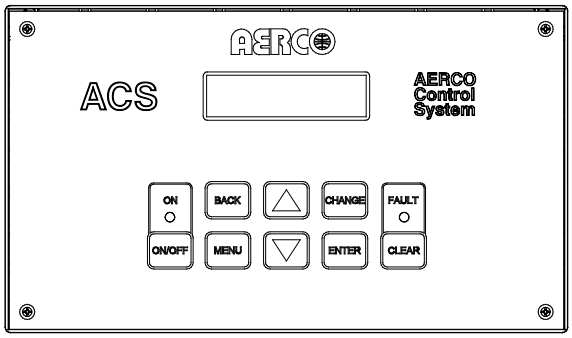
Applications Guide

AERCO Control System (ACS)

Combination Domestic/Space Heating



ACS Front Panel

03/27/2012

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Table of Contents

1. CONCEPT 4
2. ACCESSORY (FIELD PROVIDED) SPECIFICATIONS 4
2.1. Aquastat 4
2.2. 2-way Motorized Valve(s): 4
2.3. Pump: 4
3. ACS PANEL DOMESTIC HEATING OPTIONS 5
4. SEQUENCE OF OPERATION 5
4.1. OPTION 1: Designated Domestic Hot Water Boiler(s) Using ACS Panel (A) or ACS Panel and ACS Relay Box (B) 5
4.1.1. OPTION 1-A: Designated Domestic Hot Water Boiler(s) Using ACS Panel ONLY (See Diagram 1, 2 and 11) 5
4.1.2. OPTION 1-B: Designated Domestic Hot Water Boiler(s) Using ACS Panel AND ACS Relay Box (Available April 2012) (See Diagram 3, 4 and 12) 6
4.2. OPTION 2: Designated Domestic Priority Boiler(s) and Designated Building Priority (Swing) Boiler(s) Using ACS Panel AND ACS Relay Box (Available April 2012) (See Diagram 5, 6, and 12) 6
4.3. OPTION 3: Header Temperature Boost (See Diagrams 7 to 10, 13, and 14) 7
5. COMBINATION PLANT SIZING 7
6. COMPONENT DESIGN 8
7. WIRING DIAGRAMS 8

1. CONCEPT

Individual water heaters and boilers achieve maximum efficiency and precise temperature control. However, when factors such as existing indirect storage water heaters, restricted fuel input, or space limitations are conditions to be met, AERCO boilers can be used in a dual service role.

In order to accommodate the requirements for both space heating and the production of domestic hot water, multiple boilers can be used in a combination space heating and domestic water heating plant. Boilers are piped in a multiple boiler arrangement as they would be in a multiple unit space heating plant. See Combination Boiler Plant Sizing section for recommendations on number of boilers required. The boilers for domestic water production are isolated from the heating system in the supply piping by means of two-way motorized valve(s). An external hot water storage generator is used to convert boiler water to produce potable water through a closed loop coil. Upon demand for domestic water, the isolated (combination duty) boilers produce a constant temperature supply by operating in the internal setpoint mode.

The AERCO Control System (ACS) Panel is designed to stage the operation of up to 32 boilers. Eight (8) of the 32 boilers can be designated for domestic water heating in constant setpoint mode. The ACS Panel uses a simple tank aquastat to start domestic water production. It allows a transfer of the motorized valve and the control of the boilers when the space heating requires their added input. An optional ACS Relay Box (Available April 2012) can be used in conjunction with the ACS Panel to operate a second motorized valve and to enable/disable the domestic boiler water pump.

2. ACCESSORY (FIELD PROVIDED) SPECIFICATIONS

Use the following specifications when selecting an aquastat, motorized two-way valve(s), and combination system pump for use with the AERCO Control System.

2.1. Aquastat

- ±10°F Minimum Deadband
- Contact switch: Dry (unpowered)

2.2. 2-way Motorized Valve(s):

- Maximum amp draw = 5 A @ 250VAC general use; 5A @30VDC resistive; 125VA @ 120VAC Pilot Duty
- Required: Proof of open end-switch
- Recommended: Fail-Safe position (Open)

2.3. Pump:

- 1/4 HP @125VAC; 5A @ 30VDC resistive

NOTE

If valve and/or pump loads exceed the above contact ratings of the ACS and ACS Relay box, use these relays as pilot duty to activate external relays (field provided).

3. ACS PANEL DOMESTIC HEATING OPTIONS

There are three domestic heating options for the ACS.

- **Option 1:** Designated Domestic Hot Water Boiler(s) Using ACS Panel Only **OR** using ACS Panel and ACS Replay Box. Applicable to C-More controlled boilers only. Not applicable to Modulex boilers.
- **Option 2:** Designated Domestic Priority Boiler(s) and Designated Building Priority (Swing) Boiler(s) Applicable to C-More controlled boilers only. Not applicable to Modulex boilers.
- **Option 3:** Header Temperature Boost
  Applicable to C-More controlled boilers and Modulex boilers.

Options 1 and 3 require only the ACS Panel. Option 1 can also use the ACS Relay Box if control of the combination system pump cannot be achieved with building controls. Option 2 requires the ACS Panel and the ACS Relay Box (Available April 2012)

4. SEQUENCE OF OPERATION

4.1. OPTION 1: Designated Domestic Hot Water Boiler(s) Using ACS Panel (A) or ACS Panel and ACS Relay Box (B)

4.1.1. OPTION 1-A: Designated Domestic Hot Water Boiler(s) Using ACS Panel ONLY (See Diagram 1, 2 and 11)

- B1 and B2 are the space heating boilers; B3 is the domestic hot water boiler.
- **The Combination System pump shall be enabled/disabled by the building controls.**
- V1 isolates the domestic hot water boilers(s) from the space heating boilers.

An aquastat closure signals the ACS there is a domestic load. The ACS will run the domestic hot water boiler B3 in constant setpoint. At the same time, the building controls shall enable the combination system pump. When the domestic load is satisfied and the aquastat opens, the ACS disables B3 and the building controls shall disable the combination system pump.

If the space heating boilers B1 and B2 reach 100% input, the ACS will check if there is a domestic load present (via aquastat). If there is a domestic load present, the ACS will continue to run the space and domestic heating boilers independently. If there is no domestic load, the ACS will open V1, wait for its proof of open end switch to make, then runs B3 as a space heating boiler. This state will continue until one of the following occurs:

1. A domestic load is called for (via aquastat). At this point, the ACS will close V1 and run B3 as a domestic heating boiler in constant setpoint. At the same time, the building controls shall enable the combination system pump.
2. The space heating load decreases to the point in which the air-fuel valve position of B1, B2, and B3 drops below a user-programmed position (programmed in the ACS). At this point, the ACS will close V1, and returns B3 to being a domestic hot water boiler.

4.1.2. OPTION 1-B: Designated Domestic Hot Water Boiler(s) Using ACS Panel AND ACS Relay Box (Available April 2012) (See Diagram **3**, **4** and **12**)

- B1 and B2 are the space heating boilers; B3 is the domestic hot water boiler.
- **The Combination System pump shall be enabled/disabled by the ACS Relay Box.**
- V1 isolates the domestic hot water boilers(s) from the space heating boilers.

An aquastat closure signals the ACS there is a domestic load. The ACS will enable the combination system pump and run the domestic hot water boiler B3 in constant setpoint. When the domestic load is satisfied and the aquastat opens, the ACS disables the pump and B3.

If the space heating boilers B1 and B2 reach 100% input, the ACS will check if there is a domestic load present (via aquastat). If there is a domestic load present, the ACS will continue to run the space and domestic heating boilers independently. If there is no domestic load, the ACS will open V1, wait for its proof of open end switch to make, then runs B3 as a space heating boiler. This state will continue until one of the following occurs:

1. A domestic load is called for (via aquastat). At this point, the ACS will close V1, enable the combination system pump, and run B3 as a domestic heating boiler in constant setpoint.
2. The space heating load decreases to the point in which the air-fuel valve position of B1, B2, and B3 drops below a user-programmed position (programmed in the ACS). At this point, the ACS will close V1, and returns B3 to being a domestic hot water boiler.

4.2. OPTION 2: Designated Domestic Priority Boiler(s) and Designated Building Priority (Swing) Boiler(s) Using ACS Panel AND ACS Relay Box (Available April 2012) (See Diagram **5**, **6**, and **12**)

- B1 is the space heating boiler, B2 is the building priority (swing) boiler, and B3 is the domestic priority boiler
- The Combination System pump shall be enabled/disabled by the ACS Relay Box
- When both space heating and domestic load are present:
  - V1 is closed → B3 is dedicated to domestic heating.
  - V2 is open → B1 and B2 are in space heating mode.

An aquastat closure signals the ACS there is a domestic load. The ACS will enable the combination system pump and run the domestic priority boiler B3 in constant setpoint. When the domestic load is satisfied and the aquastat opens, the ACS disables the pump and B3.

If B3 reaches 100% input and stays there for more than 2 minutes, the ACS will open V1, close V2, and run B2 as a domestic heating boiler together with B3. This state will continue until the domestic load is statisfied (aquastat opens). At this point, the ACS will disable the combination system pump and B3, close V1, open V2, and return B2 to being a building priority boiler.

If the space heating boilers B1 and B2 reach 100% input, the ACS will check if there is a domestic load present (via aquastat). If there is a domestic load present, the ACS will continue to run the space and domestic priority boilers independently. If there is no domestic load, the ACS will open V1 (V2 remains open), wait for V1's proof of open end switch to make, then runs

B3 as a space heating boiler. This state will continue until one of the following occurs:

1. A domestic load is called for (via aquastat). At this point, the ACS will close V1, enable the combination system pump, and run B3 as a domestic priority boiler in constant setpoint.
2. The space heating load decreases to the point in which the air-fuel valve position of B1, B2, and B3 drops below a user-programmed position (programmed in the ACS). At this point, the ACS will close V1, and returns B3 to being a domestic priority boiler

NOTE

For Option 2, the Remote Interlocks of the Building Priority (swing) boilers must be wired to the BLR INTLK input of the ACS Relay Box. This ensures the swing boilers will only run when there is flow through them (either V1 or V2 is open). It is also recommended that the failsafe state of the swing boilers (user-programmed in the boiler C-More controls) be set to shut down. This ensures in the event the Modbus signal is lost from the ACS, the swing boilers do not fire in case V1 or V2 failed to open.

4.3. OPTION 3: Header Temperature Boost (See Diagrams **7** to **10**, **13**, and **14**)

An aquastat closure signals the ACS there is a domestic load. If the current header temperature is below the programmed "Boost Temperature", the ACS will ramp up the boilers accordingly until the boost temperature is reached. When the domestic load is satisfied and the aquastat opens, the ACS goes back to maintaining the space heating constant setpoint or goes back to following the outdoor reset or the 4-20mA/Modbus remote setpoint signal.

5. COMBINATION PLANT SIZING

The required size of a combination boiler plant is not the simple sum of the space heating load and domestic hot water load. The factor obtained from Figure 1 is multiplied by the peak domestic hot water load to obtain the boiler output capacity **to be added to the space heating load**. The result is the total required boiler output capacity. Figure 1 indicates the reduction of additional heat supply for domestic water heating if the ratio of domestic water heating to space heating is low. This reduction is possible because

- Maximum space-heating requirements do not occur at the time of day when the maximum peak hot-water demands occur.
- Space-heating requirements are based on the lowest outside design temperature, which may occur for only a few days of the total heating season.
- An additional heat supply or boiler capacity to compensate for pickup and radiation losses is usual. The pickup load cannot occur at the same time as the peak domestic hot water load because the building must be brought to a comfortable temperature before the occupants use hot water.

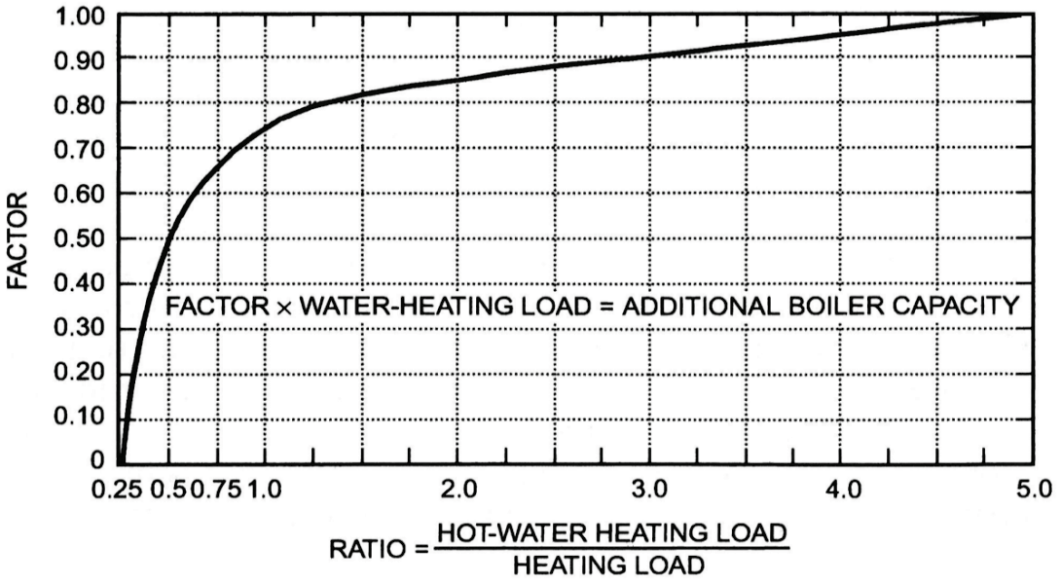


Figure 1: Table Sizing Factor for Combination Heating and Water Heating Boilers

NOTE: Chart taken from ASHRAE 2007 HVAC Applications Handbook.

Example Using Figure 1:

Space Heating Load = 5500 MBH

Hot-Water Heating (Domestic) Load = 4100 MBH

Ratio = 4100 MBH / 5500 MBH = 0.74

From **Figure 1**, Factor = 0.67

The additional boiler capacity to be added to the space heating load is factor x domestic = 0.67 x 4100 MBH

Total Plant Capacity = 5500 MBH + (0.67 x 4100 MBH) = 8247 MBH

Number of Boilers = Total Plant Capacity / Output per Boiler

If BMK2.0LN Boilers are used:

Number of BMK2.0LN = 8247 / 1706 = 5 BMK2.0LN Boilers

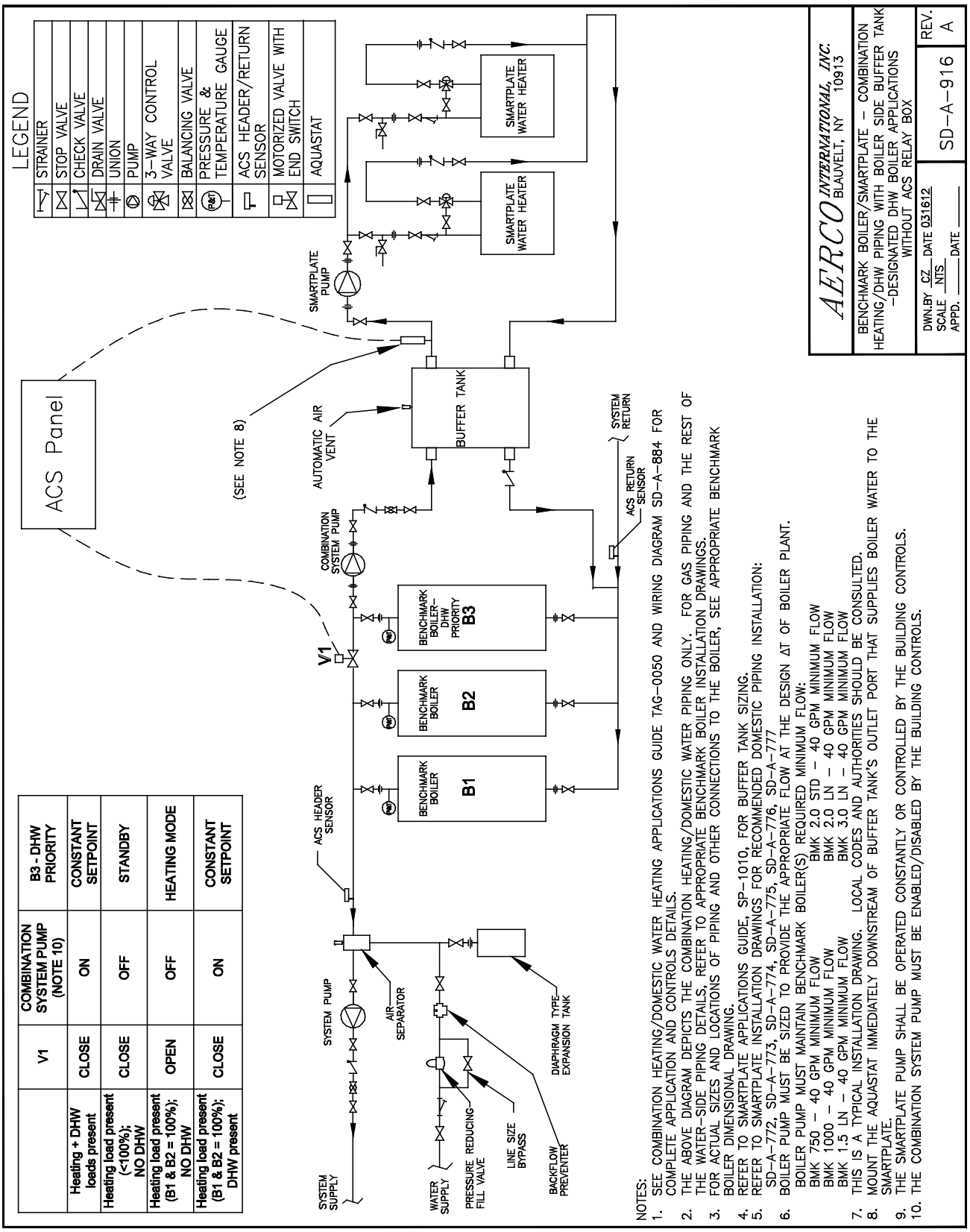
6. COMPONENT DESIGN

Domestic water sizing for a combination plant should be done in accordance with ASHRAE and ASPE standards. The storage tank size should be adequate for small domestic water draws without short cycling the domestic tank aquastat. The combination of recovery and storage should be as prescribed in the ASHRAE/ASPE methods.

The recovery of the storage tank coil exchanger should be based on a temperature drop of 20°F, or the same temperature drop as the heating system that the plant supplies. When sizing the circulating pump between the combination boiler(s) and the tank coil, the flow of the pump must be greater than the sum of the required minimum flow of the boilers. The head of the pump must be capable of overcoming the pressure drop of the boilers, the tank coil, and the frictional resistance of all piping/ accessories between them. Air elimination and expansion accessories may be required in the coil loop as well as the main heating loop.

7. WIRING DIAGRAMS

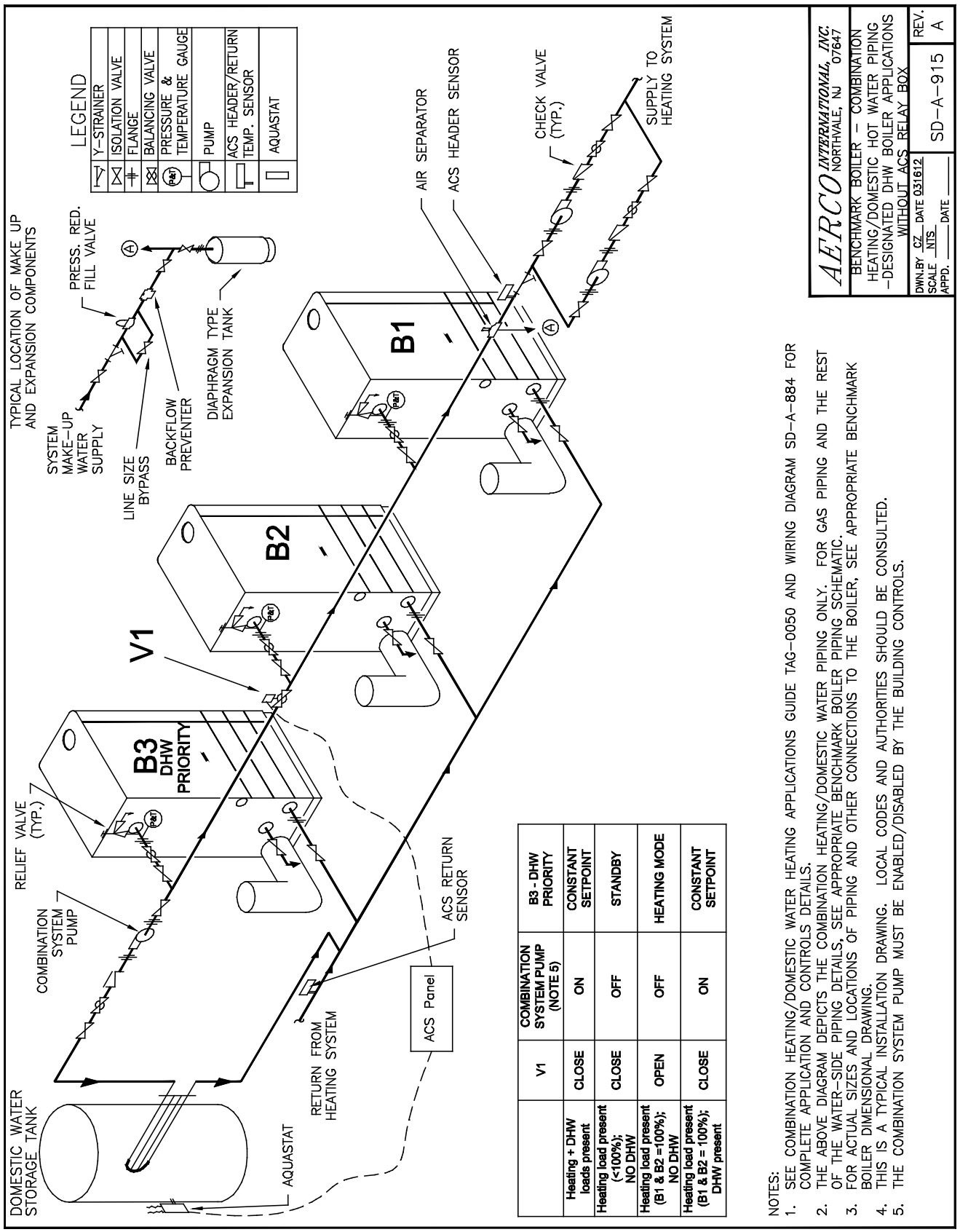
The wiring diagrams referenced to in this application guide (Diagrams 1-14) are provided on the following pages.



	V1	COMBINATION SYSTEM PUMP (NOTE 10)	B3 - DHW PRIORITY
Heating + DHW loads present	CLOSE	ON	CONSTANT SETPOINT
Heating load present (<100%); NO DHW	CLOSE	OFF	STANDBY
Heating load present (B1 & B2 = 100%); NO DHW	OPEN	OFF	HEATING MODE
Heating load present (B1 & B2 = 100%); DHW present	CLOSE	ON	CONSTANT SETPOINT

NOTES:
1. SEE COMBINATION HEATING/DOMESTIC WATER HEATING APPLICATIONS GUIDE TAG–0050 AND WIRING DIAGRAM SD–A–884 FOR COMPLETE APPLICATION AND CONTROLS DETAILS.
2. THE ABOVE DIAGRAM DEPICTS THE COMBINATION HEATING/DOMESTIC WATER PIPING ONLY. FOR GAS PIPING AND THE REST OF THE WATER–SIDE PIPING DETAILS, REFER TO APPROPRIATE BENCHMARK BOILER INSTALLATION DRAWINGS.
3. FOR ACTUAL SIZES AND LOCATIONS OF PIPING AND OTHER CONNECTIONS TO THE BOILER, SEE APPROPRIATE BENCHMARK BOILER DIMENSIONAL DRAWING.
4. REFER TO SMARTPLATE APPLICATIONS GUIDE, SP–1010, FOR BUFFER TANK SIZING.
5. REFER TO SMARTPLATE INSTALLATION DRAWINGS FOR RECOMMENDED DOMESTIC PIPING INSTALLATION: SD–A–772, SD–A–773, SD–A–774, SD–A–775, SD–A–776, SD–A–777
6. BOILER PUMP MUST BE SIZED TO PROVIDE THE APPROPRIATE FLOW AT THE DESIGN ΔT OF BOILER PLANT.
   BOILER PUMP MUST MAINTAIN BENCHMARK BOILER(S) REQUIRED MINIMUM FLOW:
   BMK 750 – 40 GPM MINIMUM FLOW — BMK 2.0 STD – 40 GPM MINIMUM FLOW
   BMK 1000 – 40 GPM MINIMUM FLOW — BMK 2.0 LN – 40 GPM MINIMUM FLOW
   BMK 1.5 LN – 40 GPM MINIMUM FLOW — BMK 3.0 LN – 40 GPM MINIMUM FLOW
7. THIS IS A TYPICAL INSTALLATION DRAWING. LOCAL CODES AND AUTHORITIES SHOULD BE CONSULTED.
8. MOUNT THE AQUASTAT IMMEDIATELY DOWNSTREAM OF BUFFER TANK'S OUTLET PORT THAT SUPPLIES BOILER WATER TO THE SMARTPLATE.
9. THE SMARTPLATE PUMP SHALL BE OPERATED CONSTANTLY OR CONTROLLED BY THE BUILDING CONTROLS.
10. THE COMBINATION SYSTEM PUMP MUST BE ENABLED/DISABLED BY THE BUILDING CONTROLS.

Diagram 1: Benchmark Boiler/Smartplate – Combination Heating/DHW Piping w/Boiler Side Buffer Tank (Designated DHW Boiler Applications without ACS Relay Box)



	V1	COMBINATION SYSTEM PUMP (NOTE 5)	B3 - DHW PRIORITY
Heating + DHW loads present	CLOSE	ON	CONSTANT SETPOINT
Heating load present (<100%); NO DHW	CLOSE	OFF	STANDBY
Heating load present (B1 & B2 =100%); NO DHW	OPEN	OFF	HEATING MODE
Heating load present (B1 & B2 = 100%); DHW present	CLOSE	ON	CONSTANT SETPOINT

NOTES:
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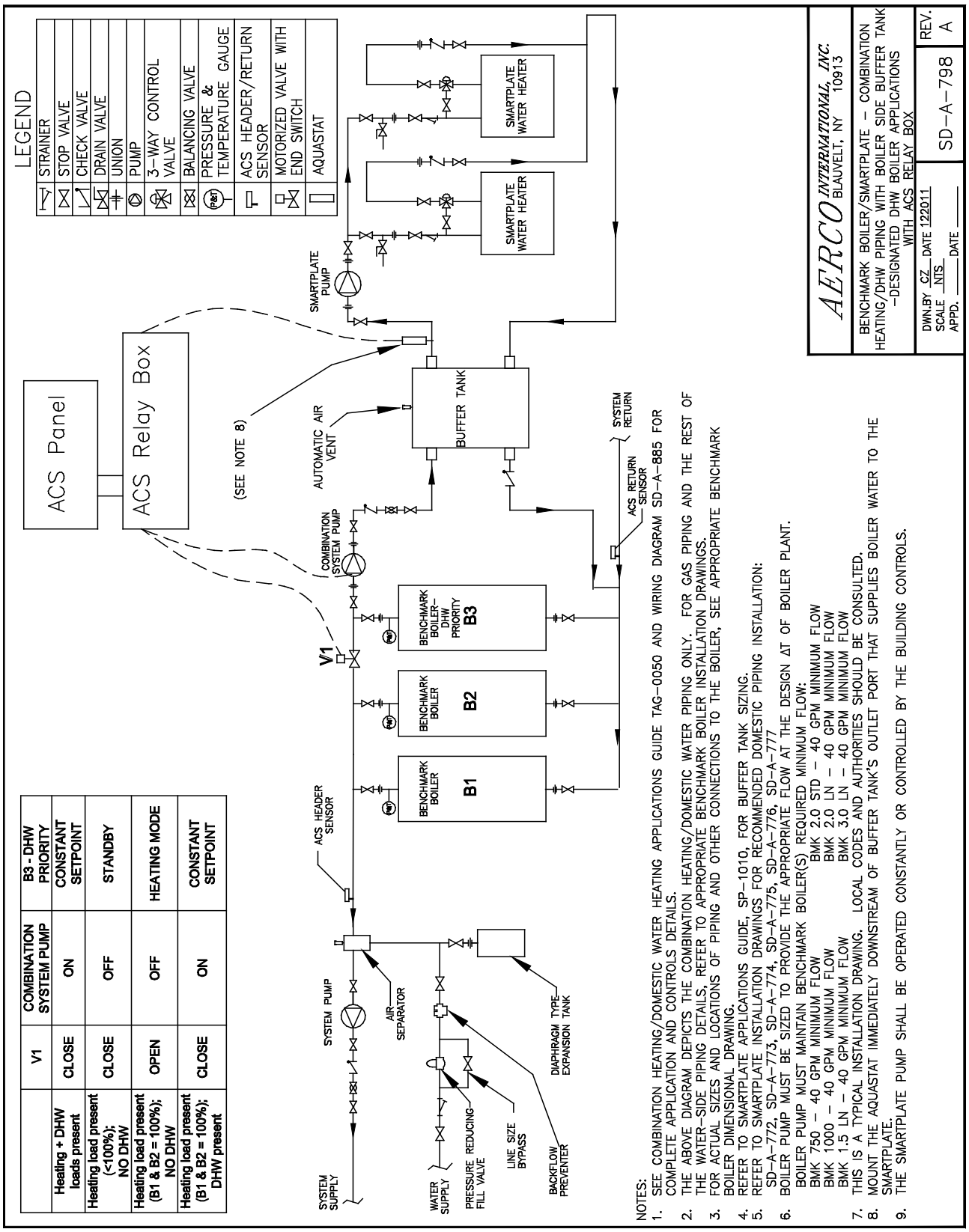
5. THE COMBINATION SYSTEM PUMP MUST BE ENABLED/DISABLED BY THE BUILDING CONTROLS.

Diagram 2: Benchmark Boiler – Combination Heating/DHW Piping (Designated DHW Boiler Applications without ACS Relay Box)



	V1	COMBINATION SYSTEM PUMP	B3 - DHW PRIORITY
Heating + DHW loads present	CLOSE	ON	CONSTANT SETPOINT
Heating load present (<100%); NO DHW	CLOSE	OFF	STANDBY
Heating load present (B1 & B2 = 100%); NO DHW	OPEN	OFF	HEATING MODE
Heating load present (B1 & B2 = 100%); DHW present	CLOSE	ON	CONSTANT SETPOINT

NOTES:
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5. REFER TO SMARTPLATE INSTALLATION DRAWINGS FOR RECOMMENDED DOMESTIC PIPING INSTALLATION: SD-A-772, SD-A-773, SD-A-774, SD-A-775, SD-A-776, SD-A-777
6. BOILER PUMP MUST BE SIZED TO PROVIDE THE APPROPRIATE FLOW AT THE DESIGN ΔT OF BOILER PLANT.
   BOILER PUMP MUST MAINTAIN BENCHMARK BOILER(S) REQUIRED MINIMUM FLOW:
   BMK 750 – 40 GPM MINIMUM FLOW
   BMK 1000 – 40 GPM MINIMUM FLOW
   BMK 1.5 LN – 40 GPM MINIMUM FLOW
   BMK 2.0 STD – 40 GPM MINIMUM FLOW
   BMK 2.0 LN – 40 GPM MINIMUM FLOW
   BMK 3.0 LN – 40 GPM MINIMUM FLOW
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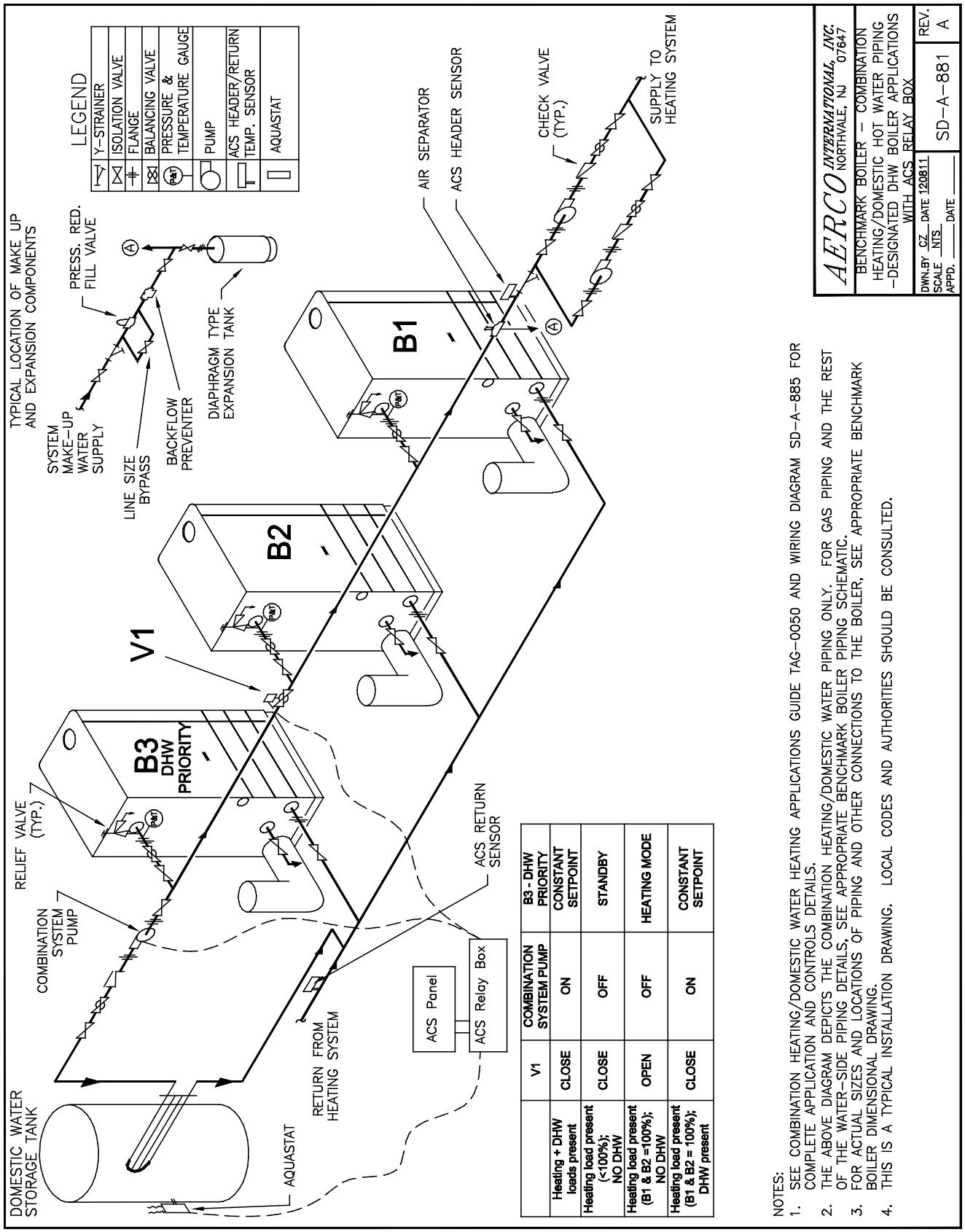
8. MOUNT THE AQUASTAT IMMEDIATELY DOWNSTREAM OF BUFFER TANK'S OUTLET PORT THAT SUPPLIES BOILER WATER TO THE SMARTPLATE.
9. THE SMARTPLATE PUMP SHALL BE OPERATED CONSTANTLY OR CONTROLLED BY THE BUILDING CONTROLS.

Diagram 3: Benchmark Boiler/Smartplate – Combination Heating/DHW Piping w/Boiler Side Buffer Tank (Designated DHW Boiler Applications with ACS Relay Box)



	V1	COMBINATION SYSTEM PUMP	B3 - DHW PRIORITY
Heating + DHW loads present	CLOSE	ON	CONSTANT SETPOINT
Heating load present (<100%); NO DHW	CLOSE	OFF	STANDBY
Heating load present (B1 & B2 =100%); NO DHW	OPEN	OFF	HEATING MODE
Heating load present (B1 & B2 = 100%); DHW present	CLOSE	ON	CONSTANT SETPOINT

NOTES:
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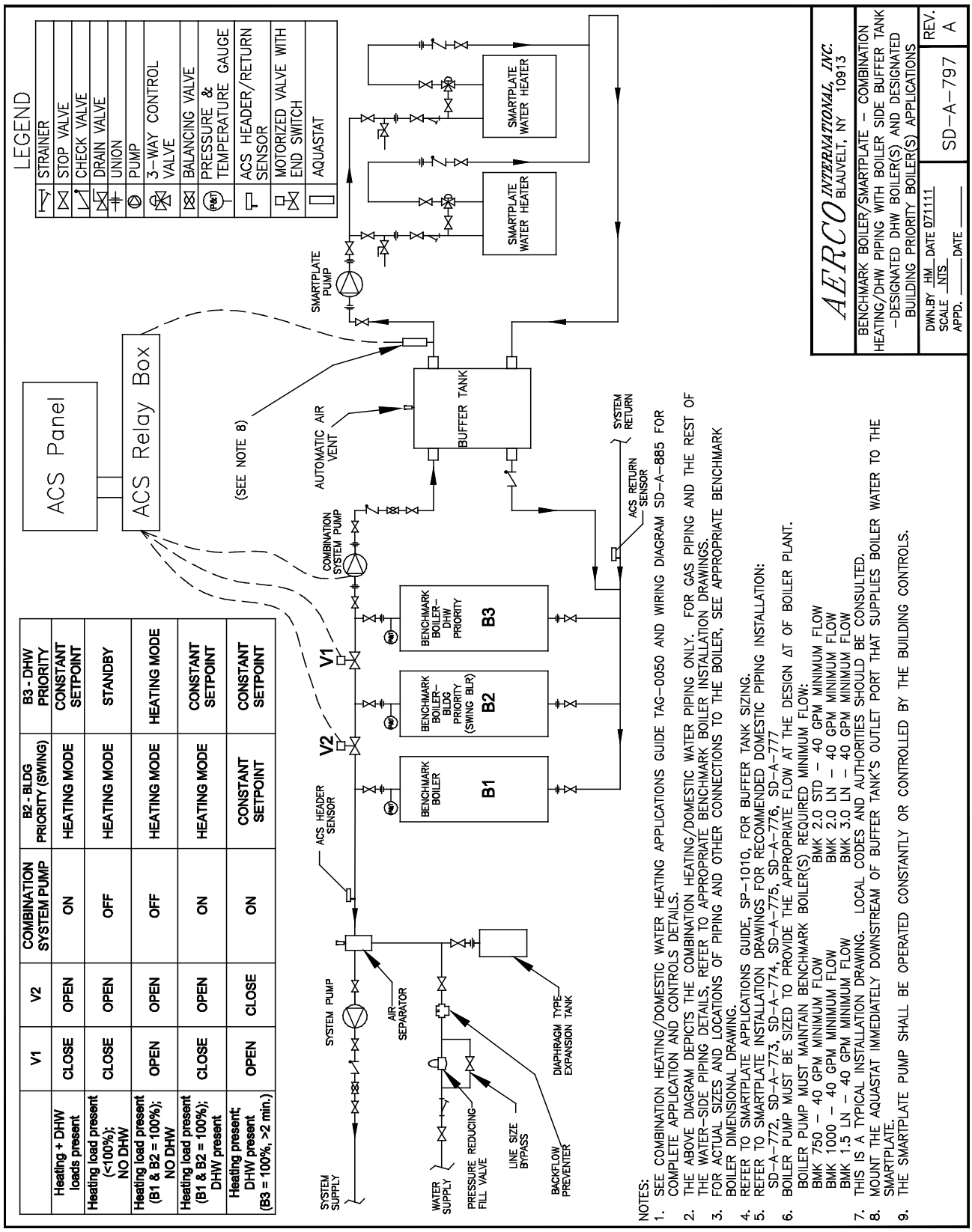

	V1	V2	COMBINATION SYSTEM PUMP	B2 - BLDG PRIORITY (SWING)	B3 - DHW PRIORITY
Heating + DHW loads present	CLOSE	OPEN	ON	HEATING MODE	CONSTANT SETPOINT
Heating load present (<100%); NO DHW	CLOSE	OPEN	OFF	HEATING MODE	STANDBY
Heating load present (B1 & B2 = 100%); NO DHW	OPEN	OPEN	OFF	HEATING MODE	HEATING MODE
Heating load present (B1 & B2 = 100%); DHW present	CLOSE	OPEN	ON	HEATING MODE	CONSTANT SETPOINT
Heating present; DHW present (B3 = 100%, >2 min.)	OPEN	CLOSE	ON	CONSTANT SETPOINT	CONSTANT SETPOINT

NOTES:
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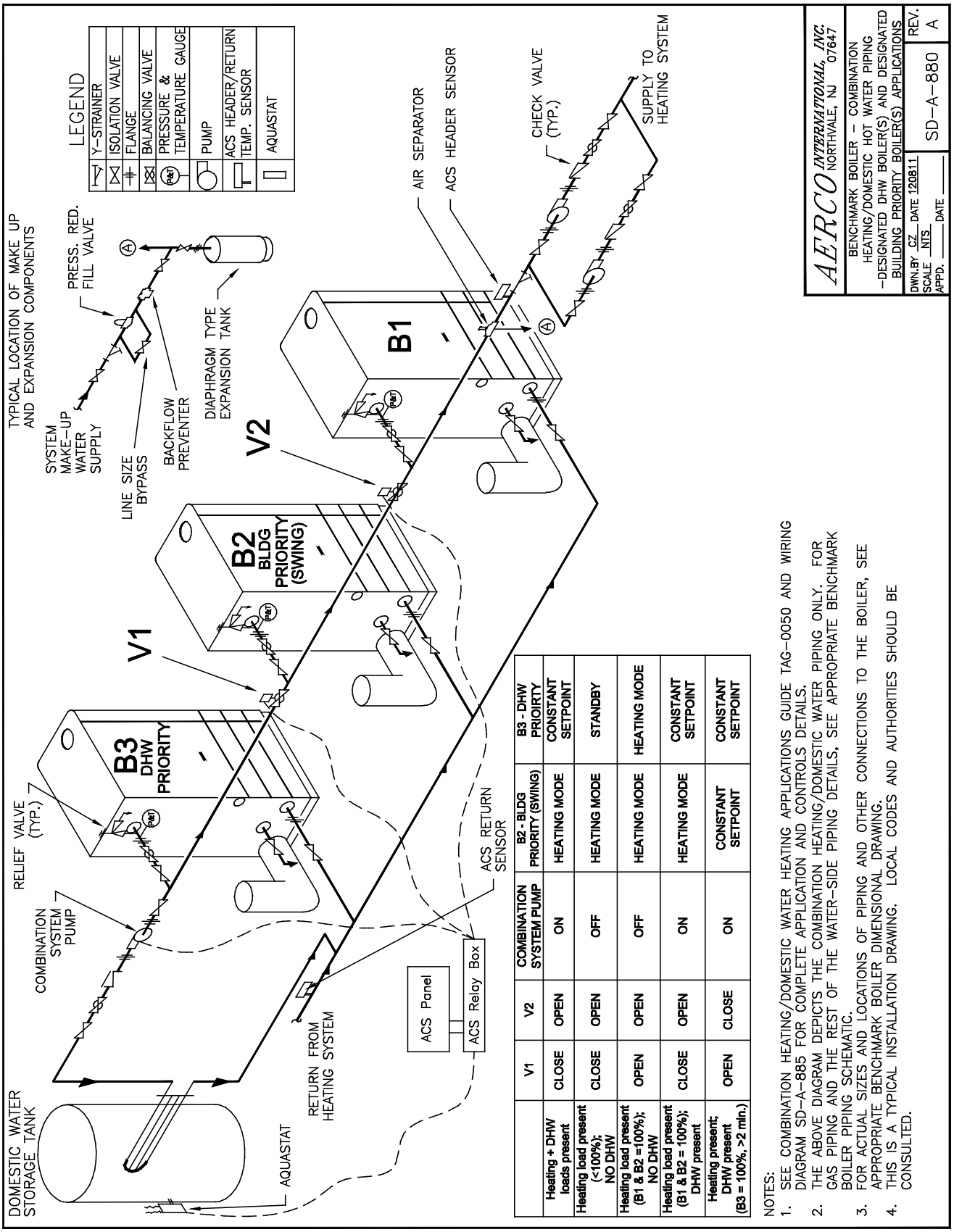

	V1	V2	COMBINATION SYSTEM PUMP	B2 - BLDG PRIORITY (SWING)	B3 - DHW PRIORITY
Heating + DHW loads present	CLOSE	OPEN	ON	HEATING MODE	CONSTANT SETPOINT
Heating load present (<100%); NO DHW	CLOSE	OPEN	OFF	HEATING MODE	STANDBY
Heating load present (B1 & B2 =100%); NO DHW	OPEN	OPEN	OFF	HEATING MODE	HEATING MODE
Heating load present (B1 & B2 = 100%); DHW present	CLOSE	OPEN	ON	HEATING MODE	CONSTANT SETPOINT
Heating present; DHW present (B3 = 100%, >2 min.)	OPEN	CLOSE	ON	CONSTANT SETPOINT	CONSTANT SETPOINT

NOTES:

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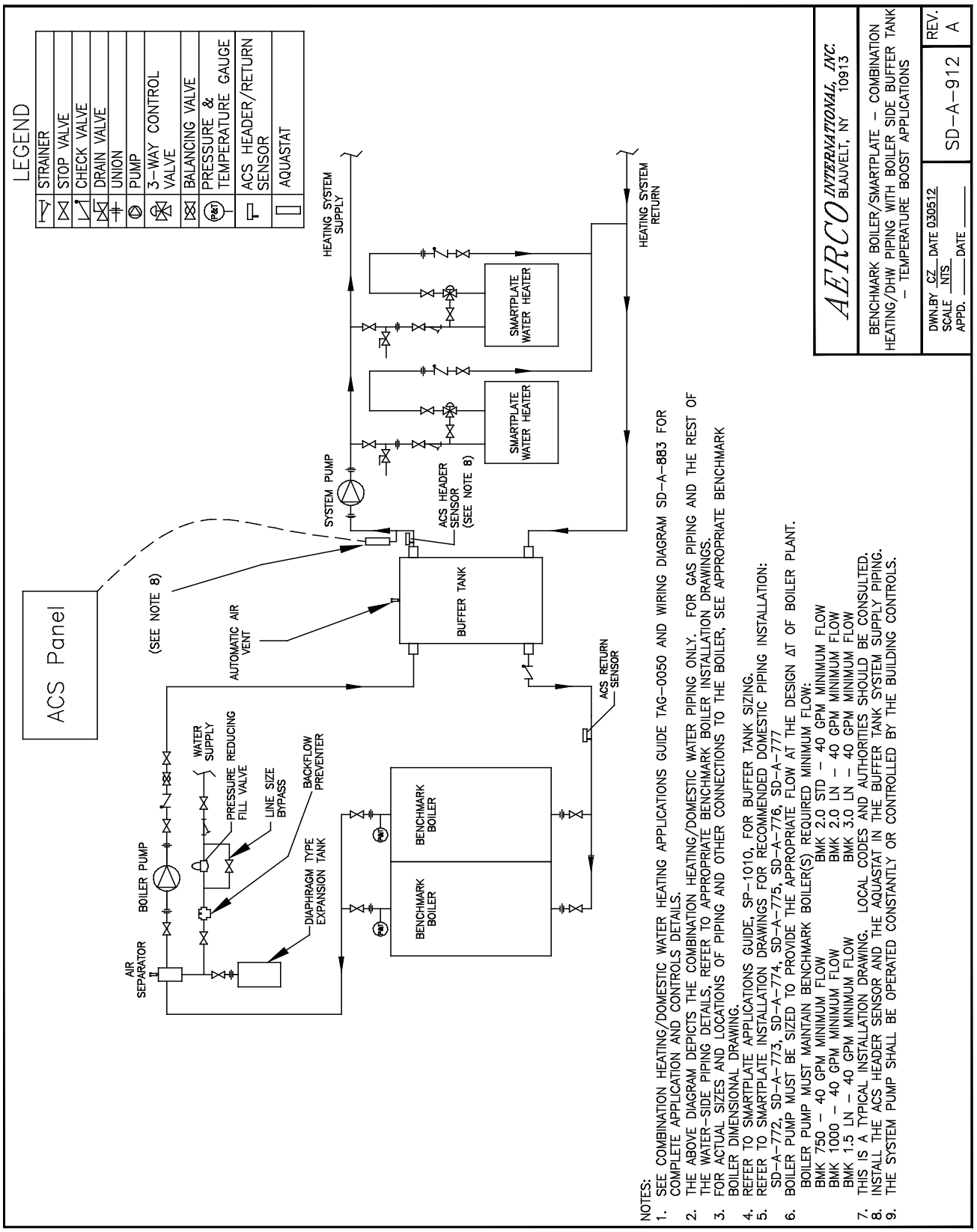
2. THE ABOVE DIAGRAM DEPICTS THE COMBINATION HEATING/DOMESTIC WATER PIPING ONLY. FOR GAS PIPING AND THE REST OF THE WATER-SIDE PIPING DETAILS, SEE APPROPRIATE BENCHMARK BOILER PIPING SCHEMATIC.
3. FOR ACTUAL SIZES AND LOCATIONS OF PIPING AND OTHER CONNECTIONS TO THE BOILER, SEE APPROPRIATE BENCHMARK BOILER DIMENSIONAL DRAWING.
4. THIS IS A TYPICAL INSTALLATION DRAWING. LOCAL CODES AND AUTHORITIES SHOULD BE CONSULTED.

Diagram 6: Benchmark Boiler – Combination Heating/DHW Piping (Designated DHW Boiler(s) and Designated Building Priority Boilers(s) Applications



NOTES:
1. SEE COMBINATION HEATING/DOMESTIC WATER HEATING APPLICATIONS GUIDE TAG-0050 AND WIRING DIAGRAM SD-A-883 FOR COMPLETE APPLICATION AND CONTROLS DETAILS.
2. THE ABOVE DIAGRAM DEPICTS THE COMBINATION HEATING/DOMESTIC WATER PIPING ONLY. FOR GAS PIPING AND THE REST OF THE WATER-SIDE PIPING DETAILS, REFER TO APPROPRIATE BENCHMARK BOILER INSTALLATION DRAWINGS.
3. FOR ACTUAL SIZES AND LOCATIONS OF PIPING AND OTHER CONNECTIONS TO THE BOILER, SEE APPROPRIATE BENCHMARK BOILER DIMENSIONAL DRAWING.
4. REFER TO SMARTPLATE APPLICATIONS GUIDE, SP-1010, FOR BUFFER TANK SIZING.
5. REFER TO SMARTPLATE INSTALLATION DRAWINGS FOR RECOMMENDED DOMESTIC PIPING INSTALLATION: SD-A-772, SD-A-773, SD-A-774, SD-A-775, SD-A-776, SD-A-777
6. BOILER PUMP MUST BE SIZED TO PROVIDE THE APPROPRIATE FLOW AT THE DESIGN ΔT OF BOILER PLANT.
   BOILER PUMP MUST MAINTAIN BENCHMARK BOILER(S) REQUIRED MINIMUM FLOW:
   BMK 750 – 40 GPM MINIMUM FLOW — BMK 2.0 STD – 40 GPM MINIMUM FLOW
   BMK 1000 – 40 GPM MINIMUM FLOW — BMK 2.0 LN – 40 GPM MINIMUM FLOW
   BMK 1.5 LN – 40 GPM MINIMUM FLOW — BMK 3.0 LN – 40 GPM MINIMUM FLOW
7. THIS IS A TYPICAL INSTALLATION DRAWING. LOCAL CODES AND AUTHORITIES SHOULD BE CONSULTED.
8. INSTALL THE ACS HEADER SENSOR AND THE AQUASTAT IN THE BUFFER TANK SYSTEM SUPPLY PIPING.
9. THE SYSTEM PUMP SHALL BE OPERATED CONSTANTLY OR CONTROLLED BY THE BUILDING CONTROLS.

Diagram 7: Benchmark Boiler/Smartplate – Combination Heating/DHW Piping w/Boiler Side Buffer Tank – Temperature Boost Applications

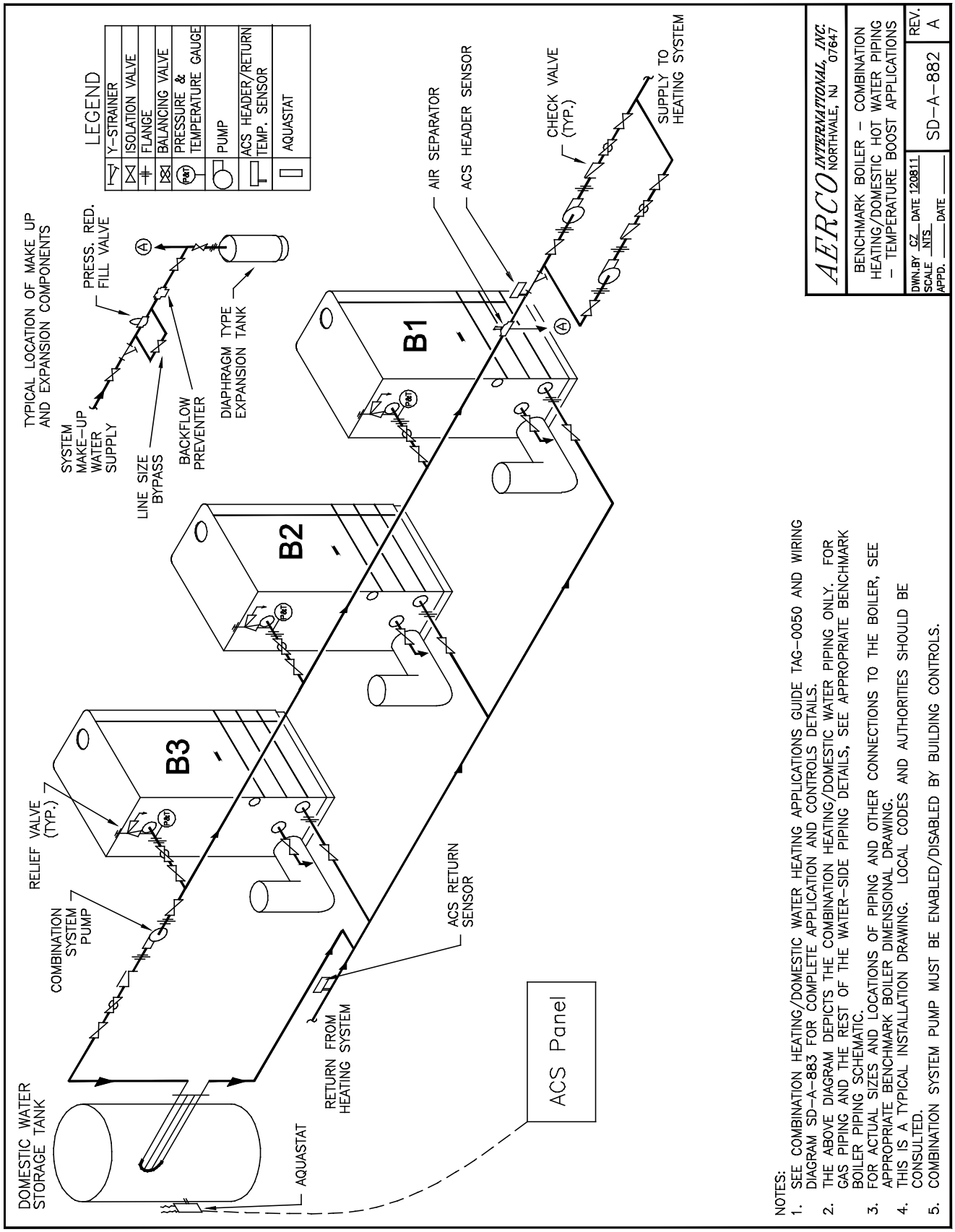


Diagram 8: Benchmark Boiler – Combination Heating/DHW Piping – Temperature Boost Applications

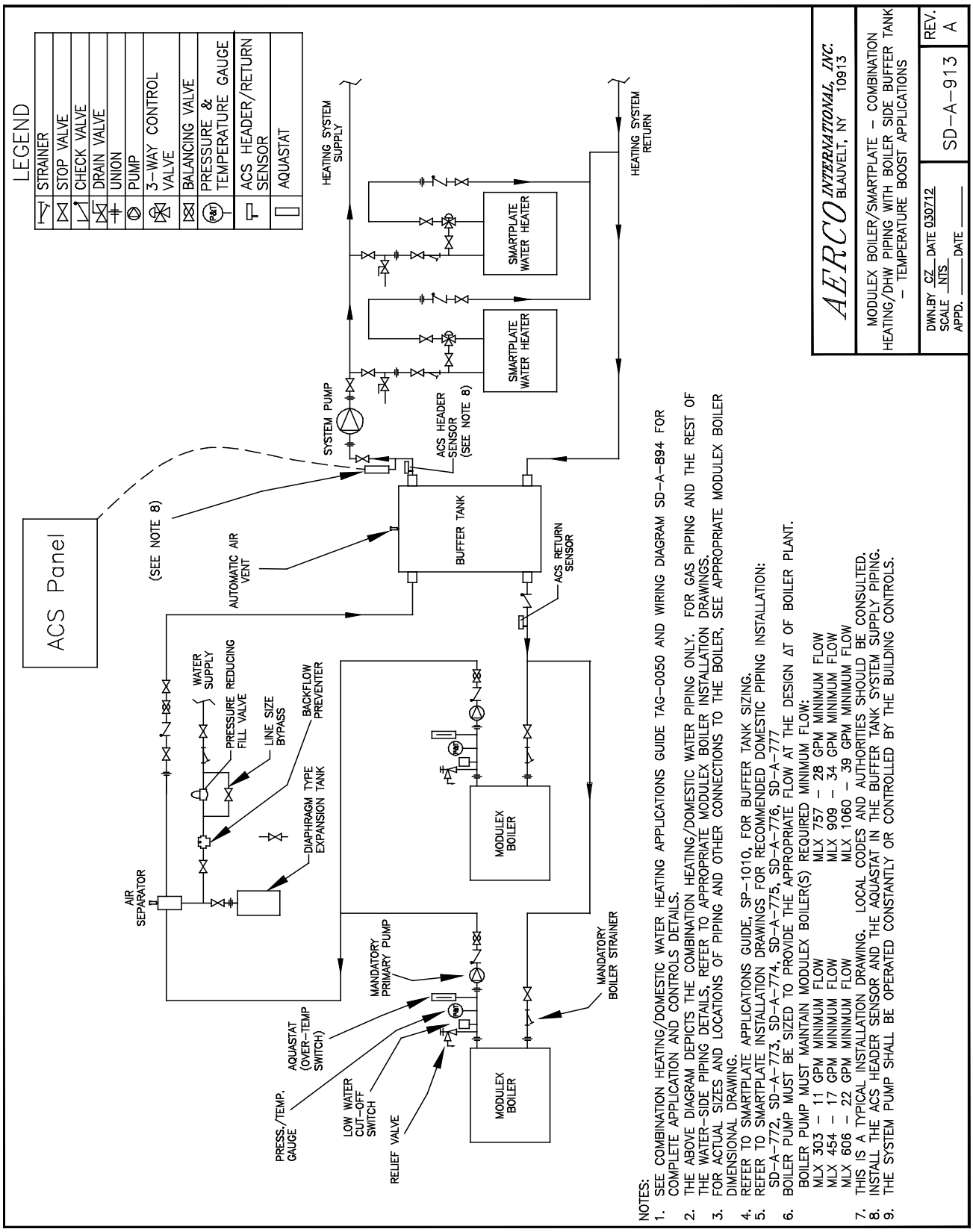
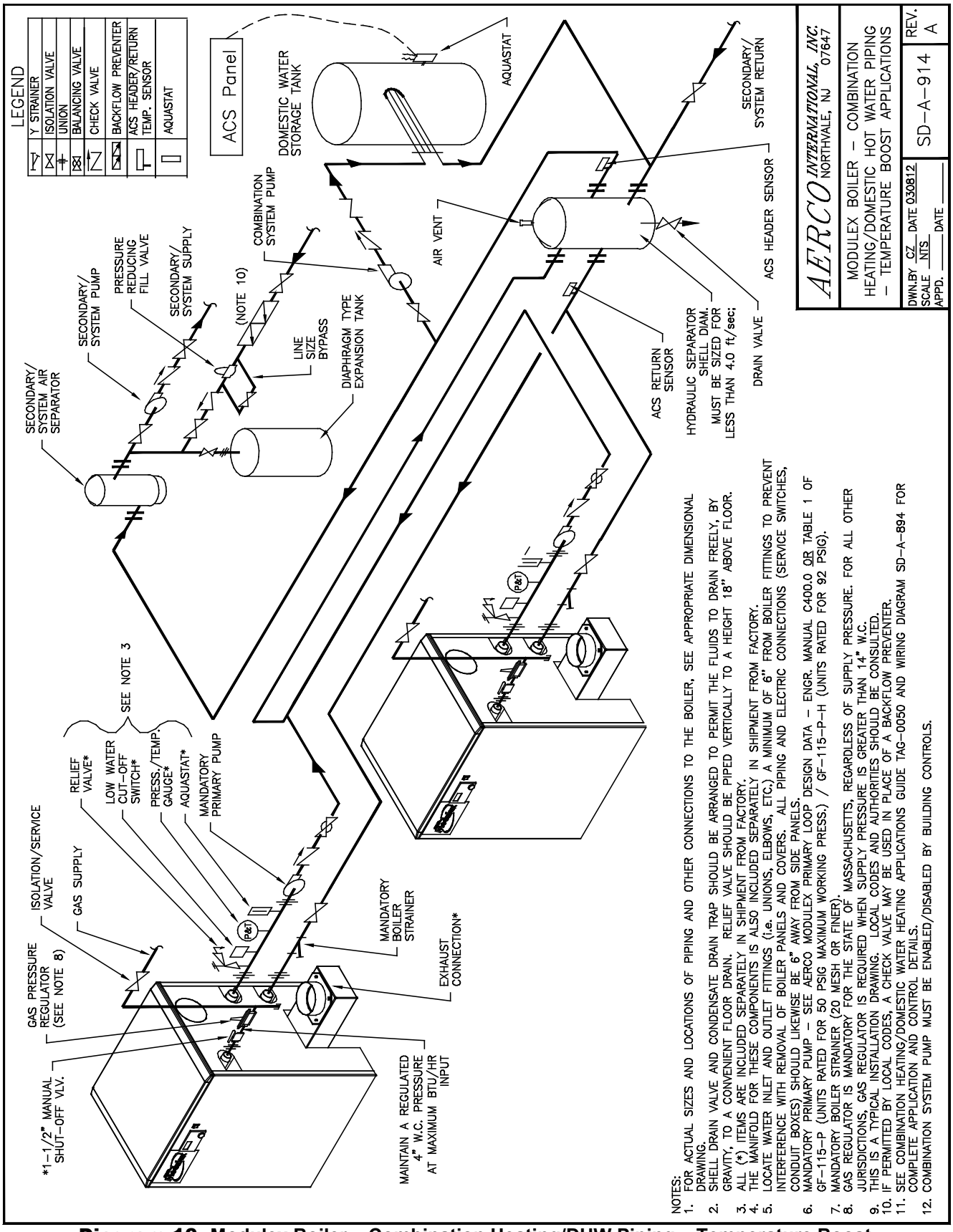
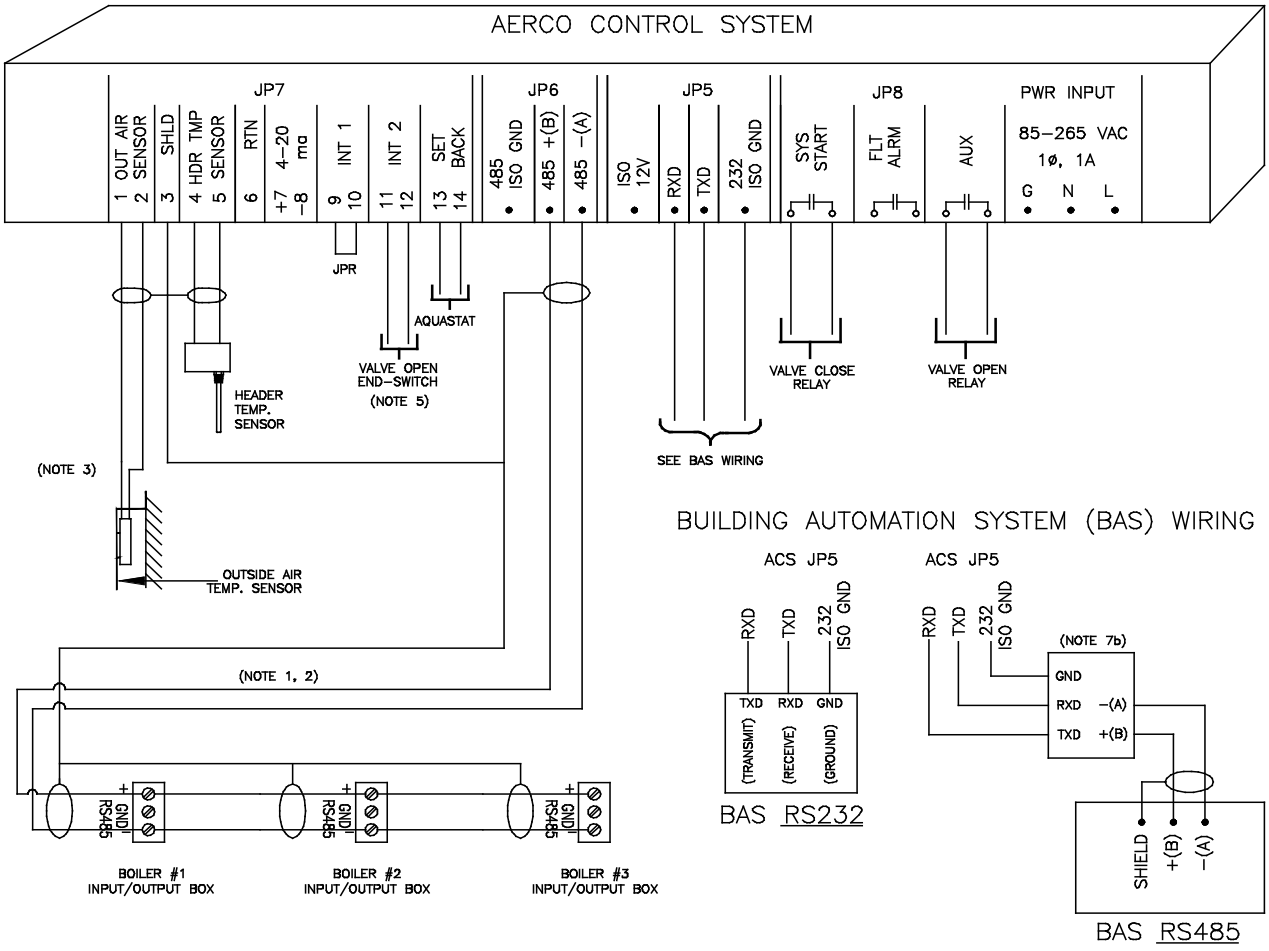


Diagram 9: Benchmark Boiler/Smartplate – Combination Heating/DHW Piping w/Boiler Side Buffer Tank – Temperature Boost Applications



NOTES:
1. FOR ACTUAL SIZES AND LOCATIONS OF PIPING AND OTHER CONNECTIONS TO THE BOILER, SEE APPROPRIATE DIMENSIONAL DRAWING.
2. SHELL DRAIN VALVE AND CONDENSATE DRAIN TRAP SHOULD BE ARRANGED TO PERMIT THE FLUIDS TO DRAIN FREELY, BY GRAVITY, TO A CONVENIENT FLOOR DRAIN. RELIEF VALVE SHOULD BE PIPED VERTICALLY TO A HEIGHT 18" ABOVE FLOOR.
3. ALL (*) ITEMS ARE INCLUDED SEPARATELY IN SHIPMENT FROM FACTORY.
4. THE MANIFOLD FOR THESE COMPONENTS IS ALSO INCLUDED SEPARATELY IN SHIPMENT FROM FACTORY.
5. LOCATE WATER INLET AND OUTLET FITTINGS (i.e. UNIONS, ELBOWS, ETC.) A MINIMUM OF 6" FROM BOILER FITTINGS TO PREVENT INTERFERENCE WITH REMOVAL OF BOILER PANELS AND COVERS. ALL PIPING AND ELECTRIC CONNECTIONS (SERVICE SWITCHES, CONDUIT BOXES) SHOULD LIKEWISE BE 6" AWAY FROM SIDE PANELS.
6. MANDATORY PRIMARY PUMP - SEE AERCO MODULEX PRIMARY LOOP DESIGN DATA - ENGR. MANUAL C400.0 OR TABLE 1 OF GF-115-P (UNITS RATED FOR 50 PSIG MAXIMUM WORKING PRESS.) / GF-115-P-H (UNITS RATED FOR 92 PSIG).
7. MANDATORY BOILER STRAINER (20 MESH OR FINER).
8. GAS REGULATOR IS MANDATORY FOR THE STATE OF MASSACHUSETTS, REGARDLESS OF SUPPLY PRESSURE. FOR ALL OTHER JURISDICTIONS, GAS REGULATOR IS REQUIRED WHEN SUPPLY PRESSURE IS GREATER THAN 14" W.C.
9. THIS IS A TYPICAL INSTALLATION DRAWING. LOCAL CODES AND AUTHORITIES SHOULD BE CONSULTED.
10. IF PERMITTED BY LOCAL CODES, A CHECK VALVE MAY BE USED IN PLACE OF A BACKFLOW PREVENTER.
11. SEE COMBINATION HEATING/DOMESTIC WATER HEATING APPLICATIONS GUIDE TAG-0050 AND WIRING DIAGRAM SD-A-894 FOR COMPLETE APPLICATION AND CONTROL DETAILS.
12. COMBINATION SYSTEM PUMP MUST BE ENABLED/DISABLED BY BUILDING CONTROLS.

Diagram 10: Modulex Boiler – Combination Heating/DHW Piping – Temperature Boost Applications



NOTES
1. WIRING TO BE SHIELDED TWISTED PAIR CABLE (BELDEN 9841 OR EQUIVALENT).
2. TERMINATE SHIELDS AT THE SOURCES ONLY, DO NOT CONNECT AT THE BOILERS.
3. OUTDOOR AIR SENSOR IS USED ONLY FOR INDOOR/OUTDOOR RESET APPLICATIONS.
4. SEE COMBINATION HEATING/DOMESTIC WATER HEATING APPLICATIONS GUIDE TAG–0050 FOR COMPLETE APPLICATION DETAILS.
5. SEE SD–A–916 AND SD–A–915 FOR ASSOCIATED PIPING DIAGRAMS. THE COMBINATION SYSTEM PUMP MUST BE ENABLED/DISABLED BY THE BUILDING CONTROLS.
6. VALVE OPEN END–SWITCH ASSURES THERE IS WATER FLOW THROUGH B3 WHENEVER IT IS CALLED TO FIRE IN SPACE HEATING MODE.
7. ACS COMMUNICATES WITH BUILDING AUTOMATION SYSTEM (BAS) VIA RS232.
   a. FOR BAS WITH RS232 COMMUNICATIONS, CONNECT THE BAS TRANSMIT (TXD) TO THE ACS RECEIVE (RXD) TERMINAL; CONNECT THE BAS RXD TERMINAL TO THE ACS TXD TERMINAL; CONNECT BAS GND TO ACS GND.
   b. FOR BAS WITH RS485 COMMUNICATIONS, USE AN RS232/RS485 CONVERTER (AERCO P/N 124943) BETWEEN THE ACS AND BAS. FOLLOW WIRING INSTRUCTIONS SUPPLIED WITH P/N 124943.
8. SEE ACS MANUAL GF–131 FOR AVAILABLE METHODS OF ACTIVATING THE BIAS AND TERMINATION OF THE RS485 LOOP.

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ACS WIRING DIAGRAM (C–More SYSTEMS) DHW PRIORITY – COMBINATION SYSTEM PUMP ENABLED/DISABLED BY BAS		
DWN.BY CZ DATE 010612 SCALE NTS APPD. _____ DATE _____	SD–A–884	REV. A

Diagram 11: ACS Wiring Diagram (C-More Systems) DHW Priority – Combination System Pump Enabled/Disabled by BAS

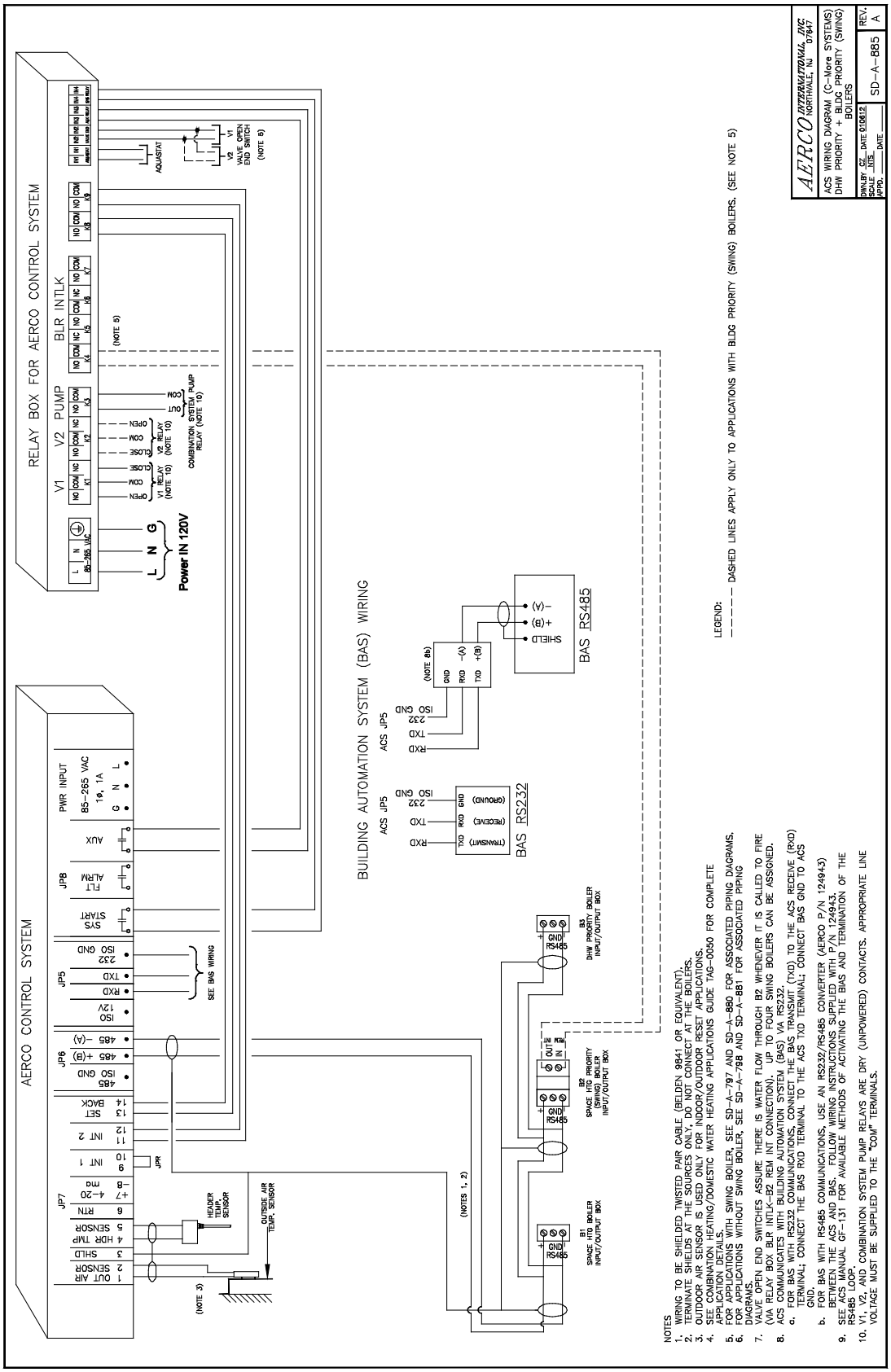
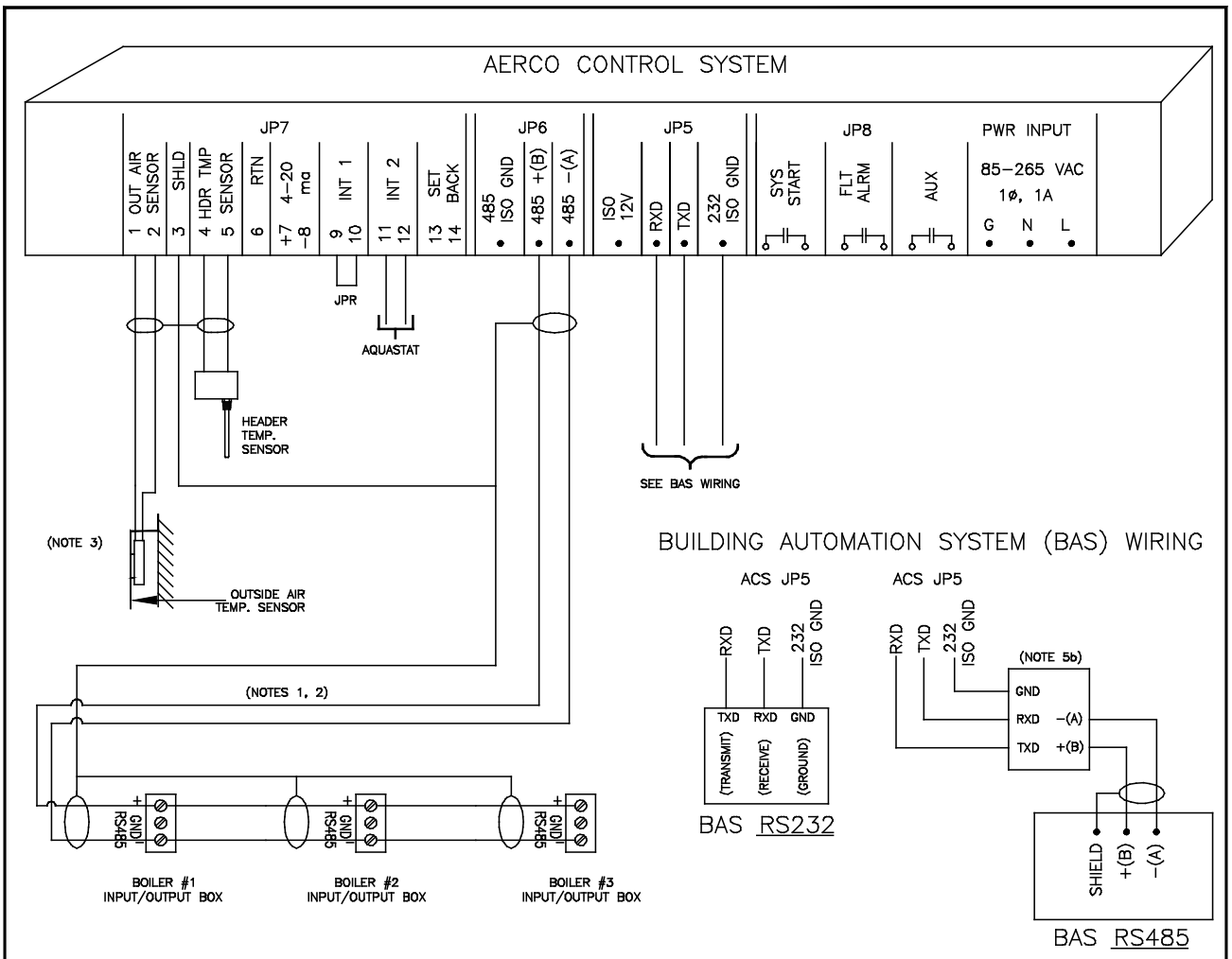


Diagram 12: ACS Wiring Diagram (C-More Systems) DHW Priority + Building Priority (Swing) Boilers



NOTES
1. WIRING TO BE SHIELDED TWISTED PAIR CABLE (BELDEN 9841 OR EQUIVALENT).
2. TERMINATE SHIELDS AT THE SOURCES ONLY, DO NOT CONNECT AT THE BOILERS.
3. OUTDOOR AIR SENSOR IS USED ONLY FOR INDOOR/OUTDOOR RESET APPLICATIONS.
4. SEE COMBINATION HEATING/DOMESTIC WATER HEATING APPLICATIONS GUIDE TAG–0050 AND PIPING DIAGRAMS SD–A–912 AND SD–A–882 FOR COMPLETE APPLICATION DETAILS.
5. ACS COMMUNICATES WITH BUILDING AUTOMATION SYSTEM (BAS) VIA RS232.
   a. FOR BAS WITH RS232 COMMUNICATIONS, CONNECT THE BAS TRANSMIT (TXD) TO THE ACS RECEIVE (RXD) TERMINAL; CONNECT THE BAS RXD TERMINAL TO THE ACS TXD TERMINAL; CONNECT BAS GND TO ACS GND.
   b. FOR BAS WITH RS485 COMMUNICATIONS, USE AN RS232/RS485 CONVERTER (AERCO P/N 124943) BETWEEN THE ACS AND BAS. FOLLOW WIRING INSTRUCTIONS SUPPLIED WITH P/N 124943.
6. SEE ACS MANUAL GF–131 FOR AVAILABLE METHODS OF ACTIVATING THE BIAS AND TERMINATION OF THE RS485 LOOP.

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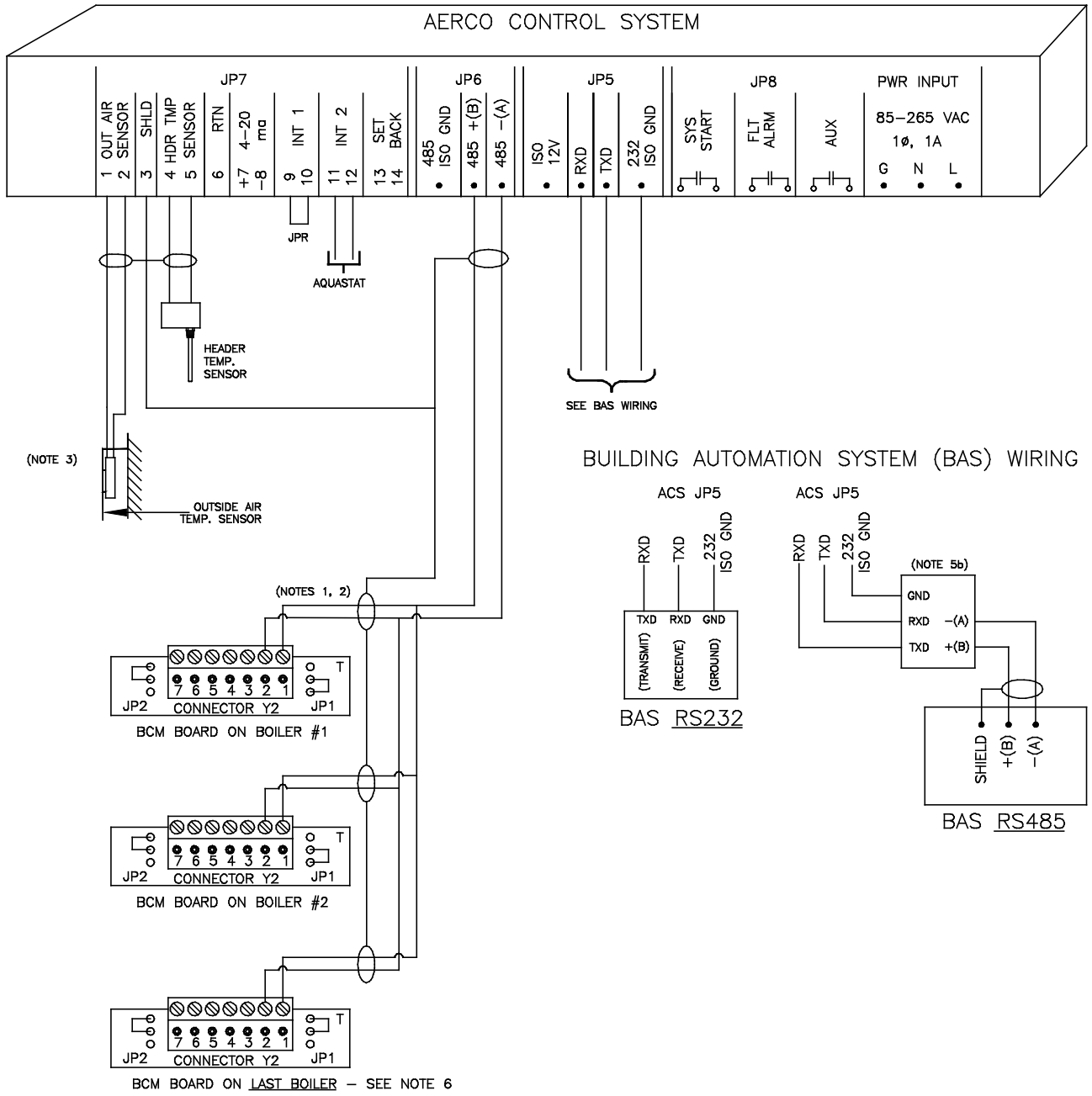
ACS WIRING DIAGRAM (C–More SYSTEMS)
HEADER TEMP BOOST APPLICATION

DWN.BY CZ DATE 010612
SCALE NTS
APPD. _____ DATE _____

SD–A–883

REV. A

Diagram 13: ACS Wiring Diagram (C-More Systems) Header Temperature Boost Application



NOTES

1. WIRING TO BE SHIELDED TWISTED PAIR CABLE (BELDEN 9841 OR EQUIVALENT).
2. TERMINATE SHIELDS AT THE SOURCES ONLY, DO NOT CONNECT AT THE BOILERS.
3. OUTDOOR AIR SENSOR IS USED ONLY FOR INDOOR/OUTDOOR RESET APPLICATIONS.
4. SEE COMBINATION HEATING/DOMESTIC WATER HEATING APPLICATIONS GUIDE TAG–0050 AND PIPING DIAGRAMS SD–A–913 AND SD–A–914 FOR COMPLETE APPLICATION DETAILS.
5. ACS COMMUNICATES WITH BUILDING AUTOMATION SYSTEM (BAS) VIA RS232.
   a. FOR BAS WITH RS232 COMMUNICATIONS, CONNECT THE BAS TRANSMIT (TXD) TO THE ACS RECEIVE (RXD) TERMINAL; CONNECT THE BAS RXD TERMINAL TO THE ACS TXD TERMINAL; CONNECT BAS GND TO ACS GND.
   b. FOR BAS WITH RS485 COMMUNICATIONS, USE AN RS232/RS485 CONVERTER (AERCO P/N 124943) BETWEEN THE ACS AND BAS. FOLLOW WIRING INSTRUCTIONS SUPPLIED WITH P/N 124943.
6. ON THE BCM BOARD OF THE LAST BOILER ONLY, POSITION THE JUMPER ON JP1 AS SHOWN.
7. ACTIVATE BIAS SWITCHES ON ACS.

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ACS WIRING DIAGRAM (MLX BOILERS) HEADER TEMP BOOST APPLICATION		
DWN.BY CZ DATE 020912 SCALE NTS APPD. _____ DATE _____	SD–A–894	REV. A

Diagram 14: ACS Wiring Diagram (MLX Boilers) Header Temperature Boost Application

NOTES:

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