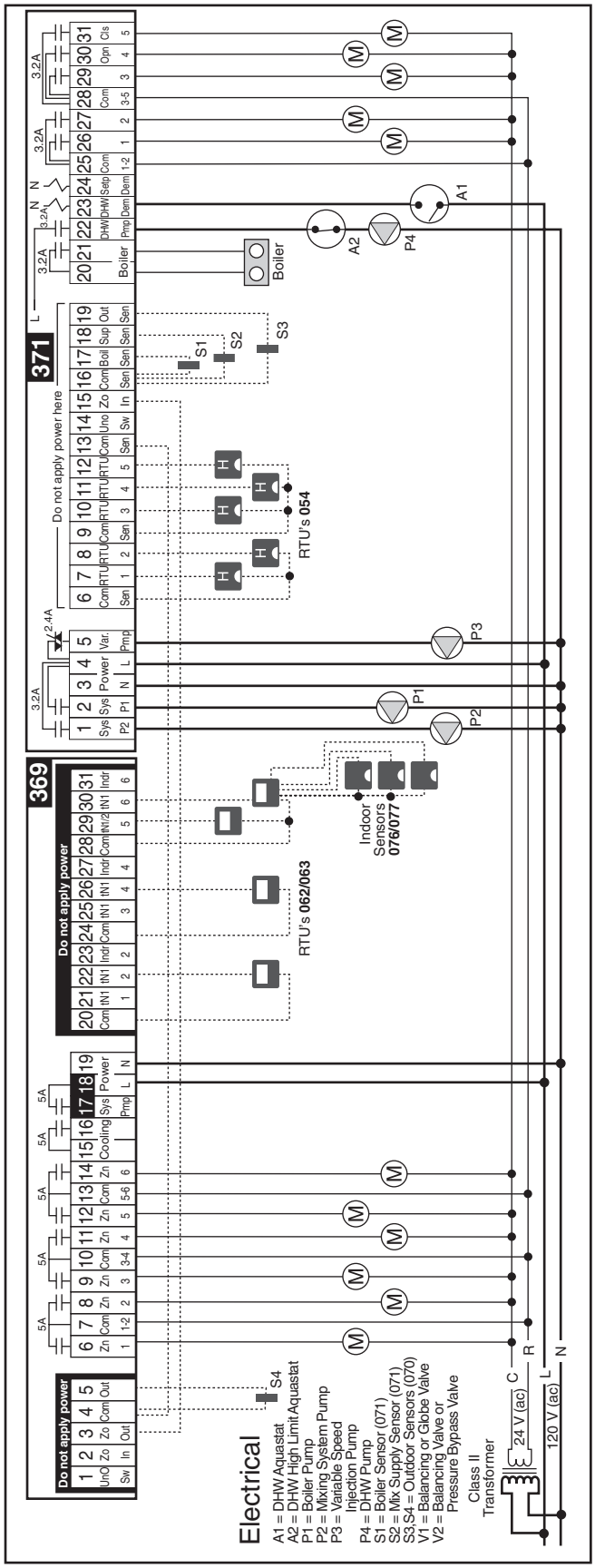
Zone Control 369 & House Control 371

A 369-6

10/00





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System Operation

The Zone Control 369 and House Control 371 combine to provide outdoor reset to one boiler zone, two - two stage zones, and six mixed zones. The 371 controls the output of the variable speed injection pump to provide a mixed supply water temperature to the mixed zones and protect the boiler from flue gas condensation. The 371 also controls the supply of heat to an indirect Domestic Hot Water (DHW) tank. The boiler operates at the required temperature in order to satisfy all loads.

Heat Source Details The heat source can be either a high mass or low mass non-condensing boiler.

Piping Details Room temperature Unit (RTU) controlled zone valves are piped into the boiler loop. Room temperature Unit (RTU) controlled zone valves are piped into the mixed loop. The variable speed injection pump (P3) is piped in primary / secondary in order to isolate the boiler loop flow rate from the mixed loop flow rate. The boiler pump (P1) provides flow through the boiler, boiler zones and high temperature of two stage mixed zones, and ensures flow past the variable speed injection pump take off.

Heating Zones The air temperatures in the boiler zone and mixed zones are controlled using RTUs. The 369 and 371 uses PID (proportional, integral, derivative) air temperature control and can synchronize the operation of the zones to provide more even loading of the system.

DHW Demand When the DHW aquastat (A1) calls for heat, the 371 turns on the DHW pump (P4) and raises the boiler water temperature to at least 180°F (82°C). The 371 provides a conditional DHW Priority by closing the boiler zones and turning off the boiler pump (P1) until the boiler temperature is greater than 170°F (77°C). Once the DHW demand is removed, the 371 performs a DHW Post Purge and possibly a DHW Mixing Purge.

Mixing Operation The 371 uses an outdoor reset strategy together with indoor temperature feedback from the mixed zones to adjust the mixed supply water temperature. When heat is required in the mixed zones, the 371 turns on the boiler pump (P1) and the mixing system pump (P2). The variable speed injection pump is then controlled to supply the required mixed supply water temperature. As the variable speed injection pump ramps up and requires more heat from the boiler, the boiler is fired to a temperature that is sufficient to satisfy the requirements of the variable speed injection pump. Whenever the boiler is fired, the 371 aims to maintain the boiler temperature above the *Min. Boiler Supply* dial setting. While the boiler is firing, the variable speed injection pump is also modulated to protect the boiler from excessively low water temperatures.

Boiler Operation The 371 uses an outdoor reset strategy together with indoor temperature feedback from the boiler zone to adjust the boiler supply water temperature. When heat is required in the boiler zone, the 371 turns on the boiler pump (P1) and opens the zone valve. The boiler is fired to satisfy the required boiler supply water temperature. Whenever the boiler is fired, the 371 aims to maintain the boiler temperature above the *Min. Boiler Supply* dial setting. While the boiler is firing, the variable speed injection pump is also modulated to protect the boiler from excessively low water temperatures.

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