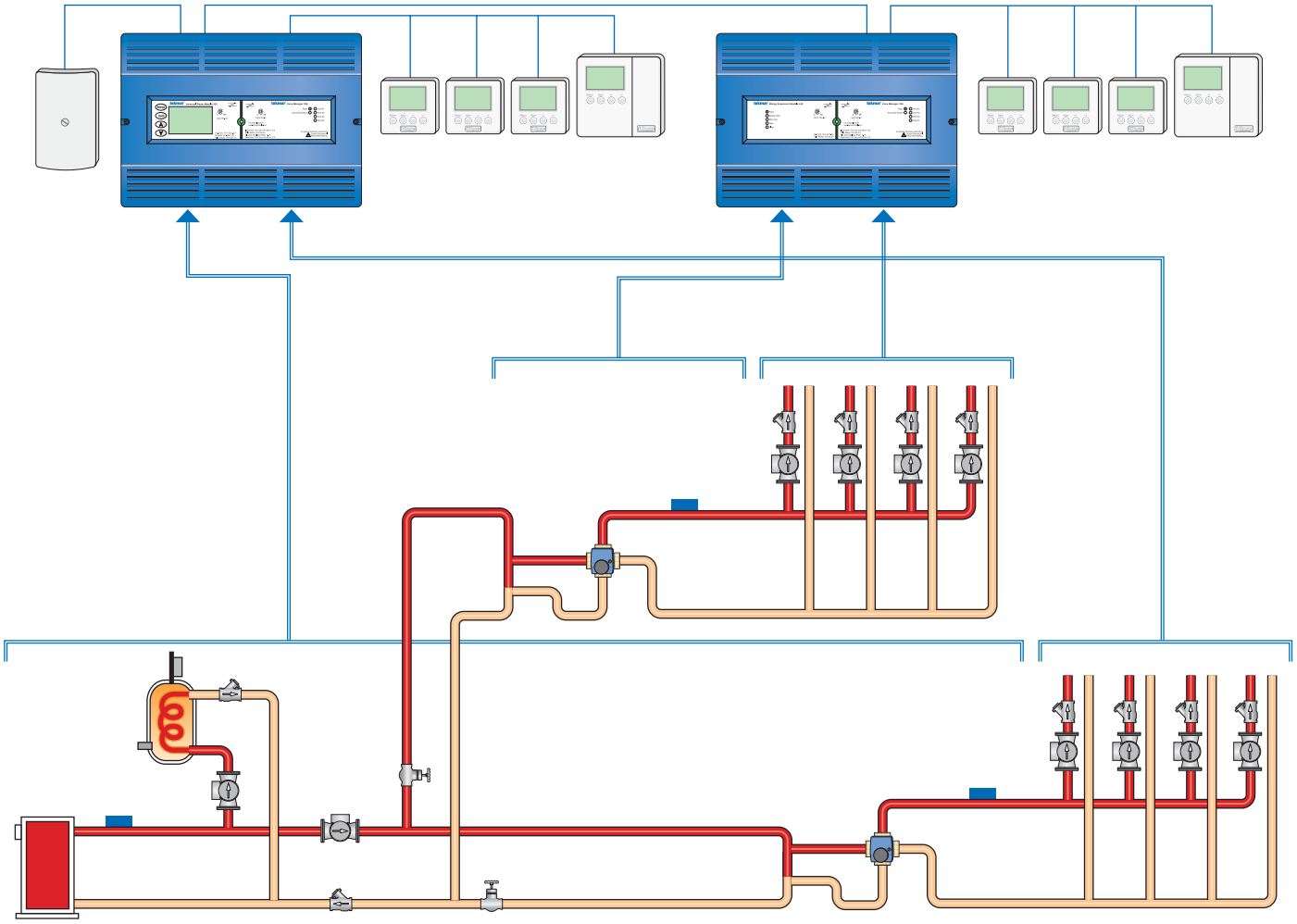
tekmar® - Application Brochure

tekmarNet® Applications

A001
07/26

Featured Products:

- Zone Expansion Module 325
- Zone Expansion Module 326
- Zone Manager 335
- Universal Reset Module 422
- Universal Reset Module 423
- Mixing Expansion Module 444
- tekmarNet® Thermostat 532
- tekmarNet® Thermostat 552
- tekmarNet® Thermostat 553
- tekmarNet® Thermostat 554
- tekmarNet® Thermostat 557



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Reset Module Applications

Application Number	DHW	Boiler Zones		Mix 1 Zones			Mix 2 Zones			Mix 3 Zones			Page #
		Valve	Pump	Device	Valve	Pump	Device	Valve	Pump	Device	Valve	Pump	
A422-1	Y		4	none			none			none			5
A422-2	Y		8	none			none			none			6
A422-3	N	6		none			none			none			8
A422-4	N			4-way	6		none			none			10
A422-5	N			var. spd.		11	none			none			11
A422-6	N			3-way	12	3	none			none			13
A422-7	N			var. spd.		4	none			none			14
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A422-12	Y		4	3-way	12		none			none			22
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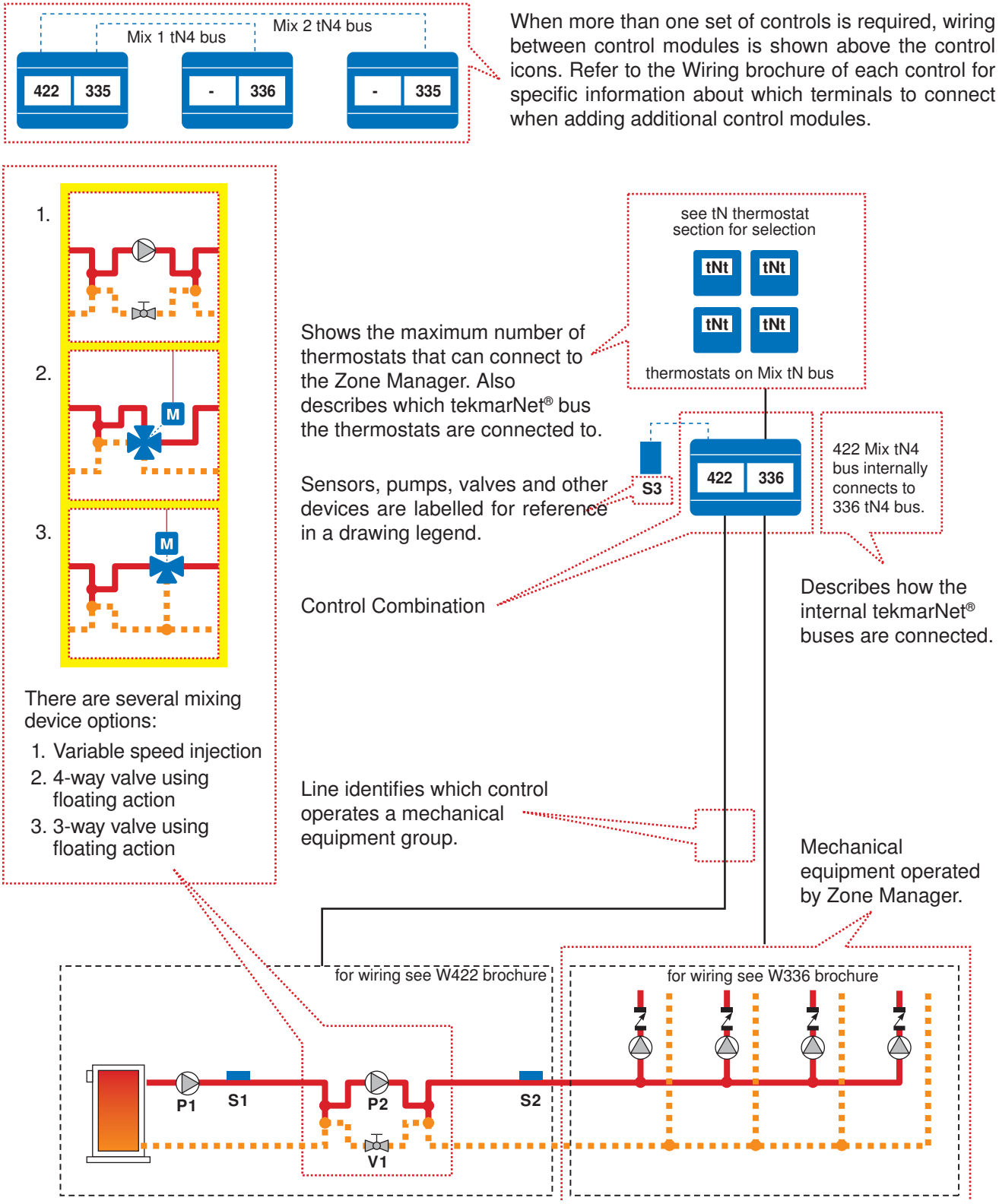
A423-2	Y			var. spd.	4		4-way		6	none			28
A423-3	Y			var. spd.		4	none			none			29
A423-4	Y			var. spd.	8		var. spd.		12	none			30
A423-5	Y			3-way	12		3-way	12		none			32
A423-6	Y		4	var. spd.		4	4-way	6		var. spd.	6		34

Thermostat Applications

Application Information

The following applications illustrate common mechanical components used to provide HVAC system control. Refer to the table on page 2 to find an application that closely matches the system design required. It is possible to use a smaller number of zones than shown. To add more zones, you may require additional Zone Managers. To add mix temperatures, you may require additional Expansion Modules.

Thermostat models are only specific in the section featuring Thermostat applications. They are chosen based on the cooling, ventilation and schedule requirements of the system.

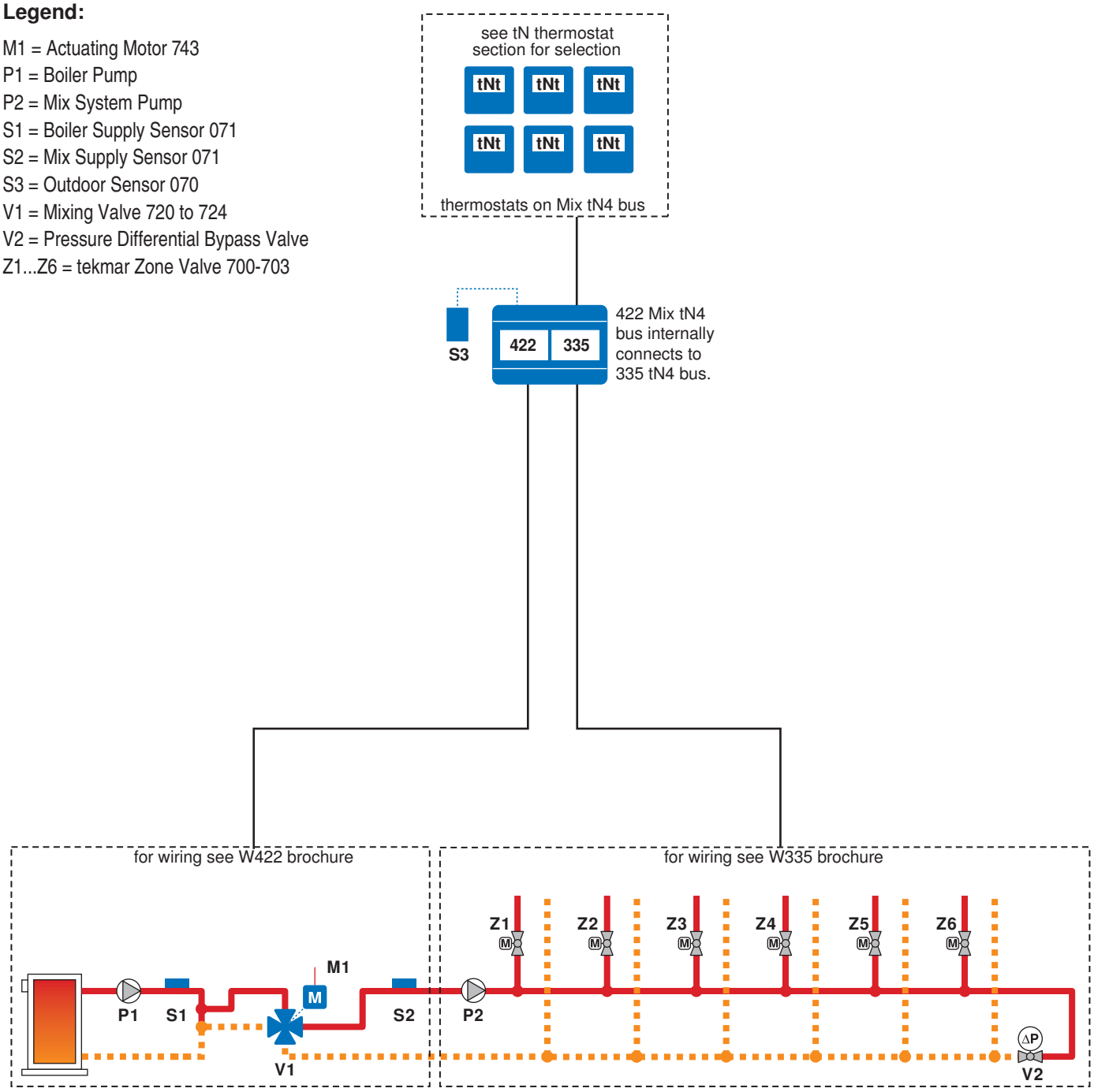


System Description: The Universal Reset Module 422 operates a single on-off boiler and a 4-way mixing valve to provide outdoor reset to the heating system. The 4-way mixing valve allows the 422 to provide boiler protection from flue gas condensation. The 422's system pump output operates the boiler pump. Six tekmarNet® Thermostats operate six zone valves through the Zone Manager 335. A tekmarNet®4 mix bus allows the thermostats to communicate to the 422 in order to provide indoor feedback to fine tune the supply water temperature.

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.

Legend:

M1 = Actuating Motor 743
P1 = Boiler Pump
P2 = Mix System Pump
S1 = Boiler Supply Sensor 071
S2 = Mix Supply Sensor 071
S3 = Outdoor Sensor 070
V1 = Mixing Valve 720 to 724
V2 = Pressure Differential Bypass Valve
Z1...Z6 = tekmar Zone Valve 700-703



Application A 422-2

326 + 2 x 336 + 422

System Description: The Universal Reset Module 422 operates a single on-off boiler and a variable speed injection pump to provide outdoor reset to the heating system. The variable speed injection pump allows the 422 to provide boiler protection from flue gas condensation. The 422's system pump output operates the boiler pump. Eleven tekmarNet® Thermostats operate eleven zone pumps through two Zone Manager 336s and one Zone Expansion Module 326. A tekmarNet® mix bus interconnects the thermostats to the two 336s, the 326 and the 422. This allows the thermostats to communicate with the 422 in order to provide indoor feedback to fine tune the supply water temperature.

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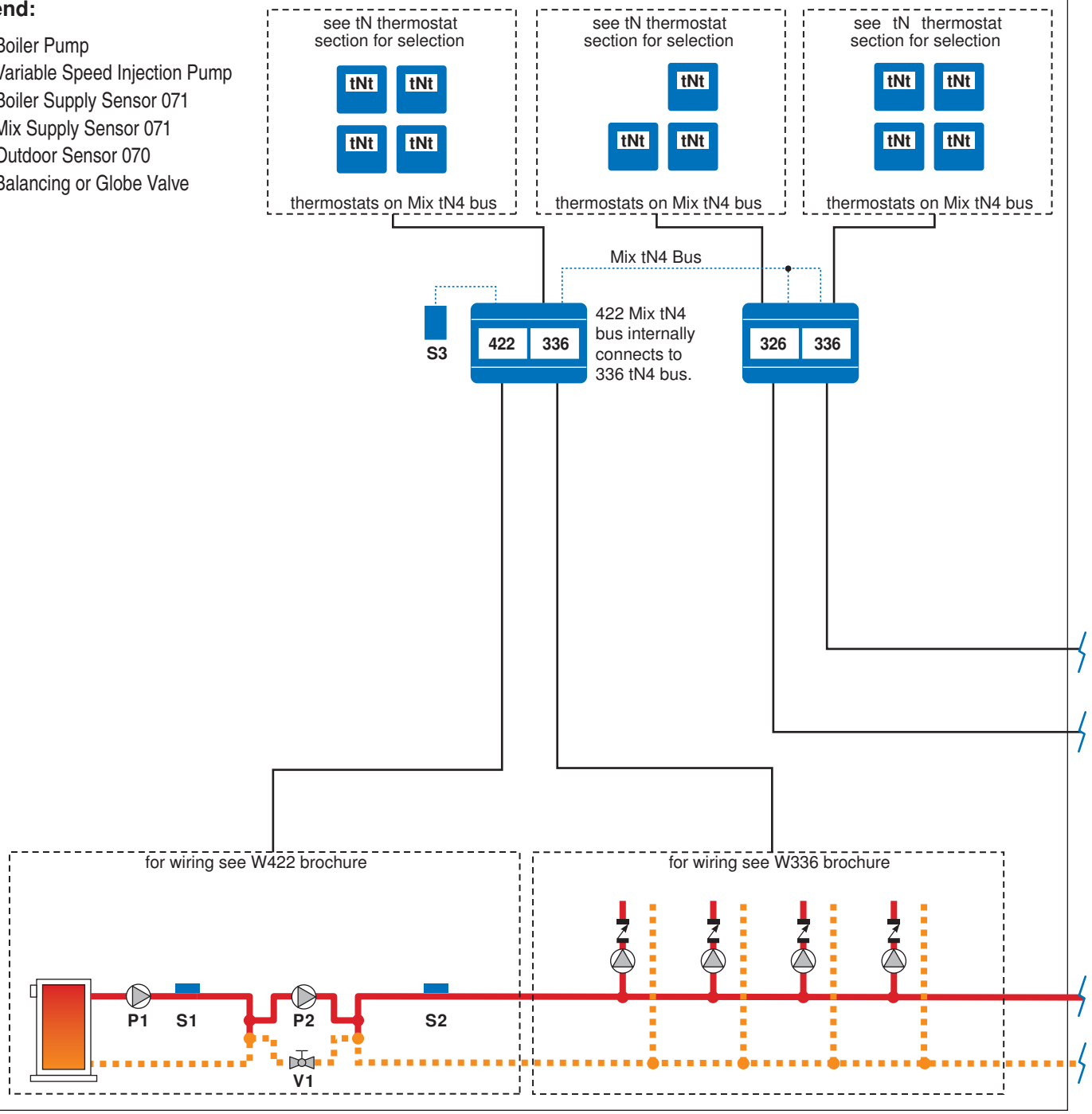
Legend:

P1 = Boiler Pump
P2 = Variable Speed Injection Pump
S1 = Boiler Supply Sensor 071
S2 = Mix Supply Sensor 071
S3 = Outdoor Sensor 070
V1 = Balancing or Globe Valve



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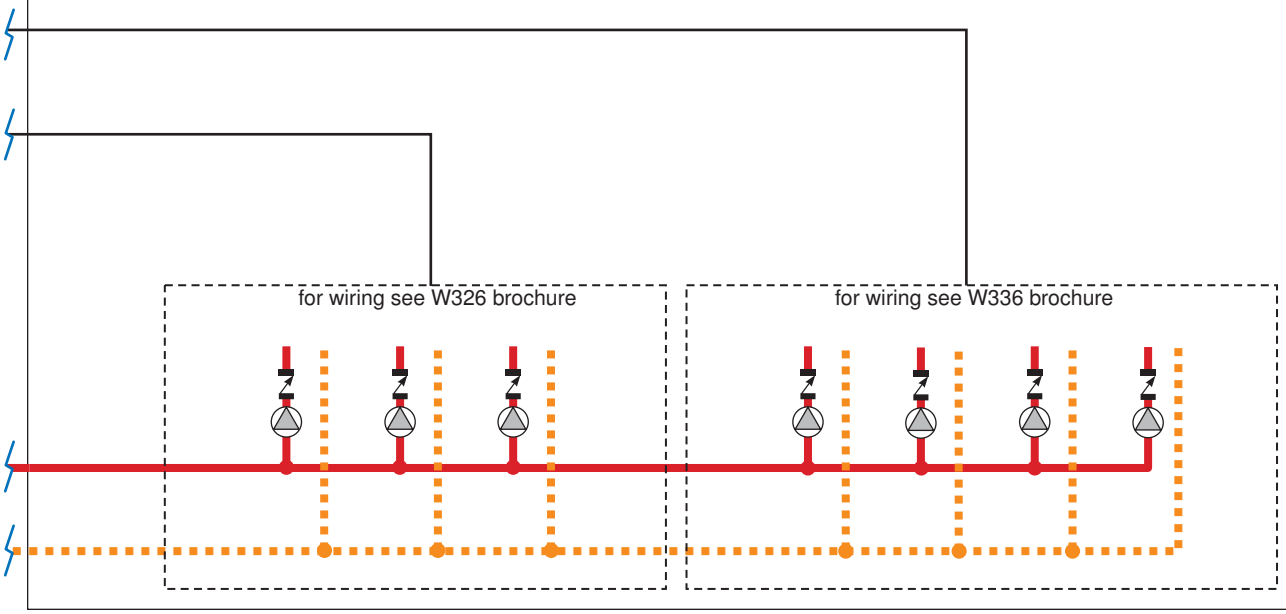

Application A 422-3

326 + 2 x 335 + 422

System Description: The Universal Reset Module 422 operates a single on-off boiler and 3-way mixing valve to provide outdoor reset to the heating system. The 3-way mixing valve allows the 422 to provide boiler protection from flue gas condensation. The 422's system pump output operates the boiler pump. Three tekmarNet® Thermostats operate three zone pumps through a Zone Expansion Module 326. Twelve tekmarNet® Thermostats operate two groups of six zone valves through two Zone Manager 335s. Each 335 uses its zone group pump output to operate a system pump in order to provide flow through its group of zones. A tekmarNet®4 mix bus interconnects the thermostats to the two 335s, the 326, and the 422. This allows the thermostats to communicate with the 422 in order to provide indoor feedback to fine tune the supply water temperature.

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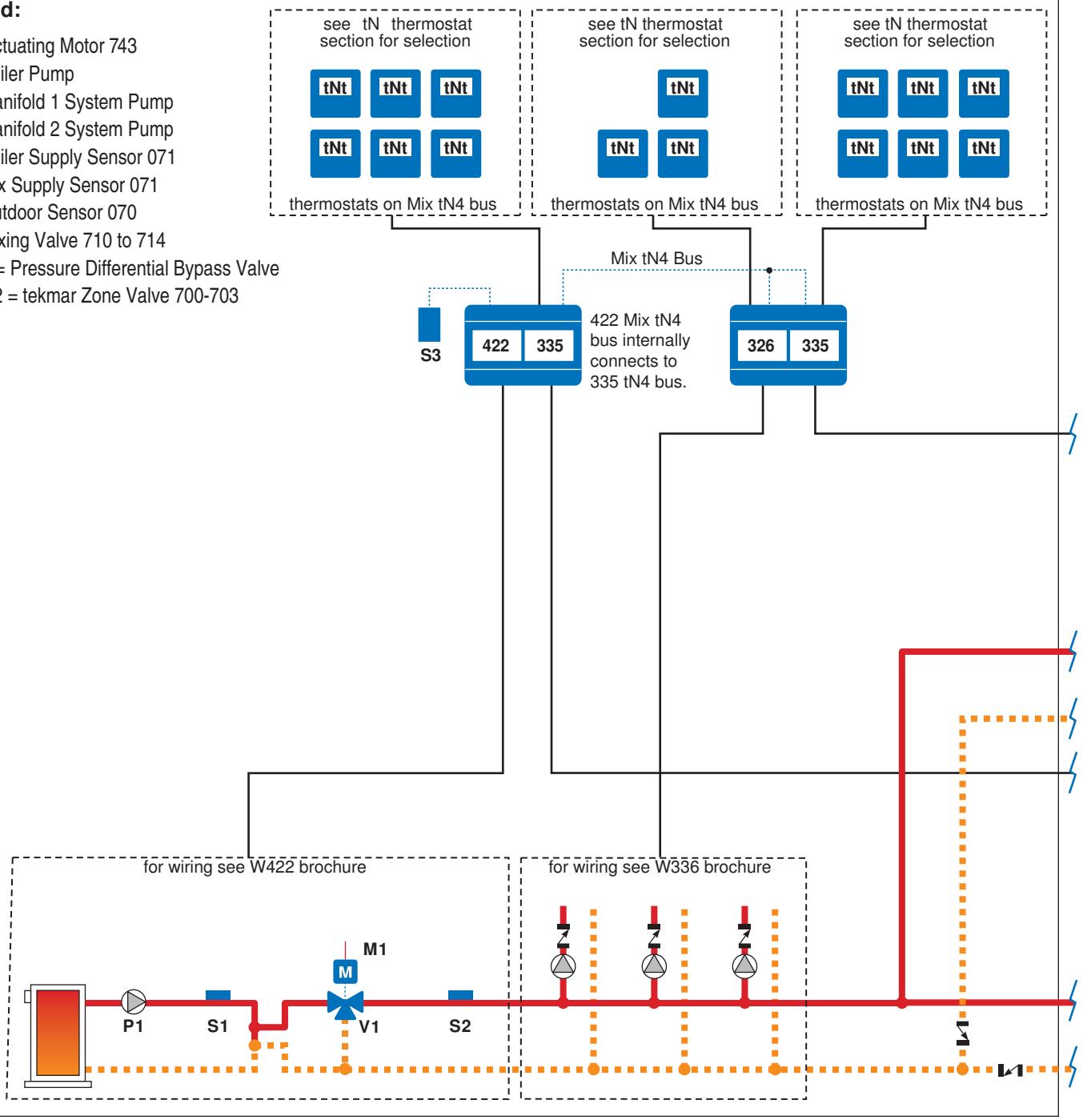
Legend:

M1 = Actuating Motor 743
P1 = Boiler Pump
P3 = Manifold 1 System Pump
P4 = Manifold 2 System Pump
S1 = Boiler Supply Sensor 071
S2 = Mix Supply Sensor 071
S3 = Outdoor Sensor 070
V1 = Mixing Valve 710 to 714
V2, V3 = Pressure Differential Bypass Valve
Z1...Z12 = tekmar Zone Valve 700-703



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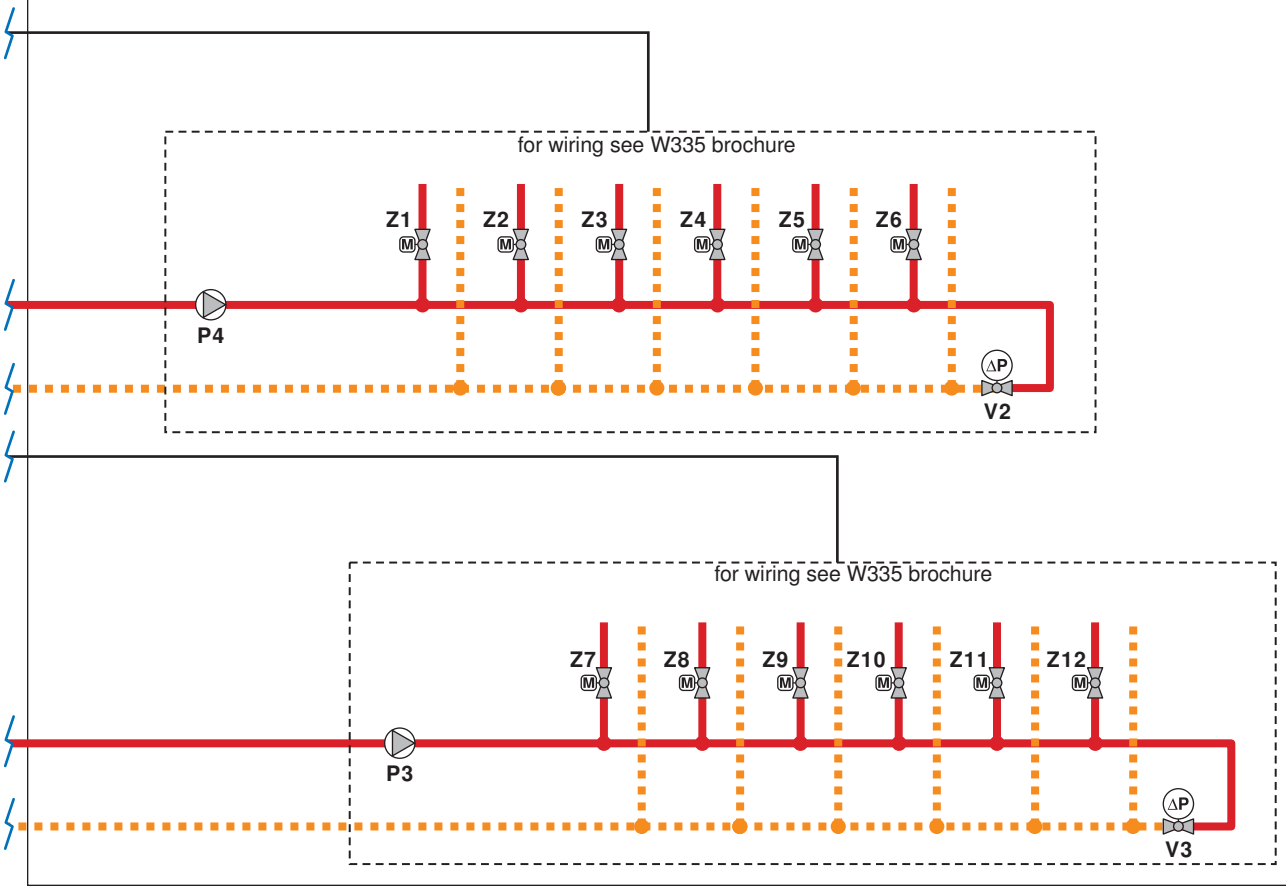

Application A 422-4 *336 + 422*

System Description: The Universal Reset Module 422 operates a single on-off boiler and a variable speed injection pump to provide outdoor reset to the heating system. The variable speed injection pump allows the 422 to provide boiler protection from flue gas condensation. The 422's system pump output operates the boiler pump. Four tekmarNet® Thermostats operate four zone pumps through the Zone Manager 336. A tekmarNet®4 bus allows the thermostats to communicate to the 422 in order to provide indoor feedback to fine tune the supply water temperature.

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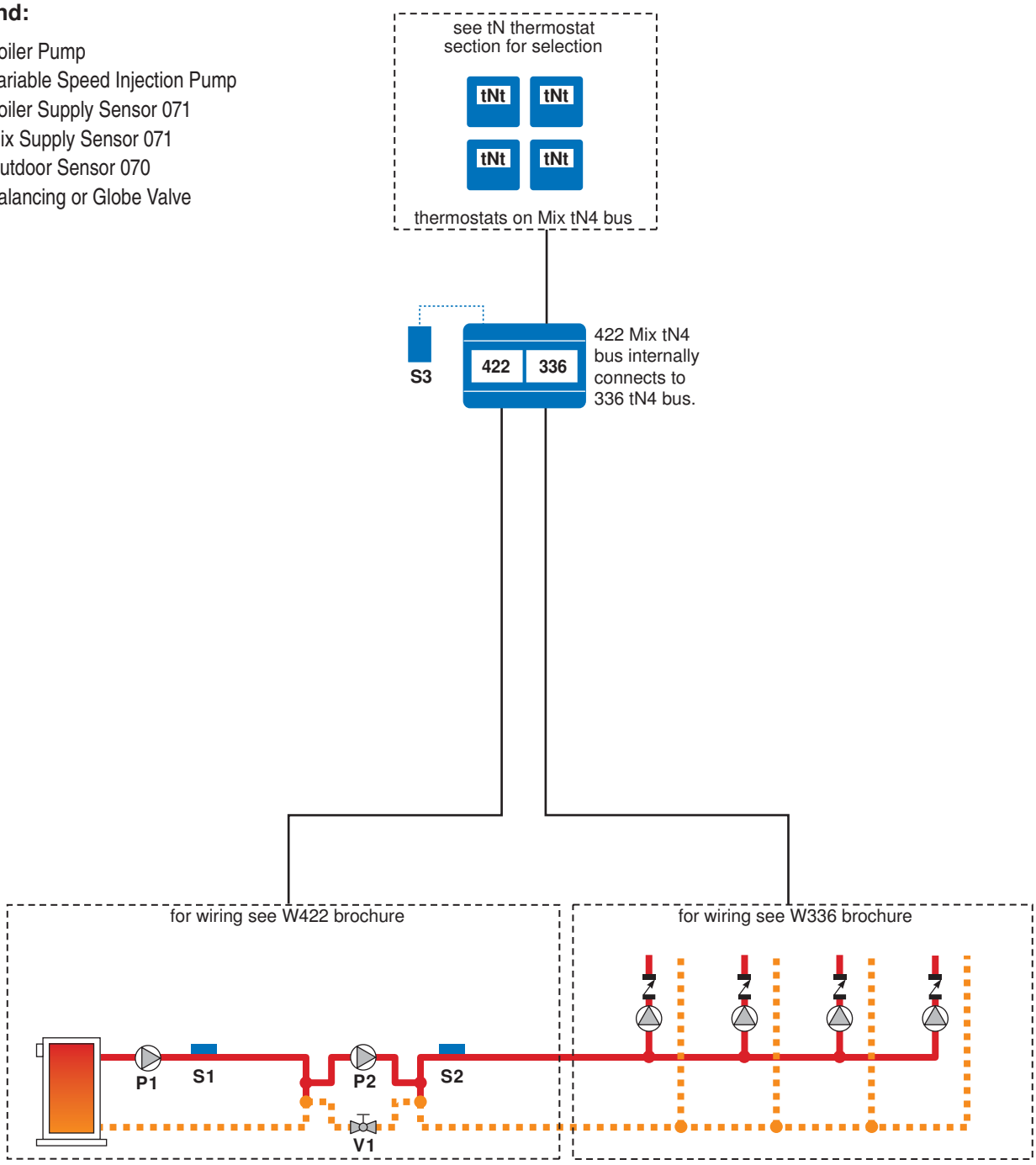
Legend:

P1 = Boiler Pump
P2 = Variable Speed Injection Pump
S1 = Boiler Supply Sensor 071
S2 = Mix Supply Sensor 071
S3 = Outdoor Sensor 070
V1 = Balancing or Globe Valve



Application A 422-5

335 + 336 + 422

System Description: The Universal Reset Module 422 operates a single on-off or modulating boiler to provide outdoor reset to the heating system and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. The 422 also operates a 4-way mixing valve to provide outdoor reset to the mix temperature heating system and boiler protection from flue gas condensation. Four tekmarNet® Thermostats operate four boiler temperature zone pumps through a Zone Manager 336. A tekmarNet®4 boiler bus interconnects the thermostats to the 336 and the 422. Six tekmarNet® Thermostats operate six mix water temperature zone valves through a Zone Manager 335. A tekmarNet®4 mix 1 bus interconnects the thermostats to the 335 and the 422. The tekmarNet®4 bus allows the thermostats to provide indoor feedback to fine tune the supply water temperature.

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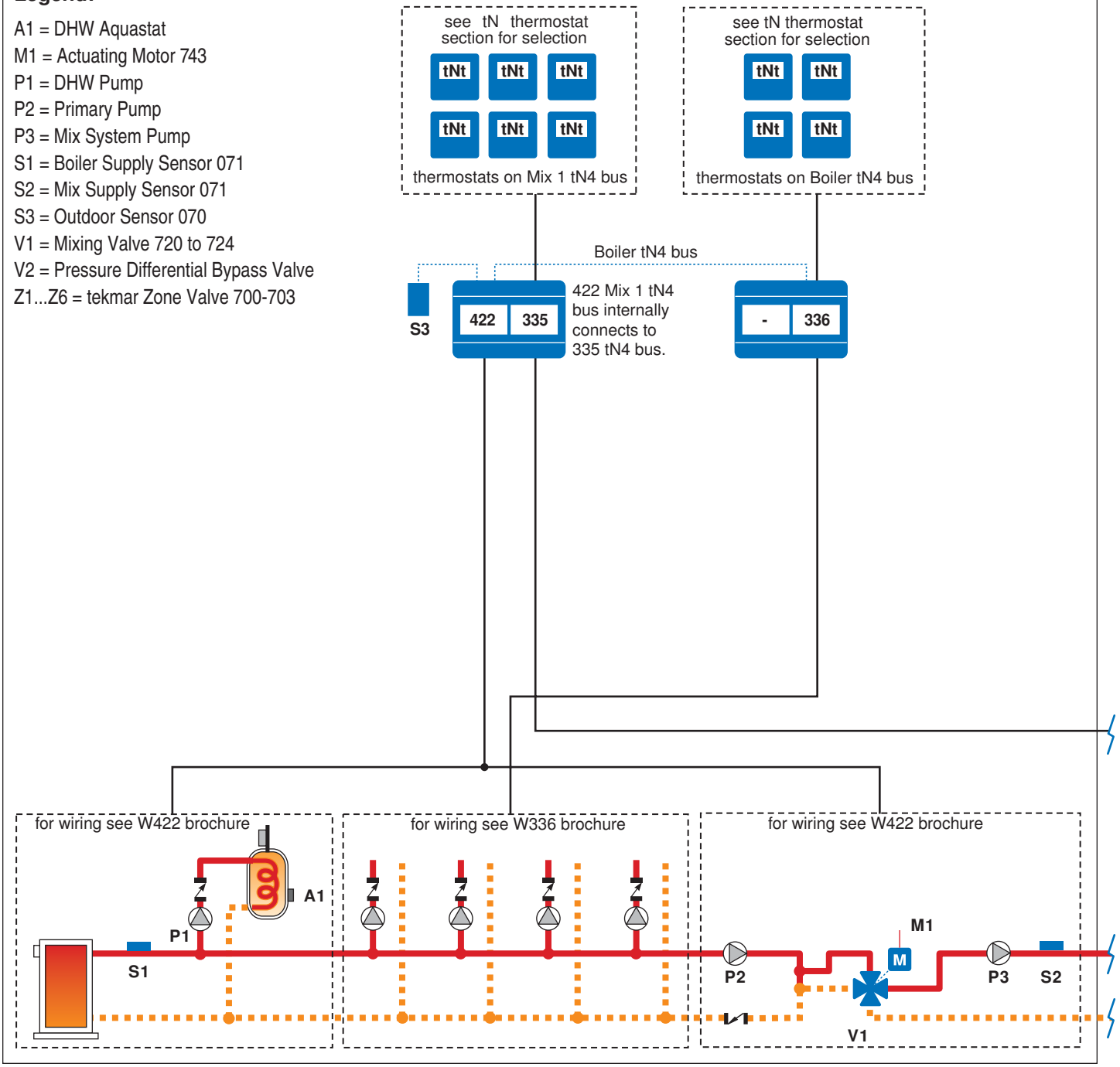
Legend:

A1 = DHW Aquastat
M1 = Actuating Motor 743
P1 = DHW Pump
P2 = Primary Pump
P3 = Mix System Pump
S1 = Boiler Supply Sensor 071
S2 = Mix Supply Sensor 071
S3 = Outdoor Sensor 070
V1 = Mixing Valve 720 to 724
V2 = Pressure Differential Bypass Valve
Z1...Z6 = tekmar Zone Valve 700-703



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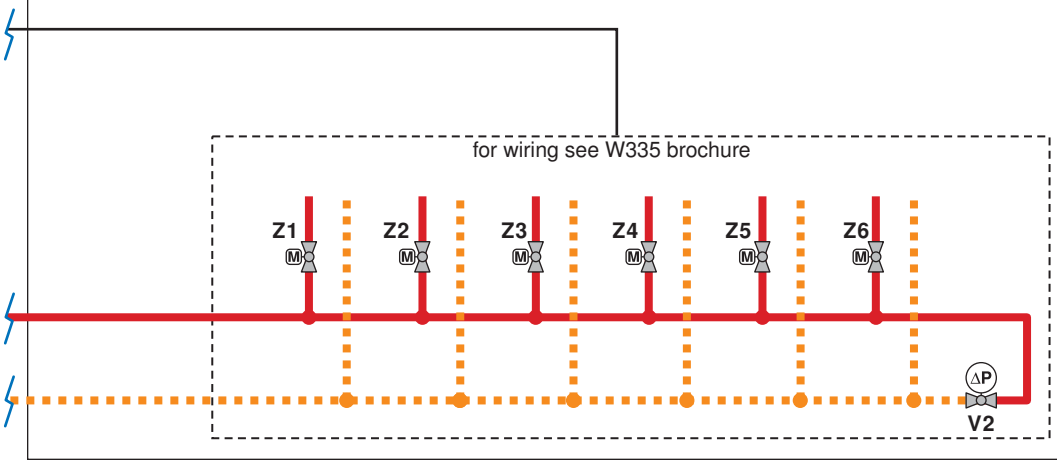

Application A 422-6 *2 x 336 + 422*

System Description: The Universal Reset Module 422 operates a single on-off or modulating boiler to provide outdoor reset to the heating system and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. The 422 also operates a variable speed injection pump to provide outdoor reset to the mix temperature heating system and boiler protection from flue gas condensation. Four tekmarNet® Thermostats operate four boiler temperature zone pumps through a Zone Manager 336. A tekmarNet® boiler bus interconnects the thermostats to the 336 and the 422. Four tekmarNet® Thermostats operate four mix water temperature zone pumps through a Zone Manager 336. A tekmarNet®4 mix 1 bus interconnects the thermostats to the 336 and the 422. The tekmarNet®4 bus allows the thermostats to provide indoor feedback to fi ne tune the supply water temperature.

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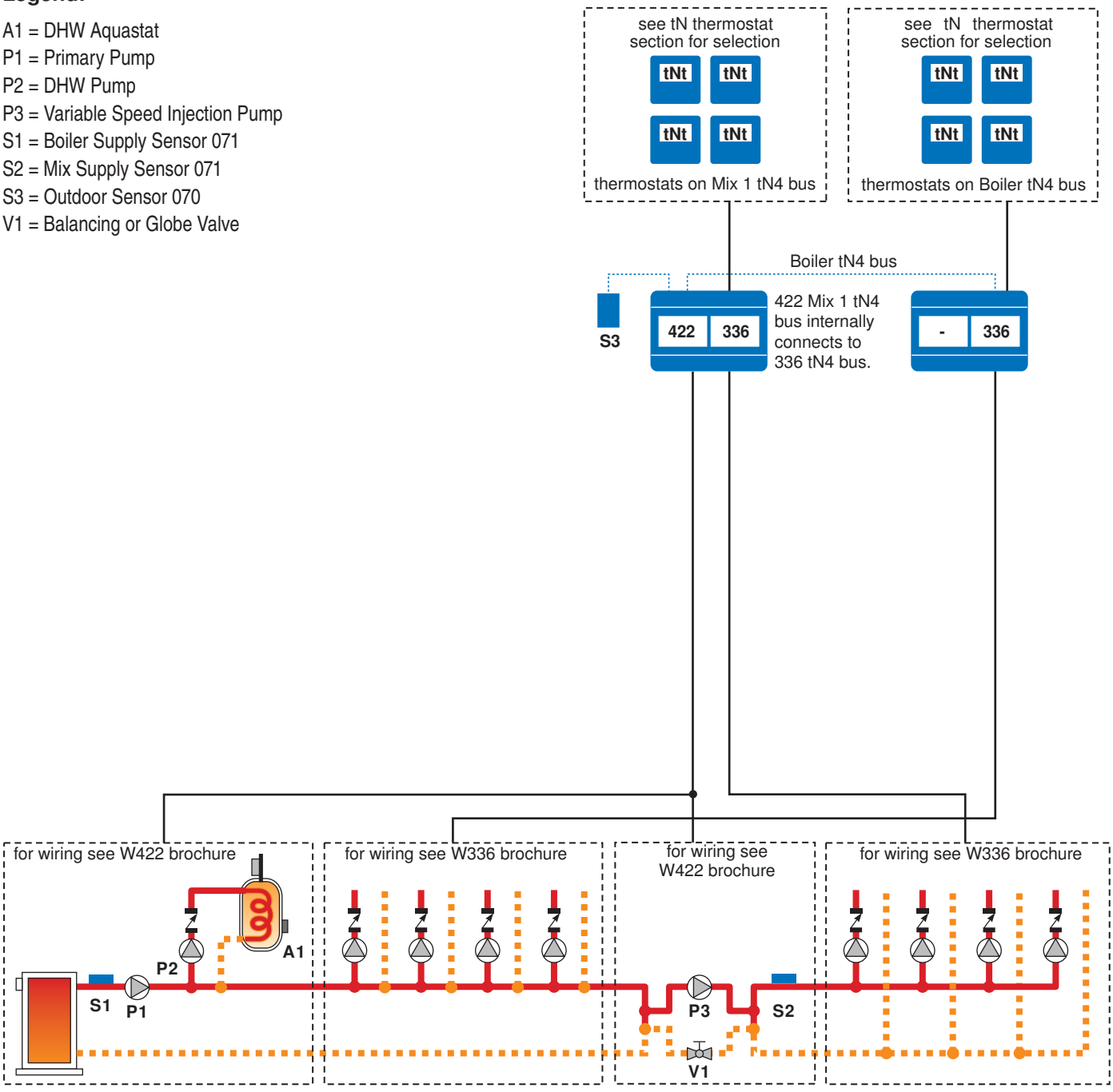
Legend:

A1 = DHW Aquastat
P1 = Primary Pump
P2 = DHW Pump
P3 = Variable Speed Injection Pump
S1 = Boiler Supply Sensor 071
S2 = Mix Supply Sensor 071
S3 = Outdoor Sensor 070
V1 = Balancing or Globe Valve



Application A 422-7 *2 x 336 + 422 + 444*

System Description: The Universal Reset Module 422 operates a single on-off or modulating boiler to provide load reset to the two mix water systems and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. The 422 also operates a 4-way mixing valve to provide outdoor reset to the mix 1 heating system and boiler protection from flue gas condensation. A Mixing Expansion Module 444 operates a second 4-way mixing valve for the mix 2 heating system. Four tekmarNet® Thermostats operate four mix 1 temperature zone pumps through a Zone Manager 336. A tekmarNet®4 mix 1 bus interconnects the thermostats to the 336 and the 422. Four tekmarNet® Thermostats operate four mix 2 water temperature zone pumps through a Zone Manager 336. A tekmarNet®4 mix 2 bus interconnects the thermostats to the 336 and the 422. The tekmarNet®4 bus allows the thermostats to provide indoor feedback to fine tune the supply water temperature.

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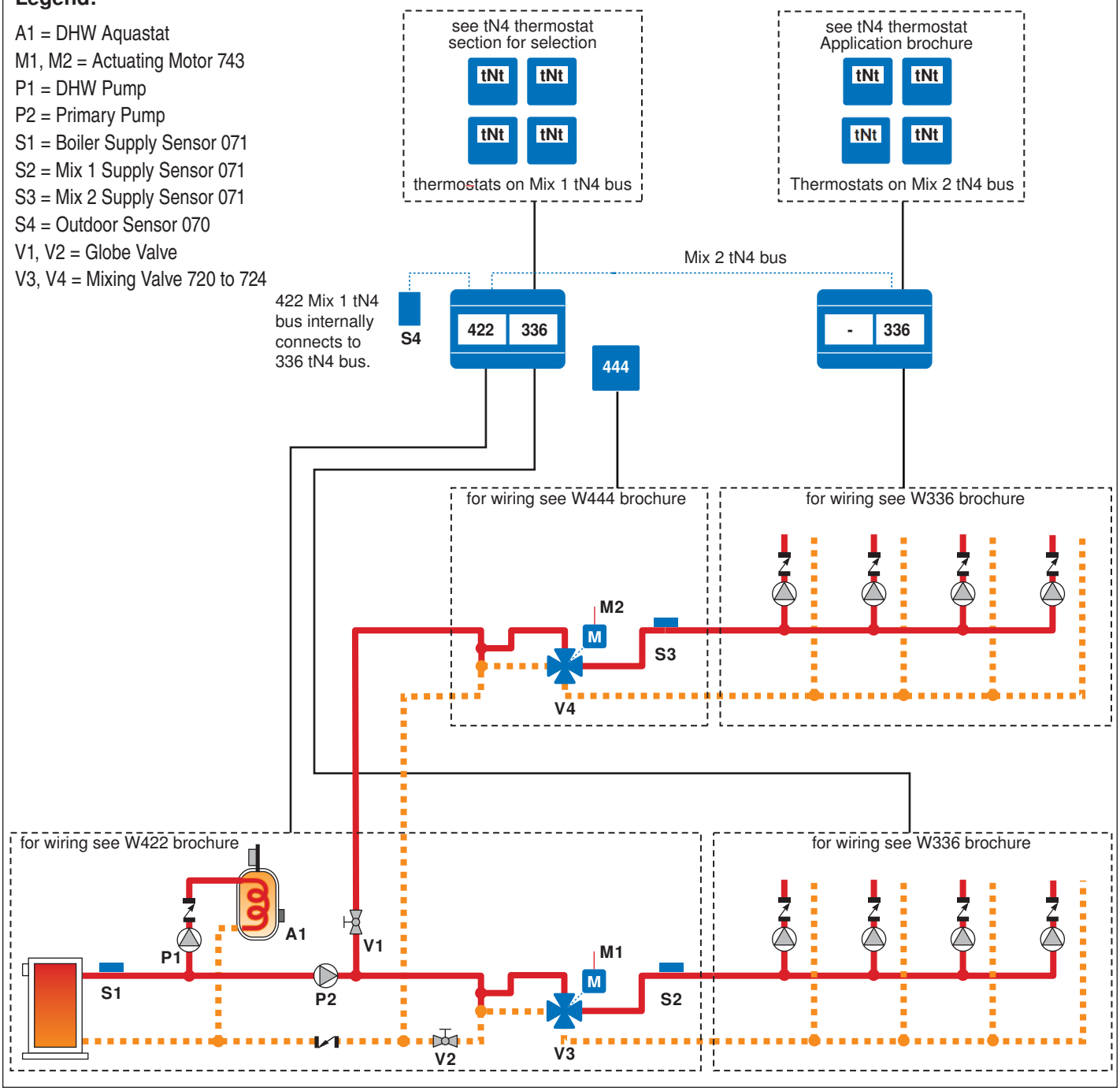
Legend:

A1 = DHW Aquastat
M1, M2 = Actuating Motor 743
P1 = DHW Pump
P2 = Primary Pump
S1 = Boiler Supply Sensor 071
S2 = Mix 1 Supply Sensor 071
S3 = Mix 2 Supply Sensor 071
S4 = Outdoor Sensor 070
V1, V2 = Globe Valve
V3, V4 = Mixing Valve 720 to 724



System Description: The Universal Reset Module 422 operates a single on-off or modulating boiler to provide outdoor reset to the heating system and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. The 422 also operates a 3-way mixing valve to provide outdoor reset to the mix temperature heating system and boiler protection from flue gas condensation. Four tekmarNet® Thermostats operate four boiler temperature zone pumps through a Zone Manager 336. A tekmarNet®4 boiler bus interconnects the thermostats to the 336 and the 422. Twelve tekmarNet® Thermostats operate twelve mix water temperature zone valves through a Zone Manager 335 and a Zone Expansion Module 325. A tekmarNet®4 mix 1 bus interconnects the thermostats to the 335, the 325, and the 422. The tekmarNet®4 bus allows the thermostats to provide indoor feedback to fi ne tune the supply water temperature.

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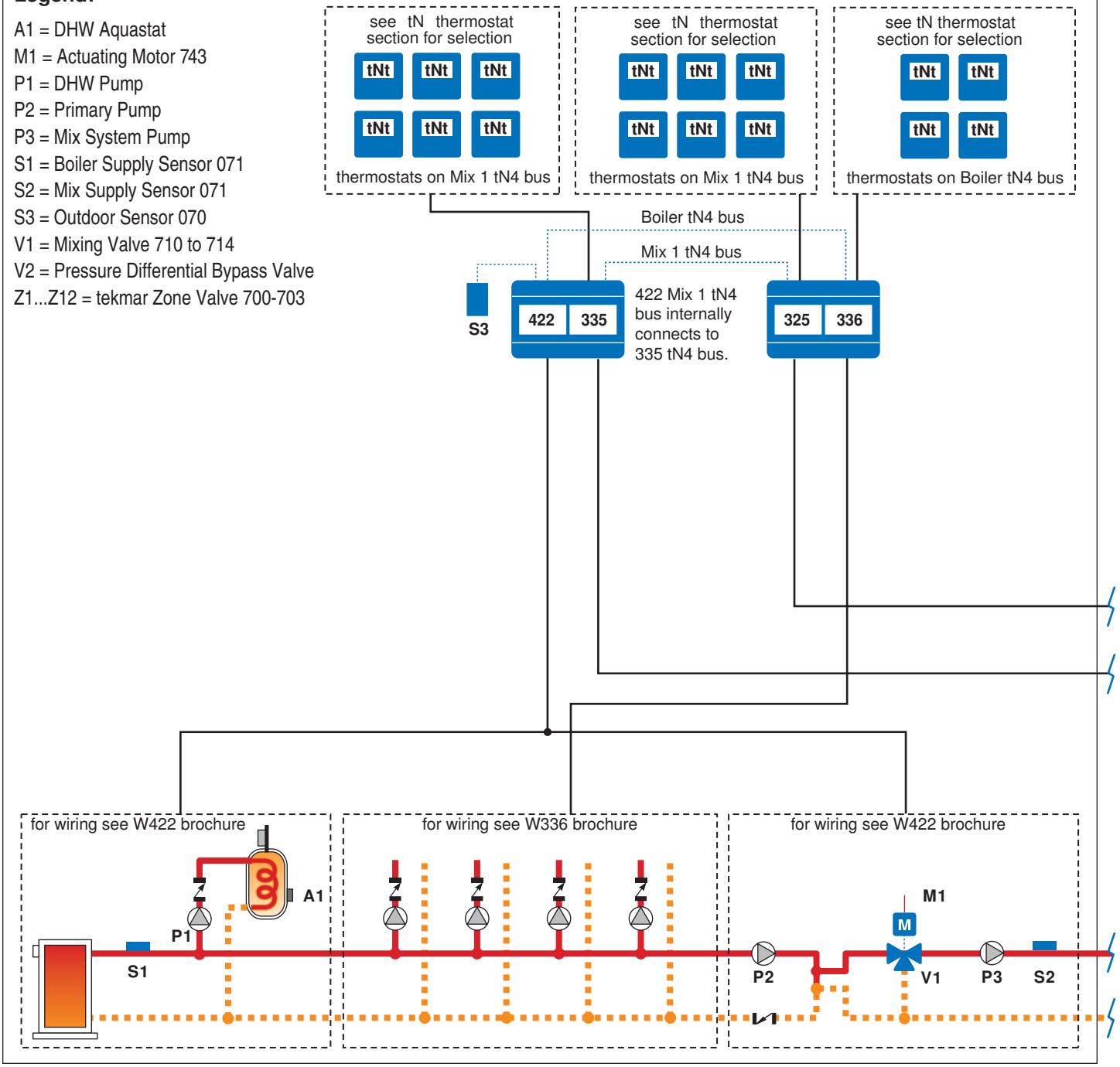
Legend:

A1 = DHW Aquastat
M1 = Actuating Motor 743
P1 = DHW Pump
P2 = Primary Pump
P3 = Mix System Pump
S1 = Boiler Supply Sensor 071
S2 = Mix Supply Sensor 071
S3 = Outdoor Sensor 070
V1 = Mixing Valve 710 to 714
V2 = Pressure Differential Bypass Valve
Z1...Z12 = tekmar Zone Valve 700-703



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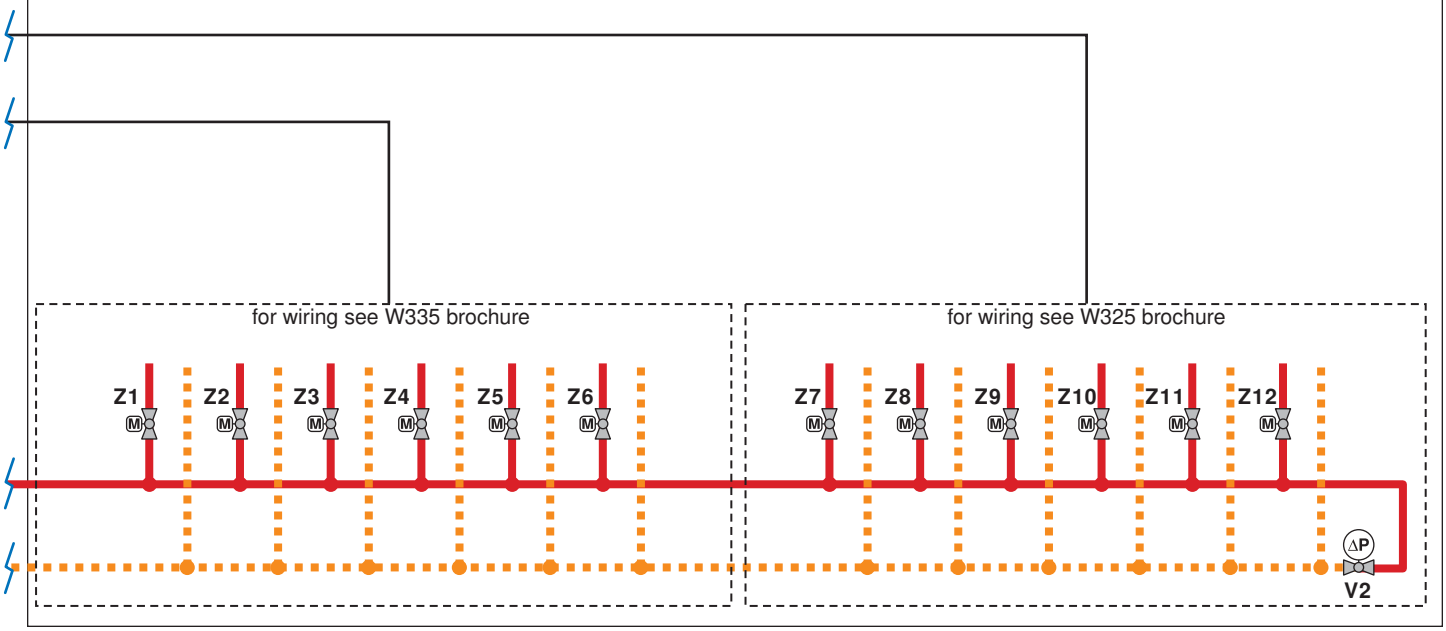

System Description: The Universal Reset Module 422 operates a single on-off or modulating boiler to provide outdoor reset to the heating system and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. The 422 also operates a variable speed injection pump to provide outdoor reset to the mix temperature heating system and boiler protection from flue gas condensation. Six tekmarNet® Thermostats operate six boiler temperature zone valves through a Zone Manager 335. A tekmarNet®4 boiler bus interconnects the thermostats to the 335 and the 422. Four tekmarNet® Thermostats operate four mix water temperature zone pumps through a Zone Manager 336. A tekmarNet®4 mix 1 bus interconnects the thermostats to the 336 and the 422. The tekmarNet®4 bus allows the thermostats to provide indoor feedback to fi ne tune the supply water temperature.

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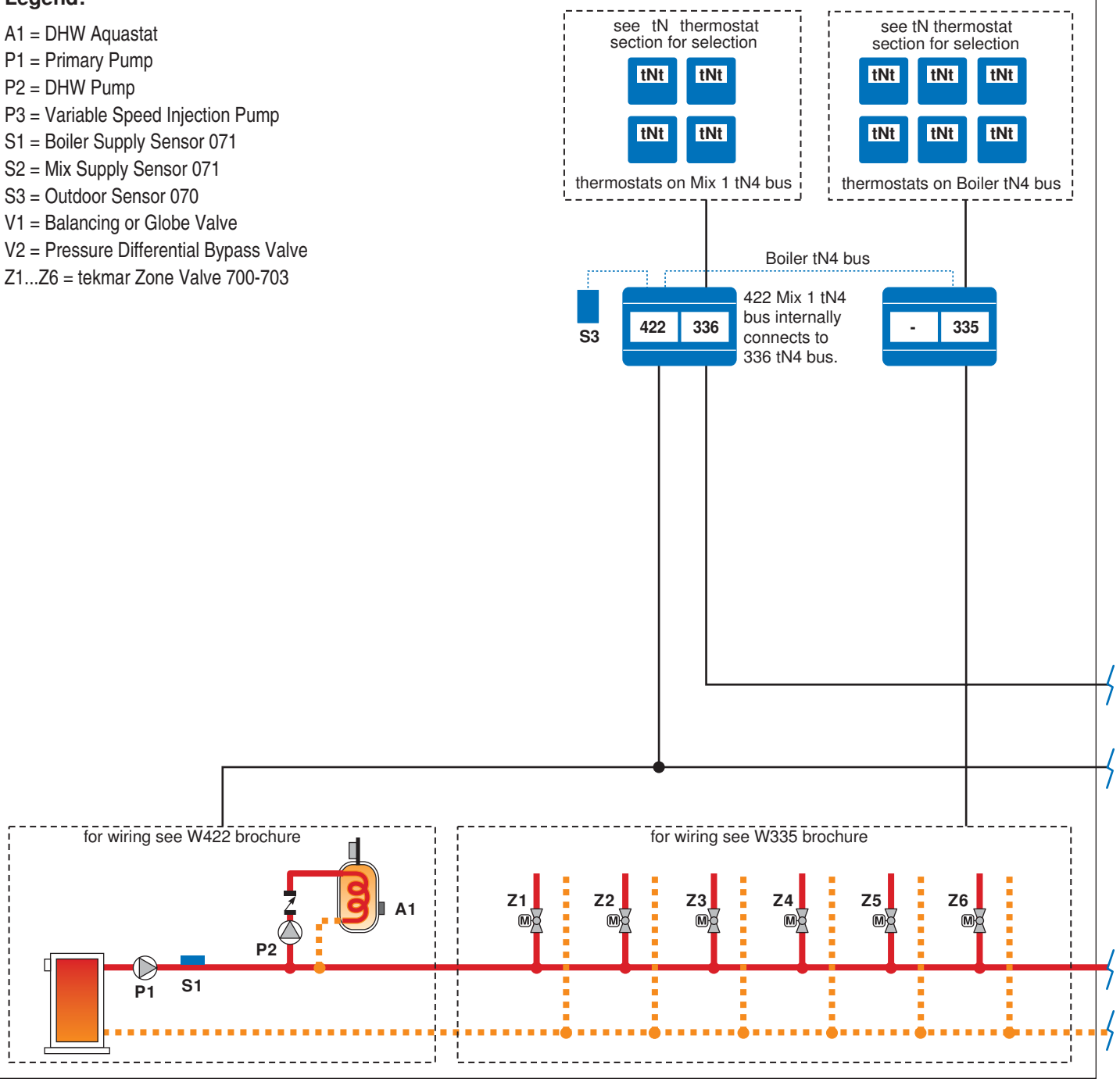
Legend:

A1 = DHW Aquastat
P1 = Primary Pump
P2 = DHW Pump
P3 = Variable Speed Injection Pump
S1 = Boiler Supply Sensor 071
S2 = Mix Supply Sensor 071
S3 = Outdoor Sensor 070
V1 = Balancing or Globe Valve
V2 = Pressure Differential Bypass Valve
Z1...Z6 = tekmar Zone Valve 700-703



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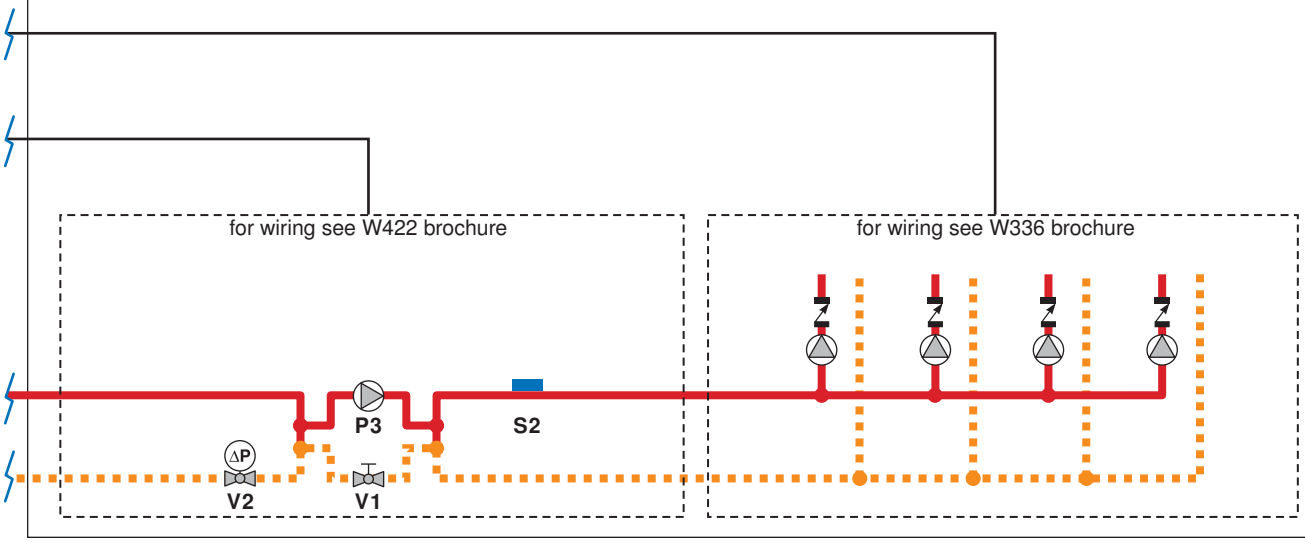

Application A 422-10

326 + 3 x 336 + 422 + 444

System Description: The Universal Reset Module 422 operates a single on-off or modulating boiler to provide load reset to the two mix water systems and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. The 422 also operates a variable speed injection pump to provide outdoor reset to the mix 1 heating system and boiler protection from flue gas condensation. A Mixing Expansion Module 444 operates a second variable speed injection pump for the mix 2 heating system. Seven tekmarNet® Thermostats operate seven mix 1 temperature zone pumps through a Zone Manager 336 and a Zone Expansion Module 326. A tekmarNet®4 mix 1 bus interconnects the thermostats to the 336, the 326, and the 422.

(Continued on next page)

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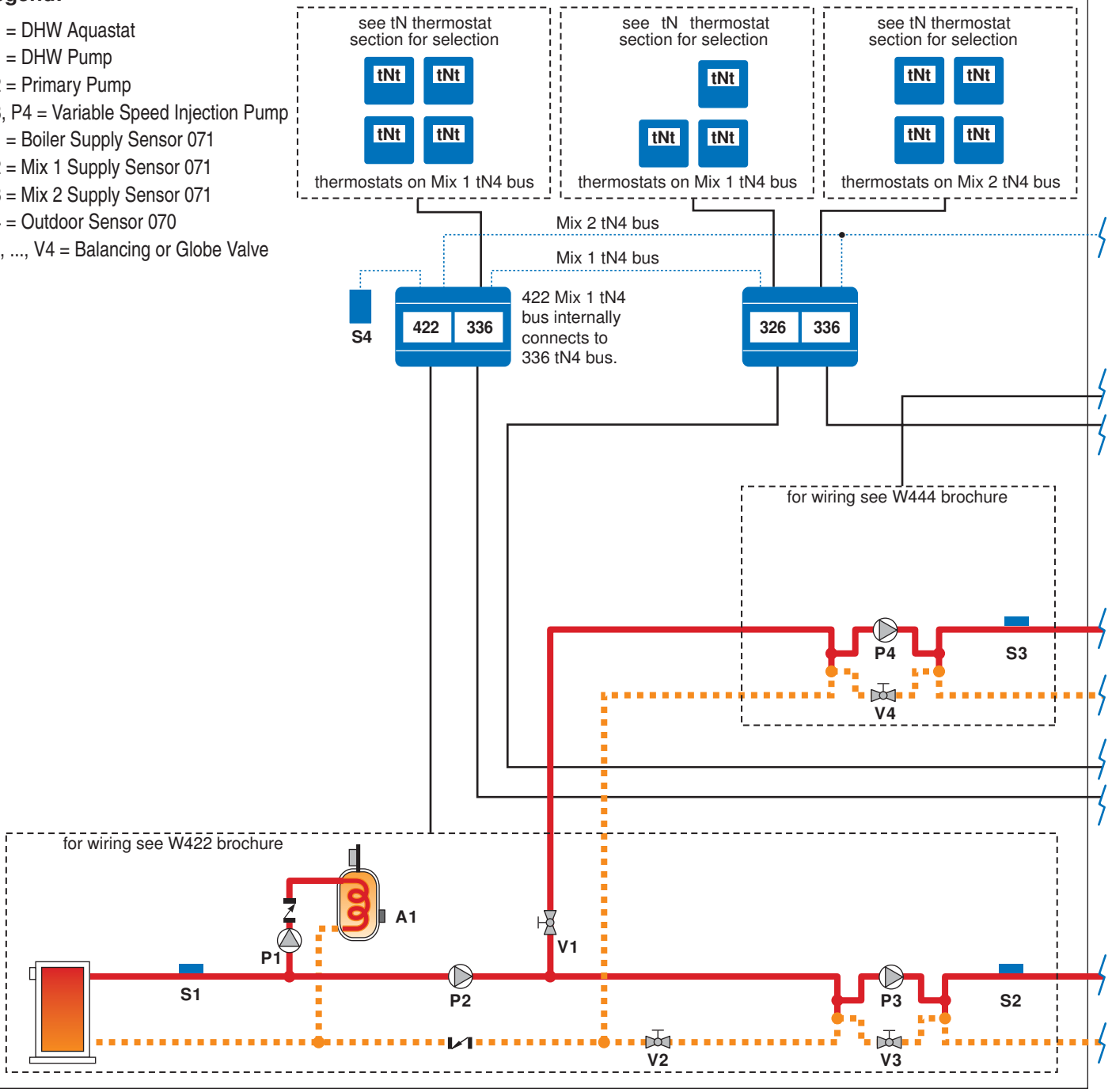
Legend:

A1 = DHW Aquastat
P1 = DHW Pump
P2 = Primary Pump
P3, P4 = Variable Speed Injection Pump
S1 = Boiler Supply Sensor 071
S2 = Mix 1 Supply Sensor 071
S3 = Mix 2 Supply Sensor 071
S4 = Outdoor Sensor 070
V1, ..., V4 = Balancing or Globe Valve



Application A 422-10

326 + 3 x 336 + 422 + 444

Eight tekmarNet® Thermostats operate eight mix 2 water temperature zone pumps through two Zone Manager 336s. A tekmarNet®4 mix 2 bus interconnects the thermostats to the 336s and the 422. The tekmarNet®4 bus allows the thermostats to provide indoor feedback to fine tune the supply water temperature.

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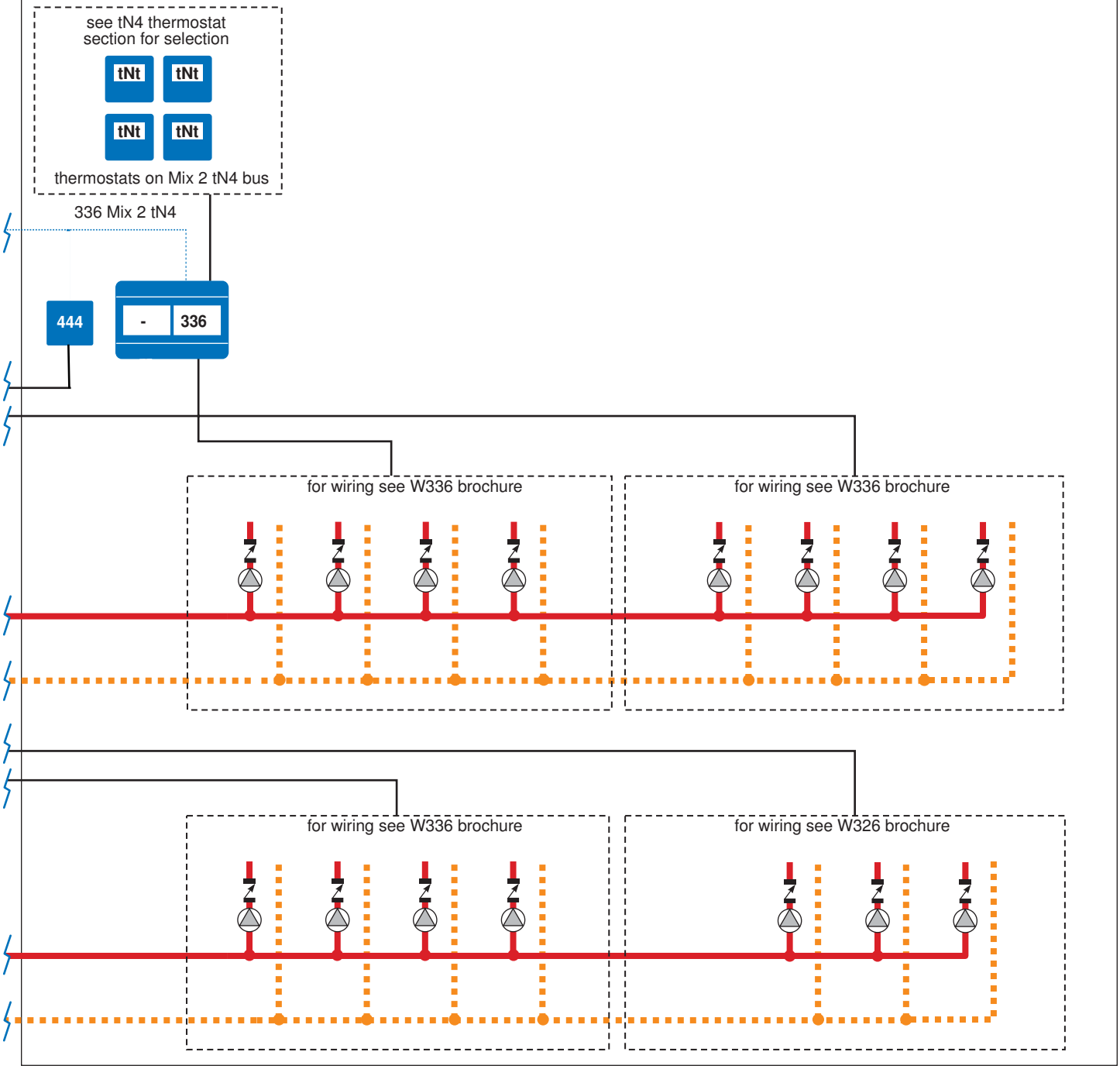


Application A 422-11

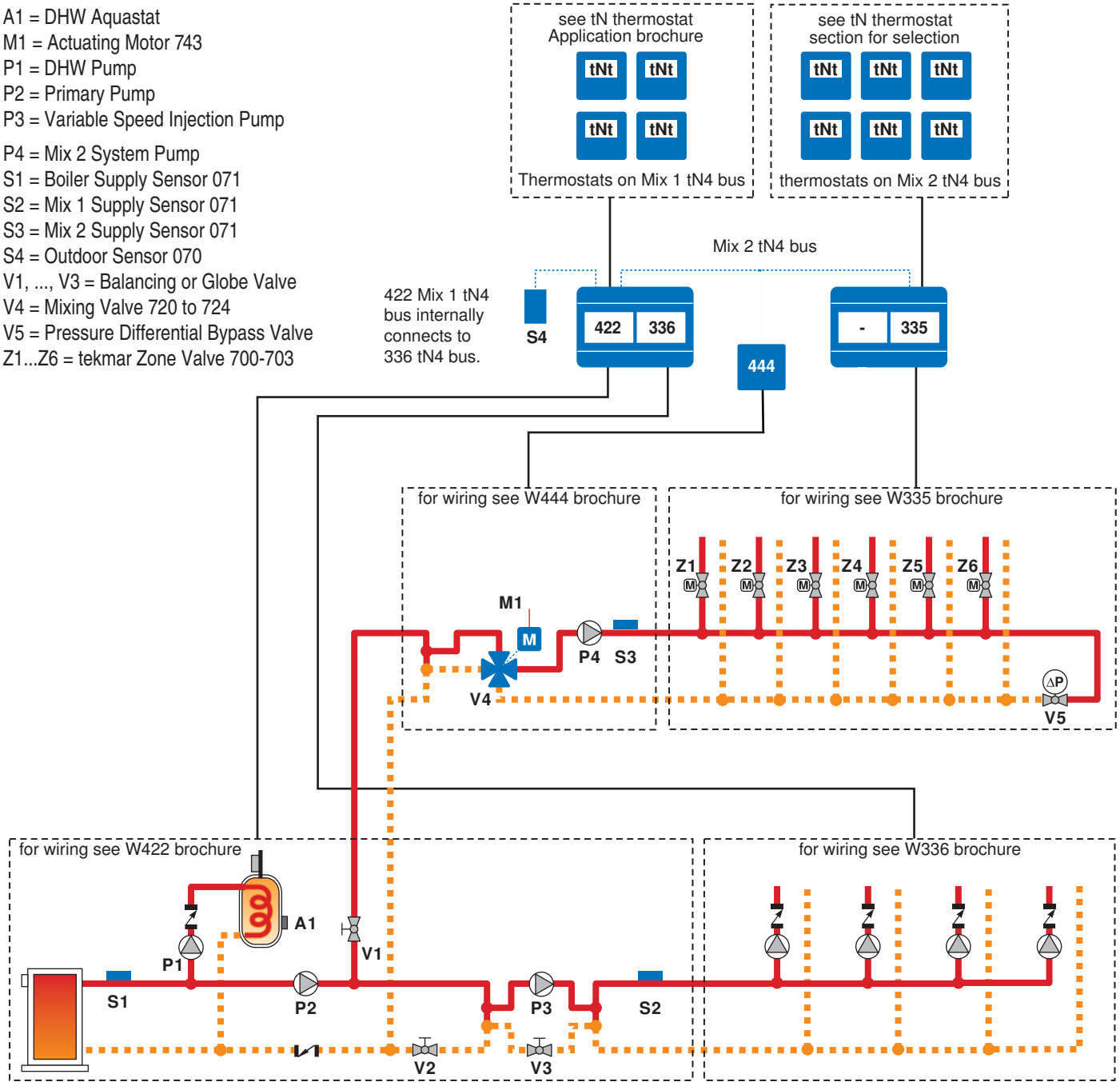
335 + 336 + 422 + 444

System Description: The Universal Reset Module 422 operates a single on-off or modulating boiler to provide load reset to the two mix water systems and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. The 422 also operates a variable speed injection pump to provide outdoor reset to the mix 1 heating system and boiler protection from flue gas condensation. A Mixing Expansion Module 444 operates a 4-way mixing valve for the mix 2 heating system. Four tekmarNet® Thermostats operate four mix 1 temperature zone pumps through a Zone Manager 336. A tekmarNet®4 mix 1 bus interconnects the thermostats to the 336, and the 422. Six tekmarNet® Thermostats operate six mix 2 water temperature zone valves through a Zone Manager 335. A tekmarNet®4 mix 2 bus interconnects the thermostats to the 335 and the 422. The tekmarNet®4 bus allows the thermostats to provide indoor feedback to fine tune the supply water temperature.

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.

Legend:

A1 = DHW Aquastat
M1 = Actuating Motor 743
P1 = DHW Pump
P2 = Primary Pump
P3 = Variable Speed Injection Pump
P4 = Mix 2 System Pump
S1 = Boiler Supply Sensor 071
S2 = Mix 1 Supply Sensor 071
S3 = Mix 2 Supply Sensor 071
S4 = Outdoor Sensor 070
V1, ..., V3 = Balancing or Globe Valve
V4 = Mixing Valve 720 to 724
V5 = Pressure Differential Bypass Valve
Z1...Z6 = tekmar Zone Valve 700-703



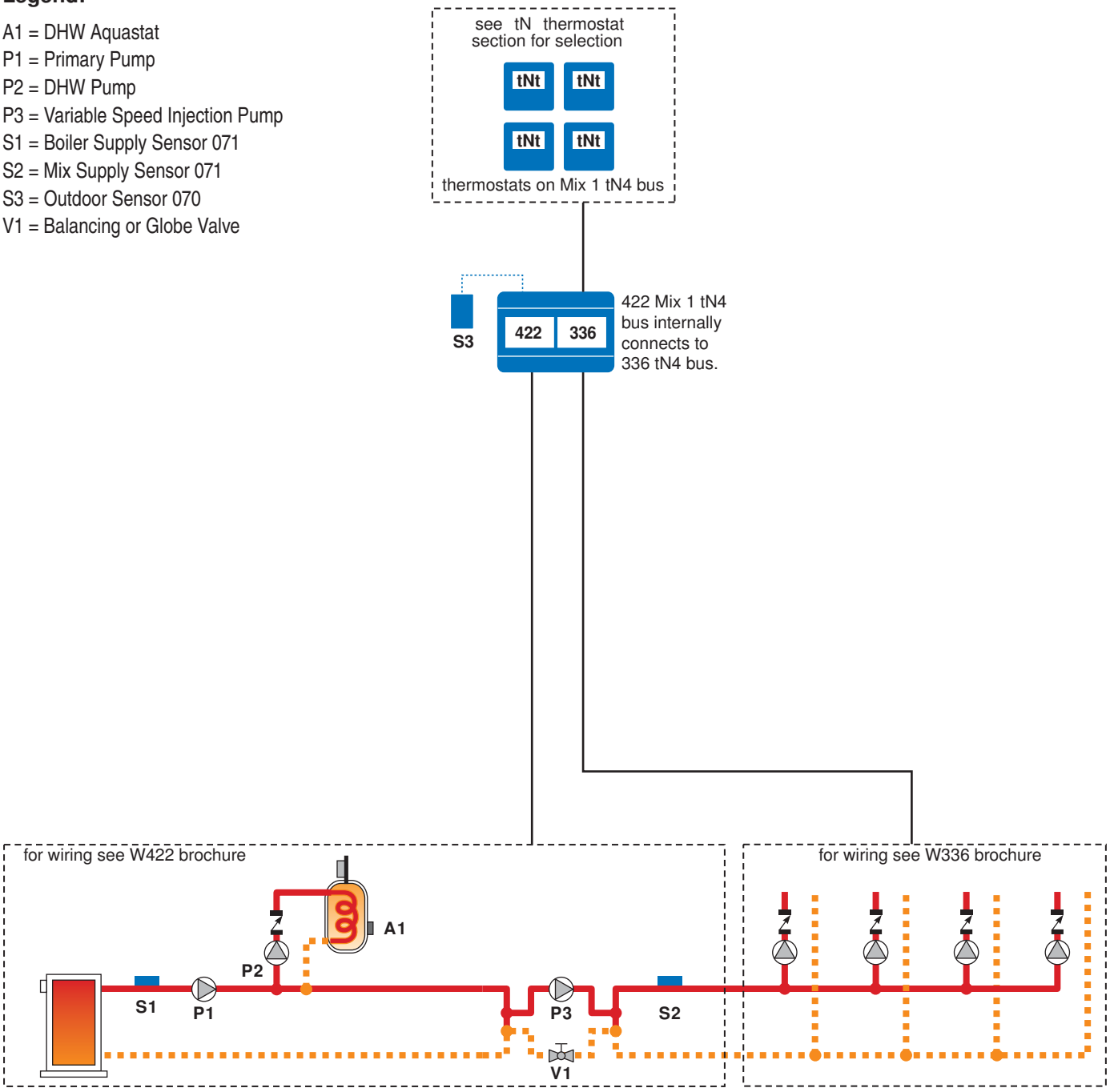
Application A 422-12 *336 + 422*

System Description: The Universal Reset Module 422 operates a single on-off boiler and a variable speed injection pump to provide outdoor reset to the heating system. The variable speed injection pump allows the 422 to provide boiler protection from flue gas condensation. The 422 is able to heat an indirect domestic hot water tank. Priority for the indirect domestic hot water tank is optional. Four tekmarNet® Thermostats operate four zone pumps through the Zone Manager 336. A tekmarNet®4 bus allows the thermostats to communicate to the 422 in order to provide indoor feedback to fine tune the supply water temperature.

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.

Legend:

A1 = DHW Aquastat
P1 = Primary Pump
P2 = DHW Pump
P3 = Variable Speed Injection Pump
S1 = Boiler Supply Sensor 071
S2 = Mix Supply Sensor 071
S3 = Outdoor Sensor 070
V1 = Balancing or Globe Valve



Application A 422-13

325 + 335 + 2 x 336 + 422 + 444

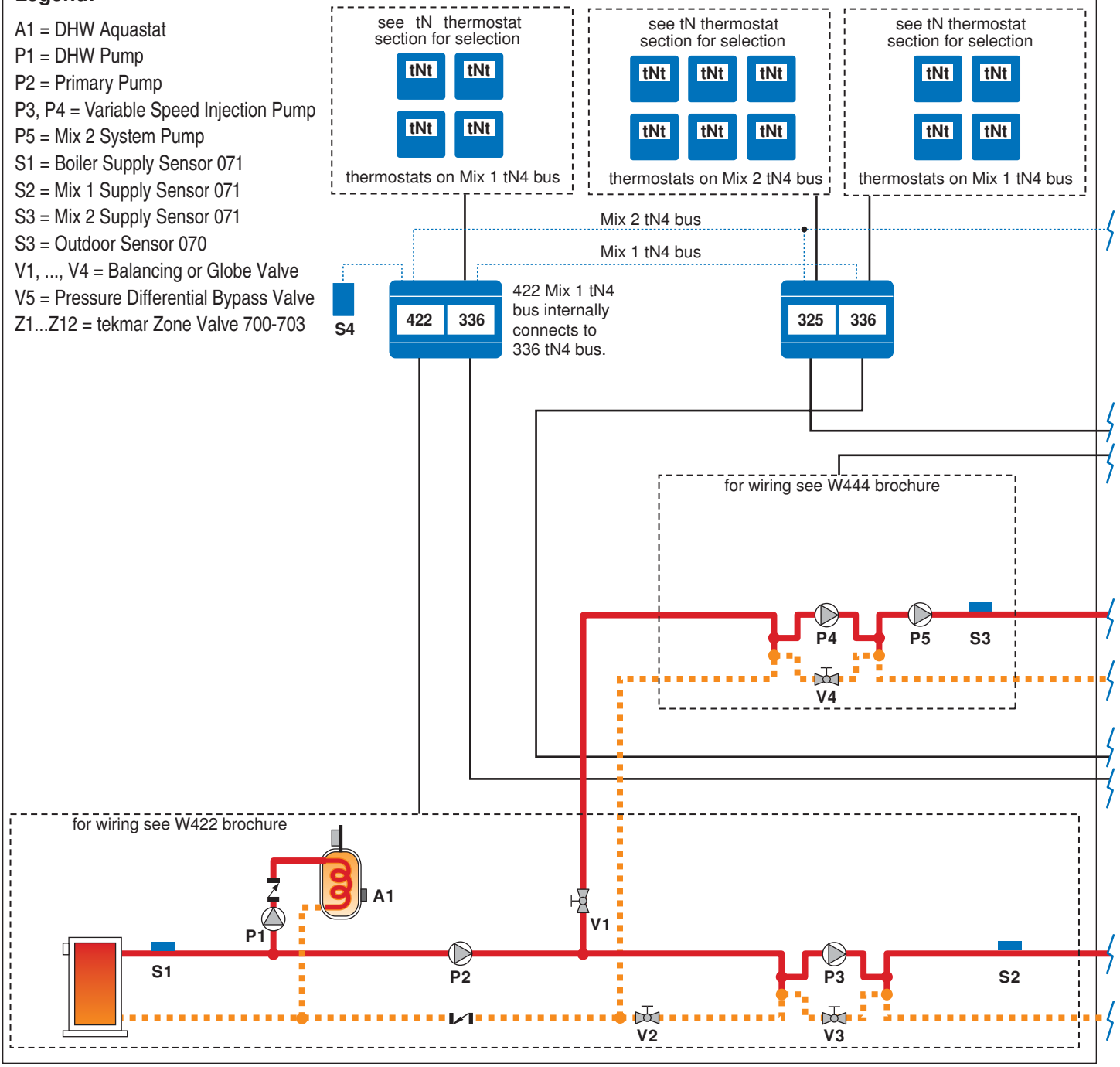
System Description: The Universal Reset Module 422 operates a single on-off or modulating boiler to provide load reset to the two mix water systems and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. The 422 also operates a variable speed injection pump to provide outdoor reset to the mix 1 heating system and boiler protection from fl ue gas condensation. A Mixing Expansion Module 444 operates a variable speed injection pump for the mix 2 heating system. Eight tekmarNet® Thermostats operate eight mix 1 temperature zone pumps through a two Zone Manager 336s. A tekmarNet®4 mix 1 bus interconnects the thermostats to the 336s, and the 422.

(Continued on next page)

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.

Legend:

A1 = DHW Aquastat
P1 = DHW Pump
P2 = Primary Pump
P3, P4 = Variable Speed Injection Pump
P5 = Mix 2 System Pump
S1 = Boiler Supply Sensor 071
S2 = Mix 1 Supply Sensor 071
S3 = Mix 2 Supply Sensor 071
S3 = Outdoor Sensor 070
V1, ..., V4 = Balancing or Globe Valve
V5 = Pressure Differential Bypass Valve
Z1...Z12 = tekmar Zone Valve 700-703

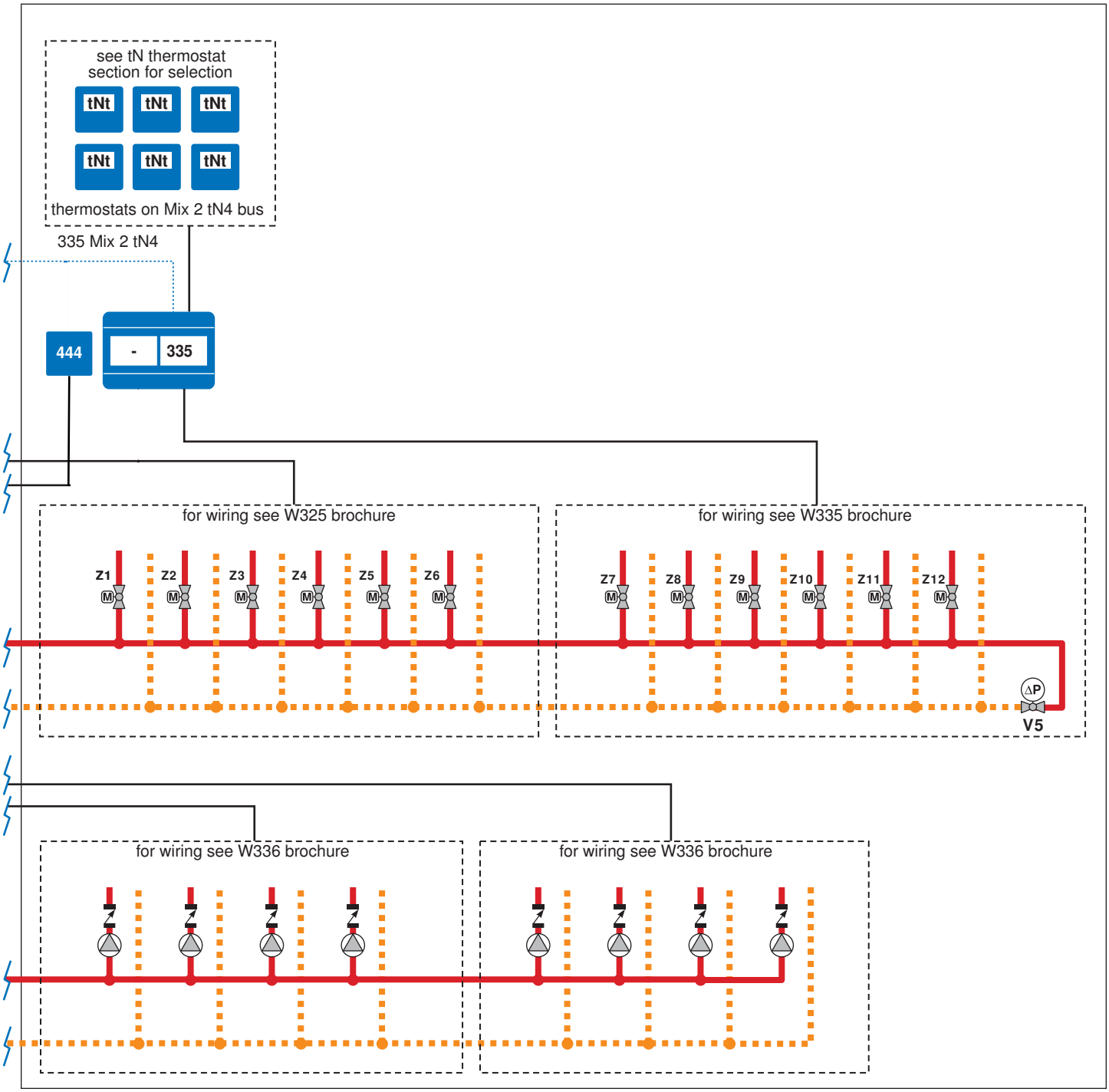


Application A 422-13

325 + 335 + 2 x 336 + 422 + 444

Twelve tekmarNet® Thermostats operate twelve mix 2 water temperature zone valves through a Zone Manager 335 and a Zone Expansion Module 325. A tekmarNet®4 mix 2 bus interconnects the thermostats to the 335, the 325, and the 422. The tekmarNet®4 bus allows the thermostats to provide indoor feedback to fine tune the supply water temperature.

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 422-14

325 + 3 x 335 + 422 + 444

System Description: The Universal Reset Module 422 operates a single on-off or modulating boiler to provide load reset to the two mix water systems and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. The 422 also operates a 3-way mixing valve to provide outdoor reset to the mix 1 heating system and boiler protection from flue gas condensation. A Mixing Expansion Module 444 operates a 3-way mixing valve for the mix 2 heating system. Twelve tekmarNet® Thermostats operate twelve mix 1 temperature zone valves through a Zone Manager 335 and a Zone Expansion Module 325.

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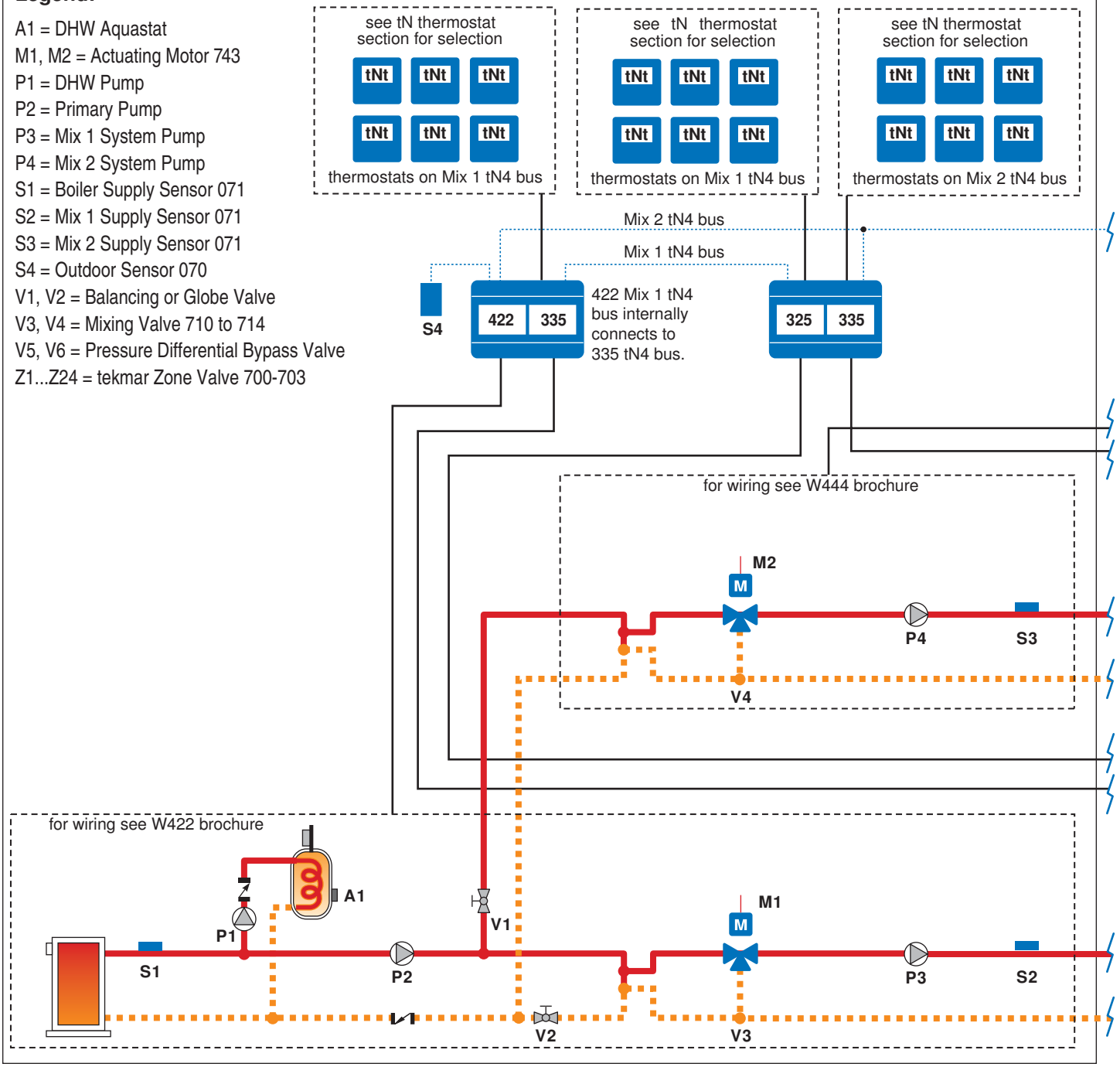
Concept Drawing: This is only a concept drawing, not an engineered drawing. It is not intended to describe a complete system, nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed, including additional 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.

Legend:

A1 = DHW Aquastat
M1, M2 = Actuating Motor 743
P1 = DHW Pump
P2 = Primary Pump
P3 = Mix 1 System Pump
P4 = Mix 2 System Pump
S1 = Boiler Supply Sensor 071
S2 = Mix 1 Supply Sensor 071
S3 = Mix 2 Supply Sensor 071
S4 = Outdoor Sensor 070
V1, V2 = Balancing or Globe Valve
V3, V4 = Mixing Valve 710 to 714
V5, V6 = Pressure Differential Bypass Valve
Z1...Z24 = tekmar Zone Valve 700-703

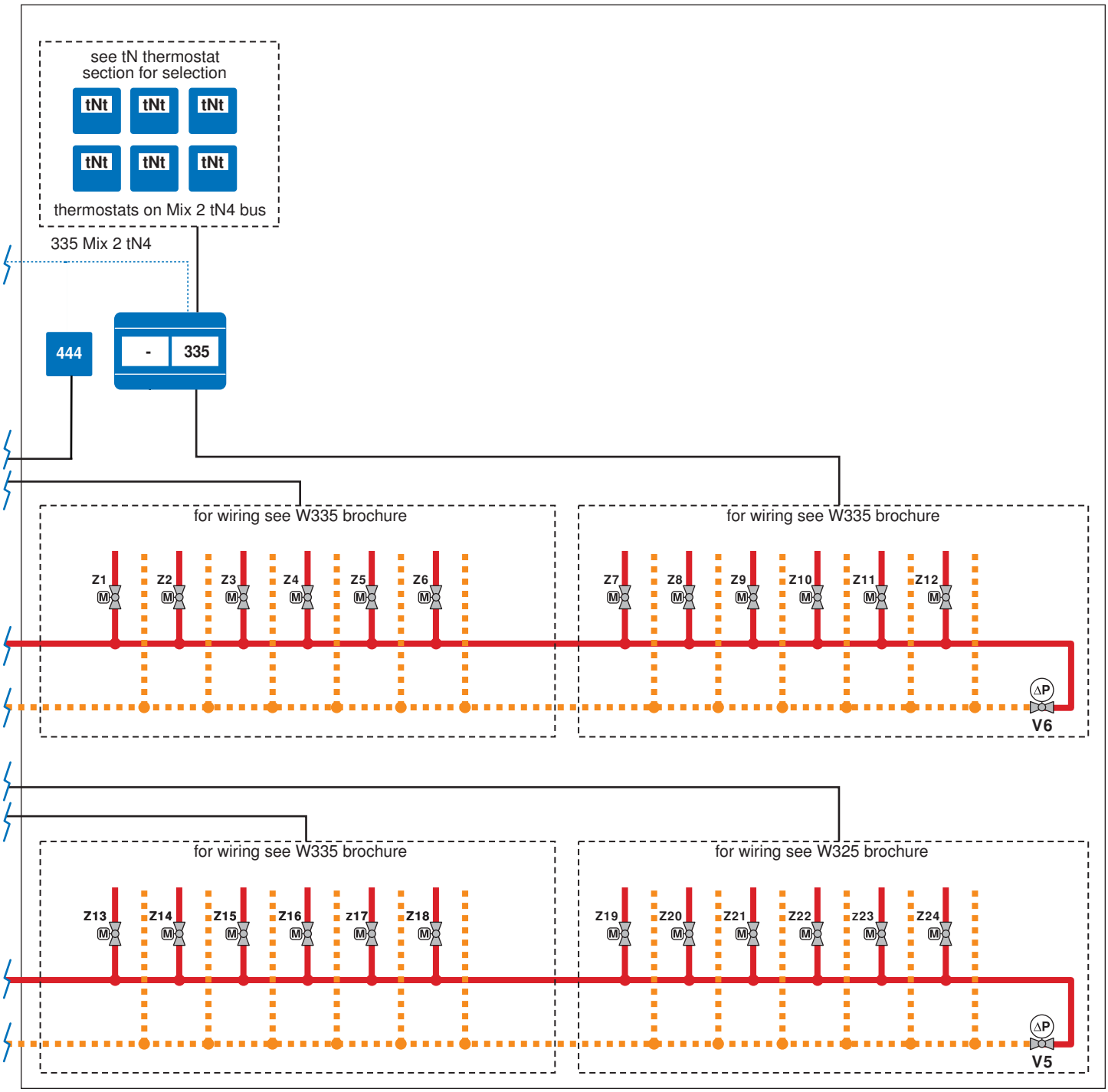


Application A 422-14

325 + 3 x 335 + 422 + 444

A tekmarNet®4 mix 1 bus interconnects the thermostats to the 335, the 325, and the 422. Twelve tekmarNet® Thermostats operate twelve mix 2 water temperature zone valves through two Zone Manager 335s. A tekmarNet®4 mix 2 bus interconnects the thermostats to the 335s and the 422. The tekmarNet®4 bus allows the thermostats to provide indoor feedback to fine tune the supply water temperature.

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.



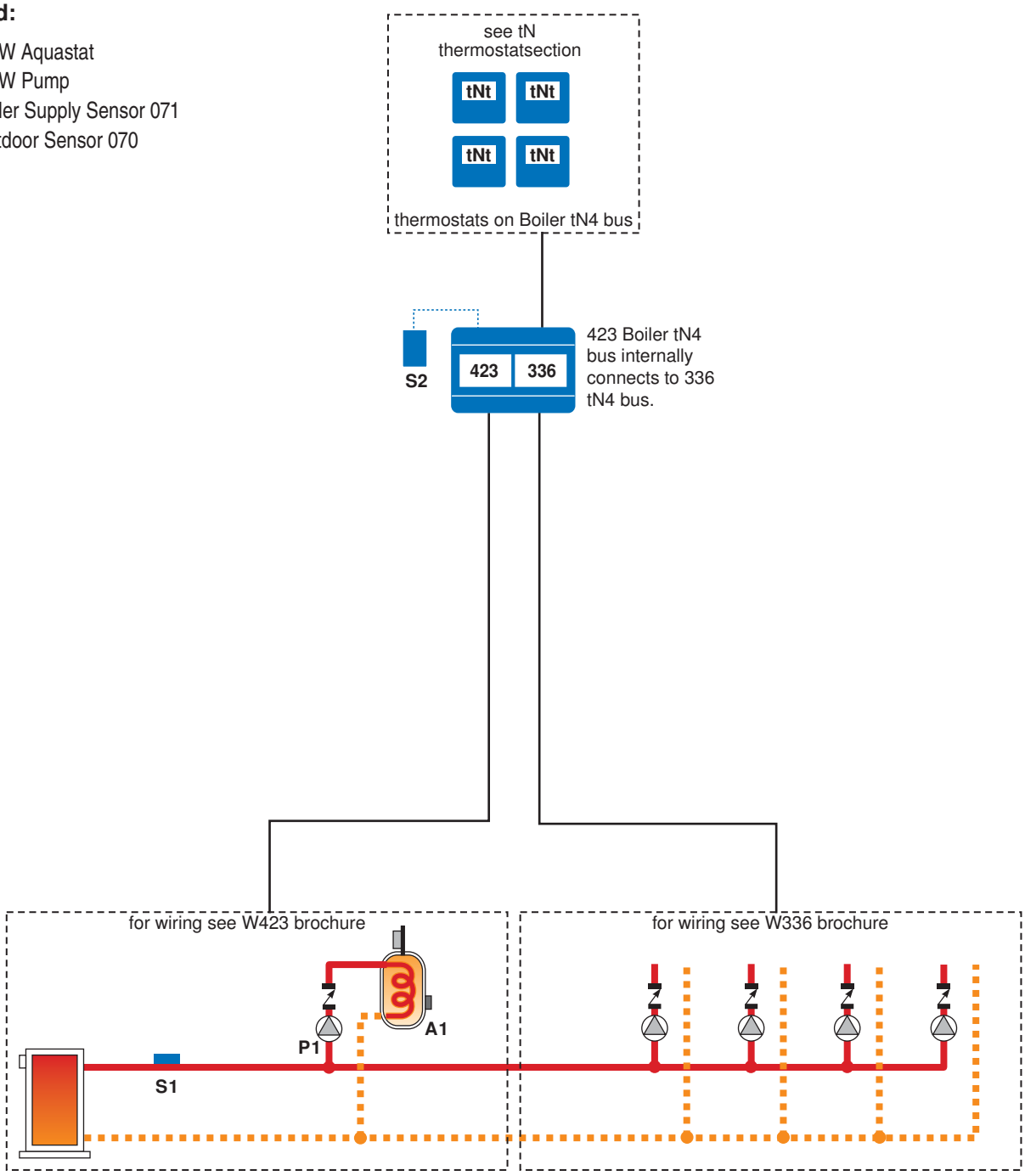
Application A 423-1 *336 + 423*

System Description: The Boiler Reset Module 423 operates a single on-off or modulating boiler to provide outdoor reset to the heating system and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. Four tekmarNet® Thermostats operate four zone pumps through the Zone Manager 336. A tekmarNet®4 boiler bus allows the thermostats to communicate to the 423 in order to provide indoor feedback to fi ne tune the supply water temperature.

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.

Legend:

A1 = DHW Aquastat
P1 = DHW Pump
S1 = Boiler Supply Sensor 071
S2 = Outdoor Sensor 070



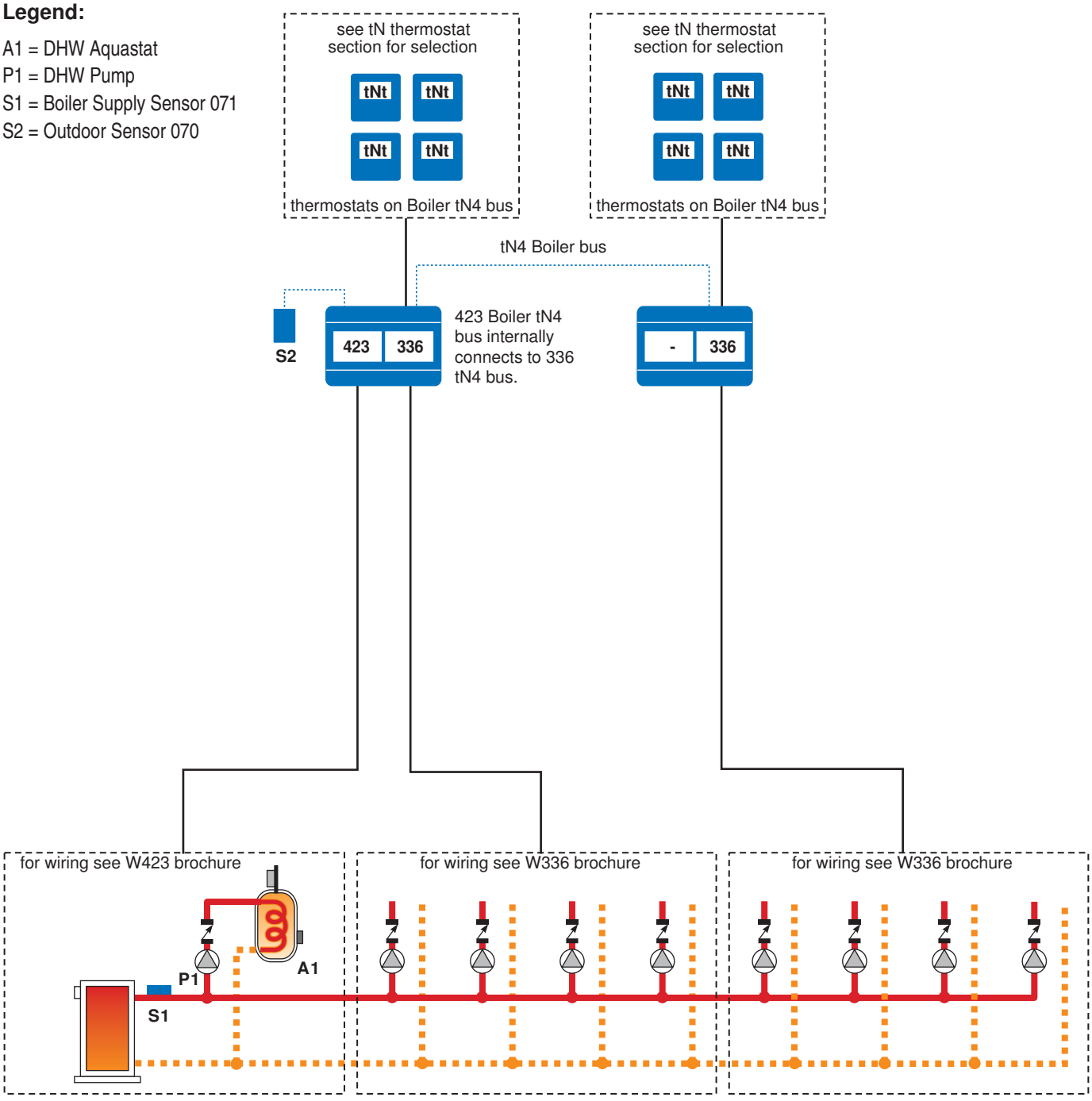
Application A 423-2 *2 x 336 + 423*

System Description: The Boiler Reset Module 423 operates a single on-off or modulating boiler to provide outdoor reset to the heating system and overrides the reset temperature to provide indirect domestic hot water tank heating. Priority for the indirect domestic hot water tank is optional. Eight tekmarNet® Thermostats operate eight zone pumps through two Zone Manager 336s. A tekmarNet®4 boiler bus interconnects the thermostats to the two 336s and the 423. This allows the thermostats to communicate with the 423 in order to provide indoor feedback fine tune the supply water temperature.

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.

Legend:

A1 = DHW Aquastat
P1 = DHW Pump
S1 = Boiler Supply Sensor 071
S2 = Outdoor Sensor 070

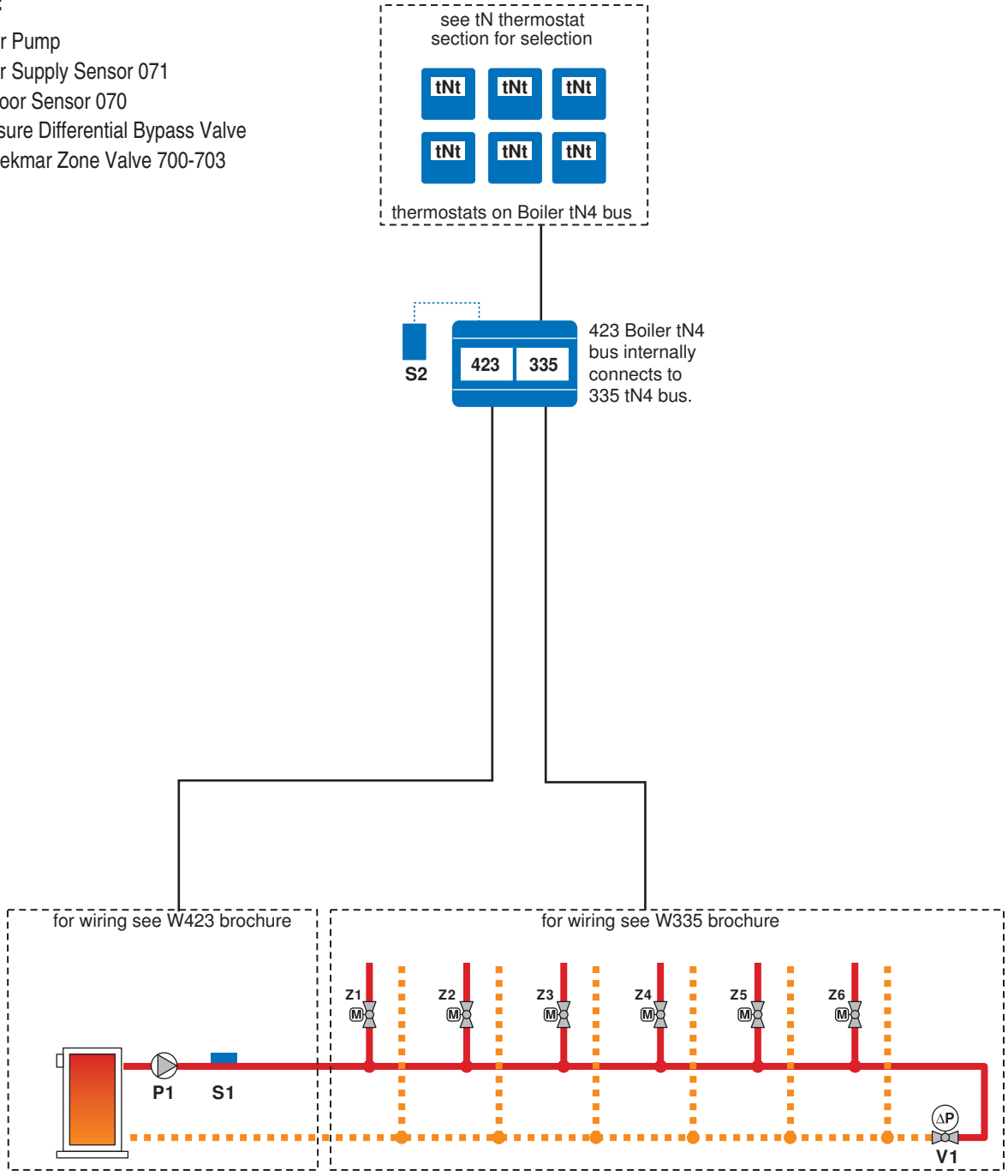


System Description: The Universal Reset Module 423 operates a single on-off or modulating boiler to provide outdoor reset to the heating system. Six tekmarNet® Thermostats operate six zone valves through the Zone Manager 335. The 423's primary pump operates as a system pump for the six zone valves. A tekmarNet®4 boiler bus allows the thermostats to communicate to the 423 in order to provide indoor feedback to fine tune the supply water temperature.

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.

Legend:

P1 = Boiler Pump
S1 = Boiler Supply Sensor 071
S2 = Outdoor Sensor 070
V1 = Pressure Differential Bypass Valve
Z1...Z6 = tekmar Zone Valve 700-703



Application A 423-4

2x 335 + 2x 336 + 423 + 2x 444

System Description: The Universal Reset Module 423 operates two on-off or modulating boilers to provide outdoor reset to the heating system and overrides the reset temperature to provide indirect domestic hot water tank heating. Four tekmarNet®4 Thermostats operate four boiler temperature zone pumps through a Zone Manager 336. The 423 connects to 3 Mixing Expansion Modules to provide outdoor reset to mixing zones.

A Mixing Expansion Module 444 operates a variable speed injection pump for the mix 1 heating system. Four tekmarNet®4 Thermostats operate four mix 1 zone pumps through a Zone Manager 336.

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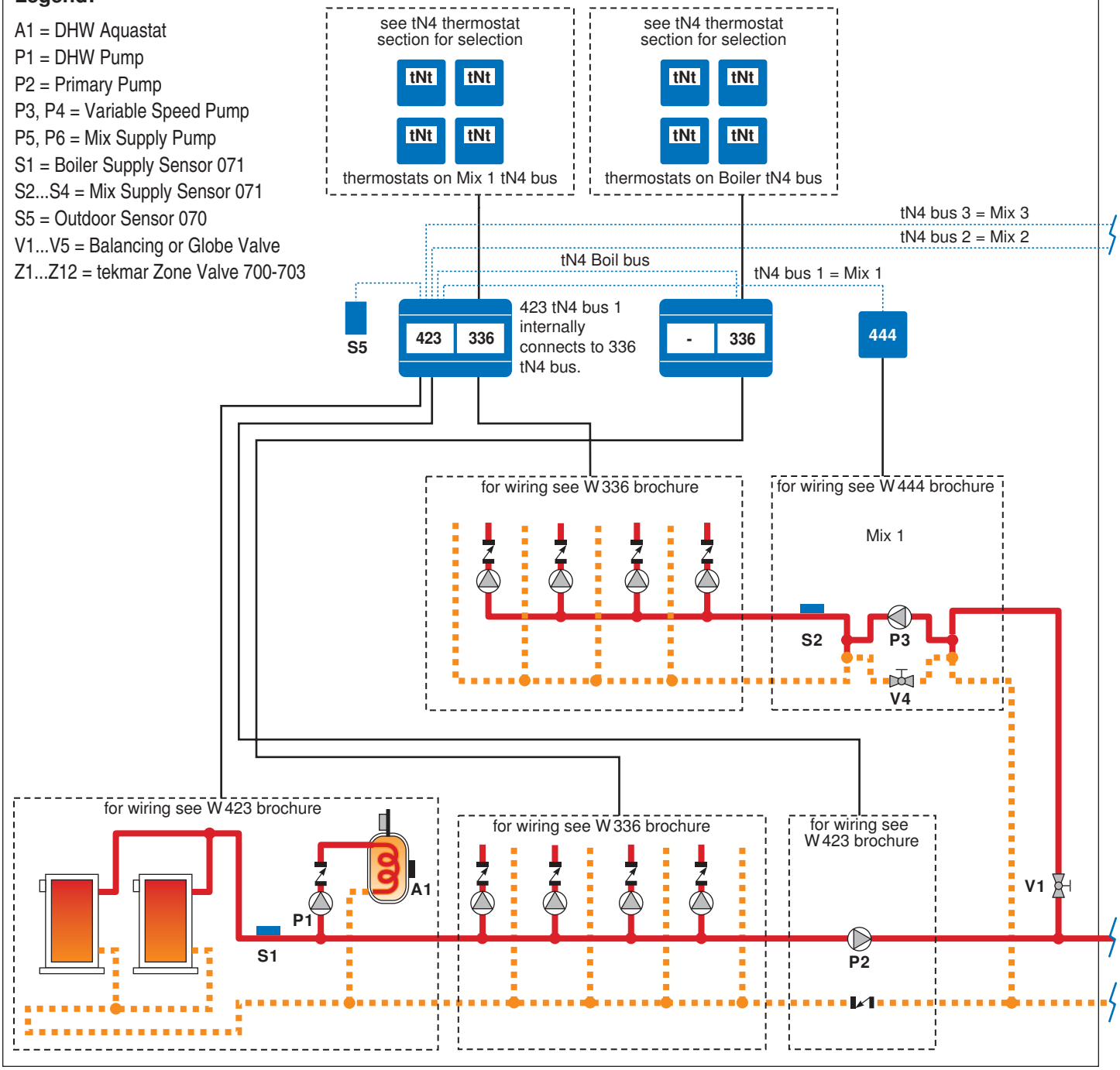
Concept Drawing: This is only a concept drawing, not an engineered drawing. It is not intended to describe a complete system, nor any particular system. It is up to the system designer to determine the necessary components for and configuration of the particular system being designed, including additional 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.

Legend:

A1 = DHW Aquastat
P1 = DHW Pump
P2 = Primary Pump
P3, P4 = Variable Speed Pump
P5, P6 = Mix Supply Pump
S1 = Boiler Supply Sensor 071
S2...S4 = Mix Supply Sensor 071
S5 = Outdoor Sensor 070
V1...V5 = Balancing or Globe Valve
Z1...Z12 = tekmar Zone Valve 700-703



Application A 423-4

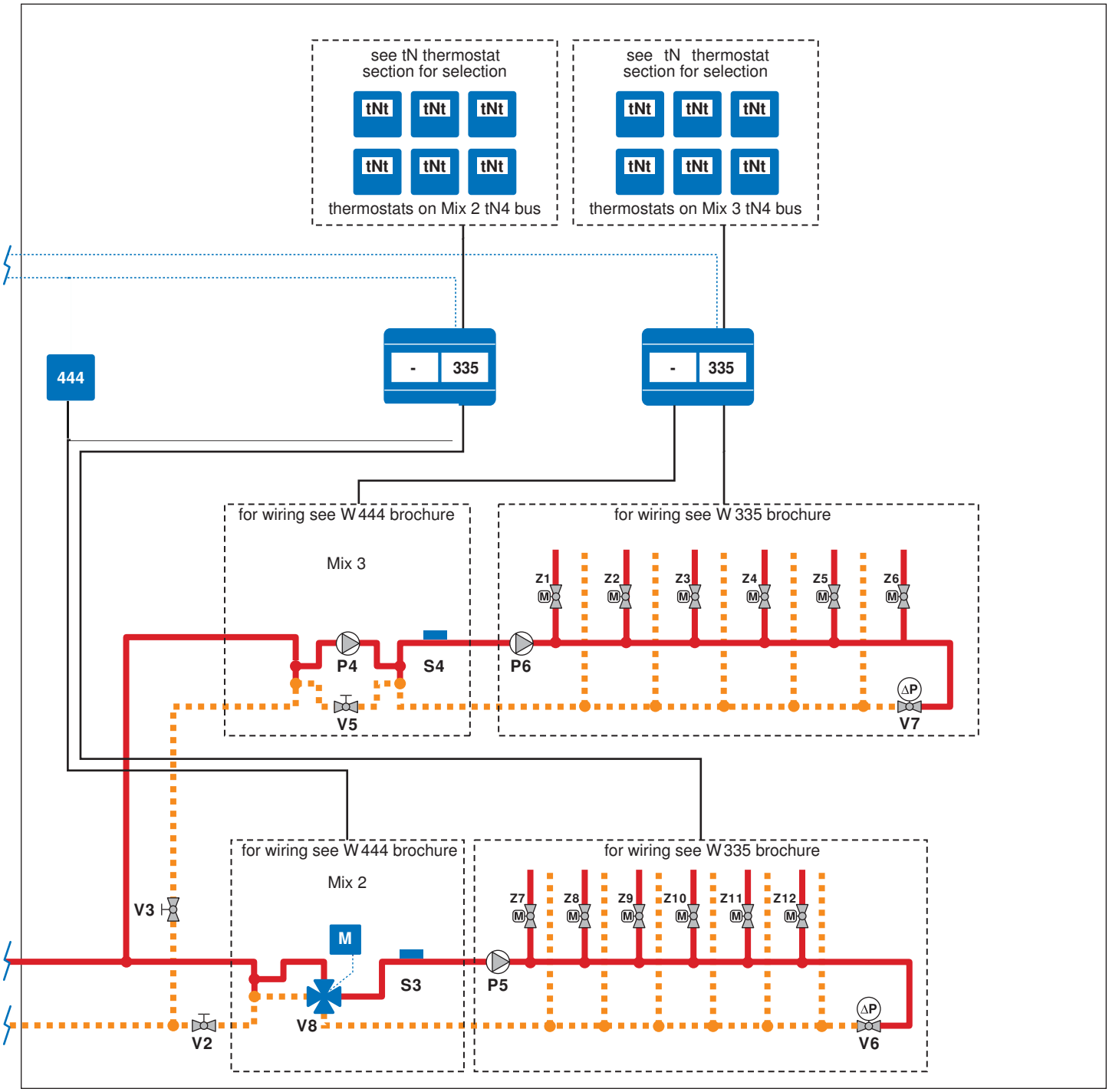
2x 335 + 2x 336 + 423 + 2x 444

A Mixing Expansion Module 444 operates a 4-way mixing valve for the mix 2 heating system. Six tekmarNet® Thermostats operate six mix 2 zone valves through a Zone Manager 335.

A Mixing Expansion Module 444 operates a variable speed injection pump for the mix 3 heating system. Six tekmarNet® Thermostats operate six mix 3 zone valves through a Zone Manager 335.

The tekmarNet®4 bus allows the thermostats to provide indoor temperature feedback to fine tune the supply water temperature.

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 423-5

294 + 4x 336 + 423

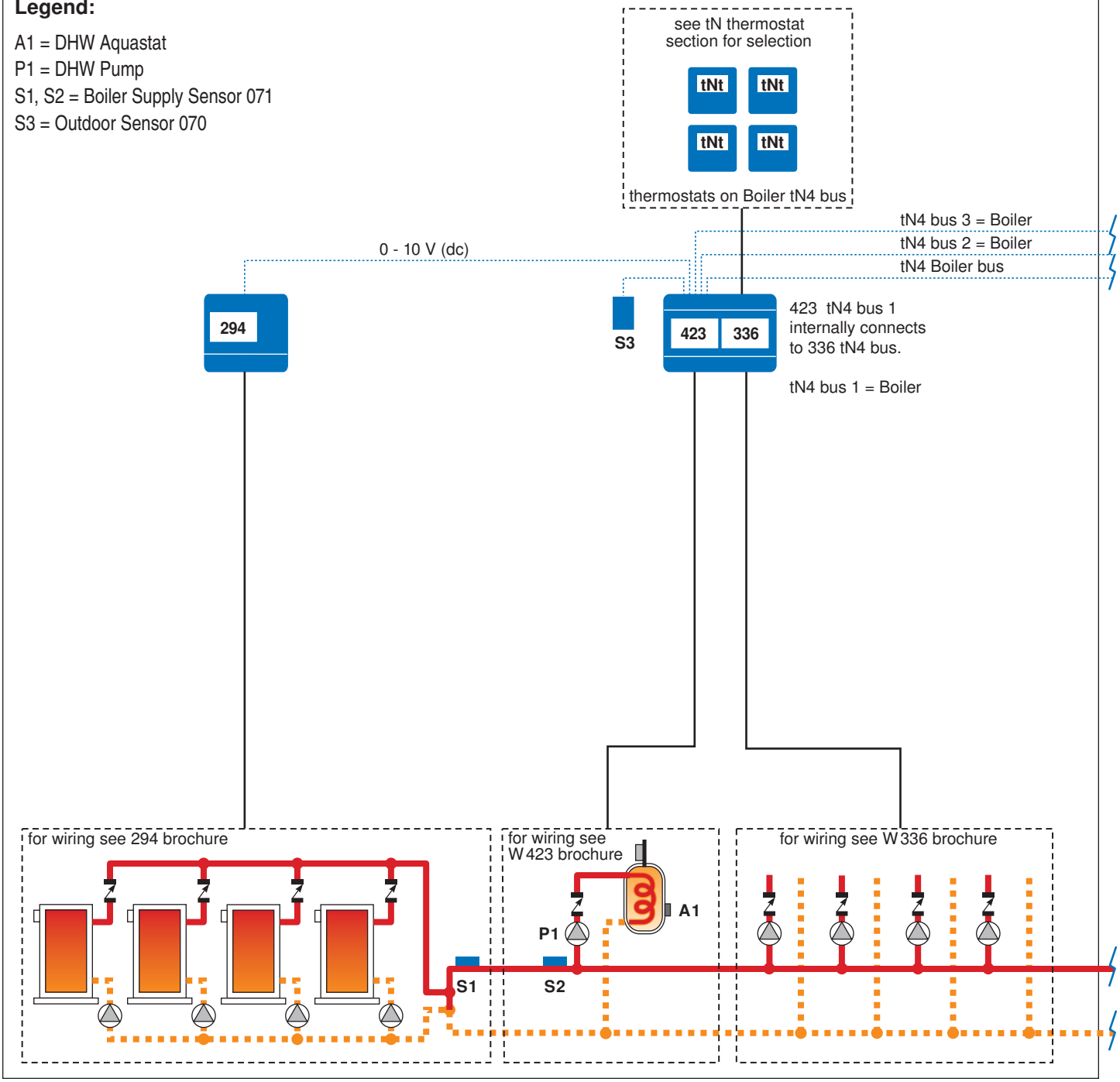
System Description: The Universal Reset Module 423 provides a 0 to 10 V (dc) signal to a Smart Boiler Control 294 in order to provide outdoor reset to the heating system and overrides the reset temperature to provide indirect domestic hot water tank heating. The 423 has four tekmarNet®4 buses that are all configured to operate boiler water temperatures. This allows up to 96 tekmarNet® Thermostats to be connected to Zone Managers.

The Smart Boiler Control 294 provides staging and rotation to four boilers as well as operating the boiler pumps to provide pre and post purging of the boilers.

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.

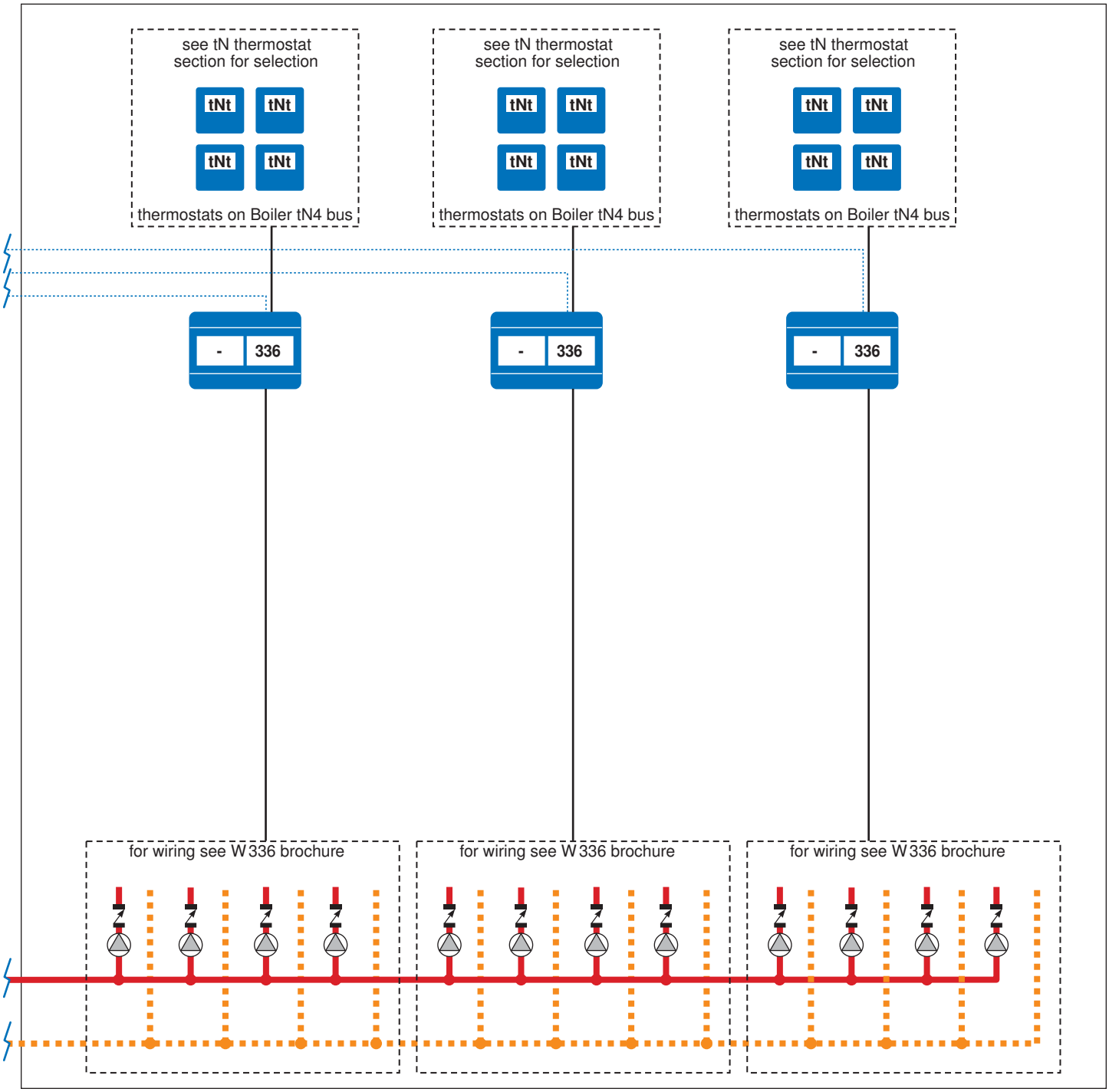
Legend:

A1 = DHW Aquastat
P1 = DHW Pump
S1, S2 = Boiler Supply Sensor 071
S3 = Outdoor Sensor 070



Application A 423-5

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 423-6

4x 336 + 423 + 2x 444

System Description: The Universal Reset Module 423 operates two on-off or modulating boilers to provide outdoor reset to the heating system and overrides the reset temperature to provide indirect domestic hot water tank heating. Four tekmarNet® Thermostats operate four boiler temperature zone pumps through a Zone Manager 336. The 423 connects to 2 Mixing Expansion Modules to provide outdoor reset to mixing zones.

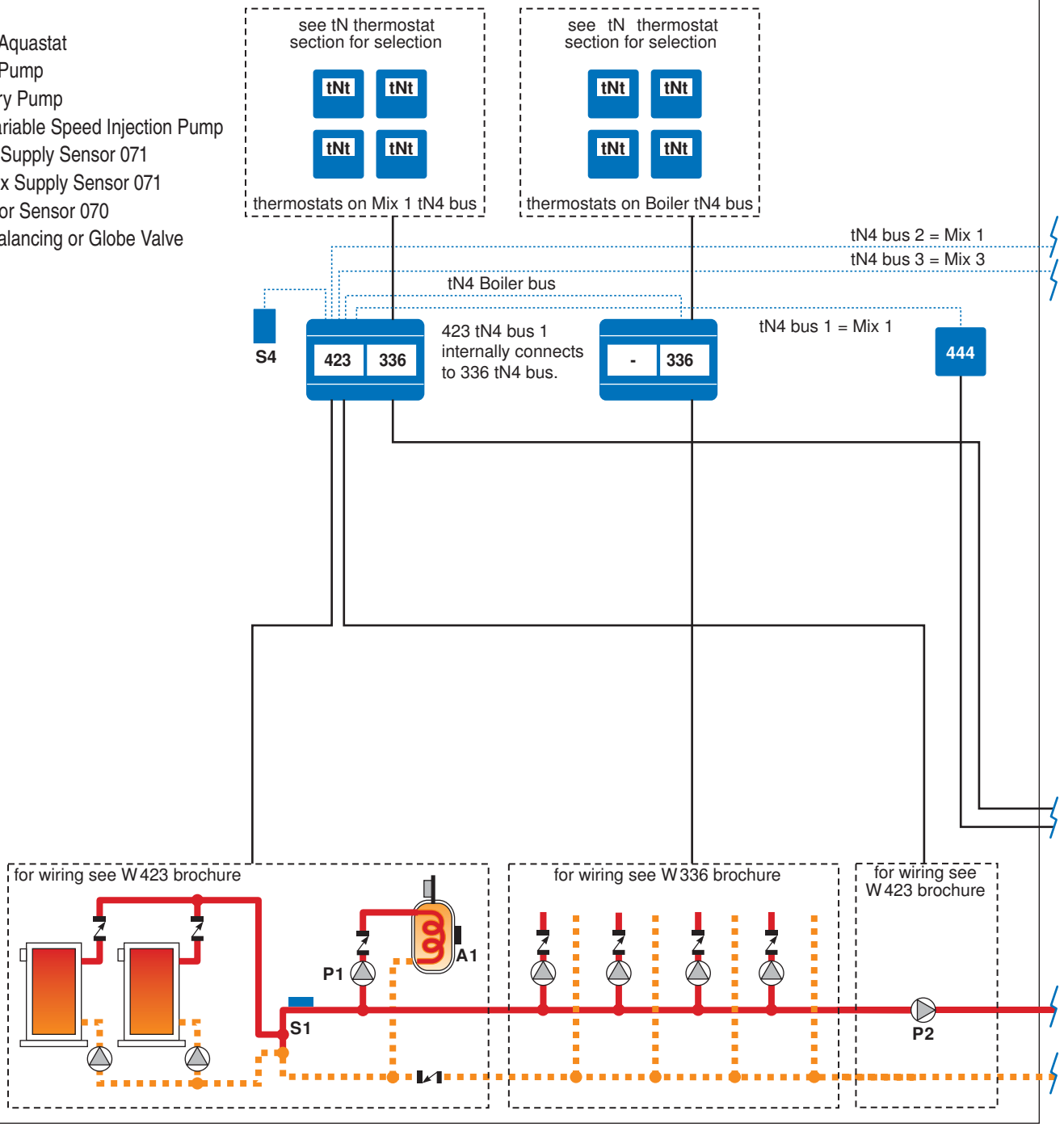
A Mixing Expansion Module 444 operates a variable speed injection pump for the mix 1 heating system. The mix 1 heating system uses two tN4 buses, Bus 1 and Bus 2 in order to accommodate up to 48 tekmarNet® Thermostats connected through Zone Managers.

(Continued on next page)

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.

Legend:

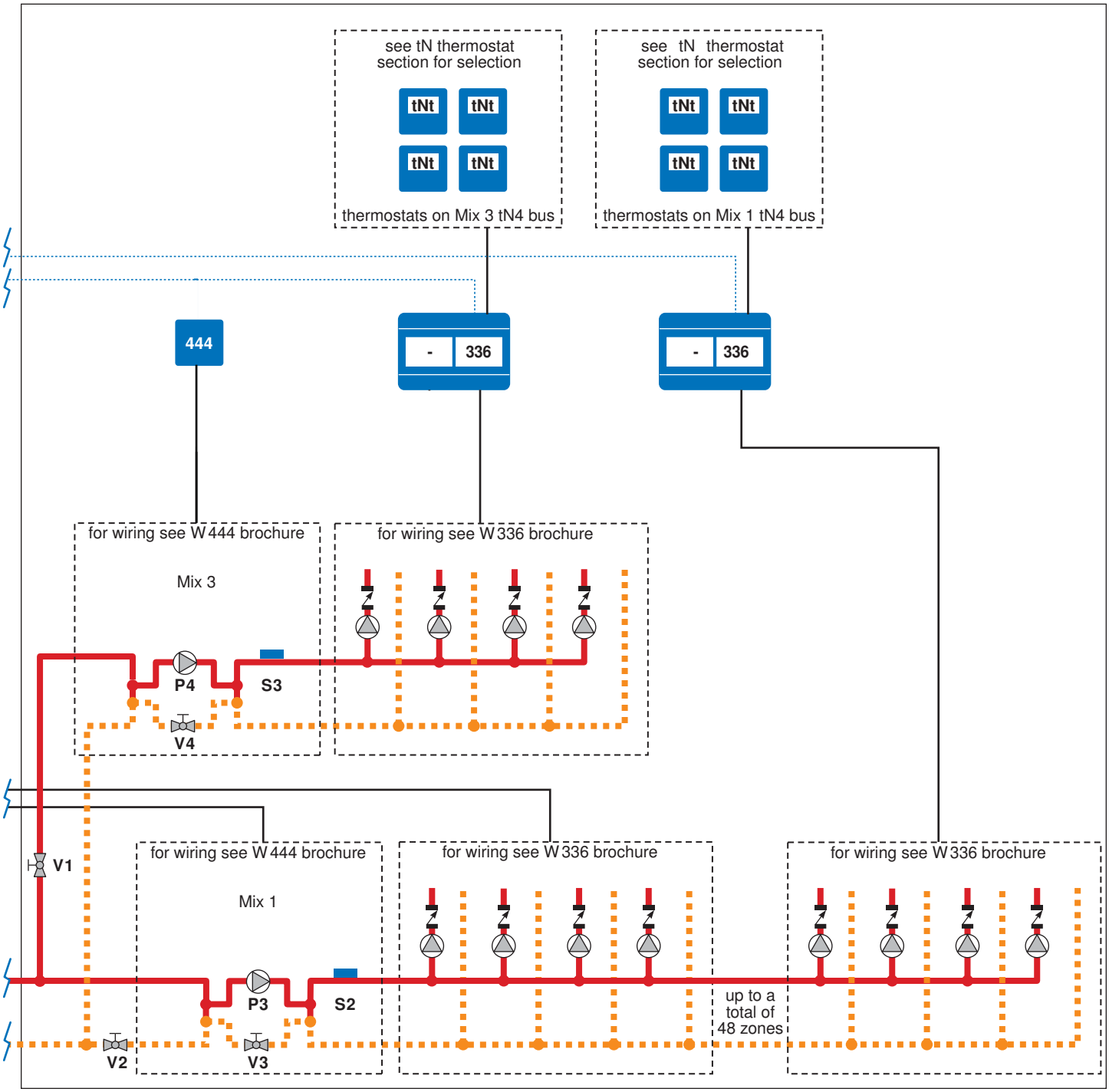
A1 = DHW Aquastat
P1 = DHW Pump
P2 = Primary Pump
P3, P4 = Variable Speed Injection Pump
S1 = Boiler Supply Sensor 071
S2, S3 = Mix Supply Sensor 071
S4 = Outdoor Sensor 070
V1...V4 = Balancing or Globe Valve



Application A 423-6

A Mixing Expansion Module 444 operates a variable speed injection pump for the mix 3 heating system. The mix 3 heating system uses tN4 Bus 3. Four tekmarNet® Thermostats operate four mix 1 zone pumps through a Zone Manager 336.

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 552-1

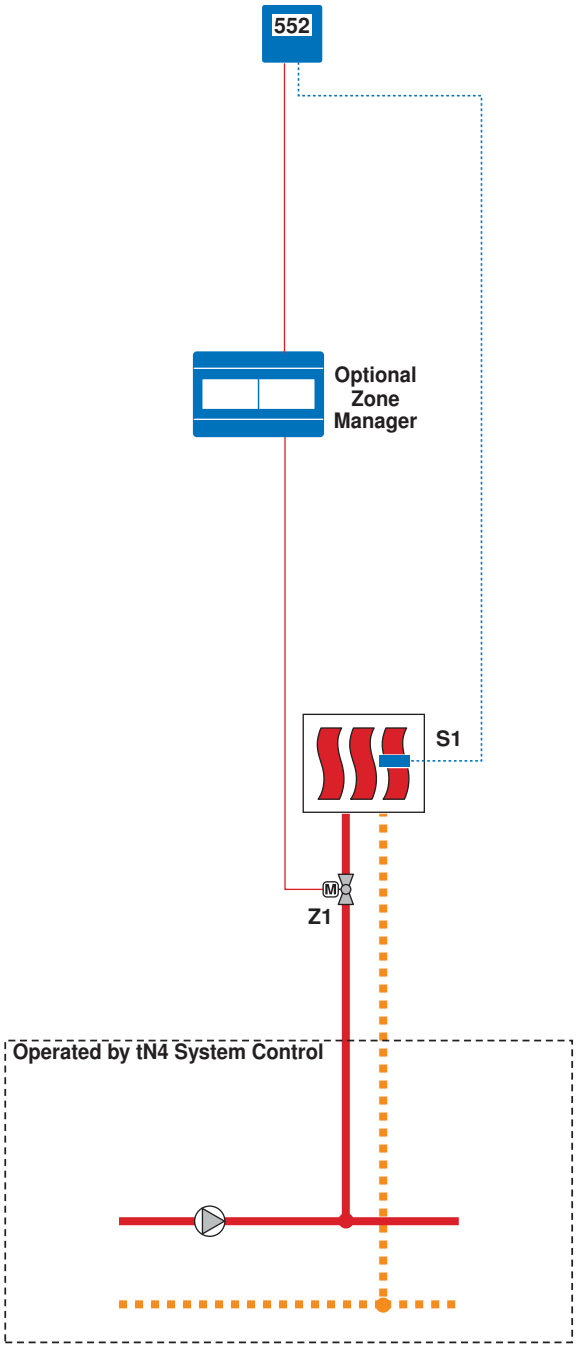
System Description: The tekmarNet® Thermostat 552 or 532 operates a single heating zone. In hydronic heating systems, the 552 or 532 can connect to a Zone Manager, which provides power and a tekmarNet® bus connection. In non-hydronic applications, the 552 or 532 can be directly connected to the heating equipment. The 552 and the 532 provide two auxiliary sensor inputs. The auxiliary sensors allows the connection of an optional floor sensor, indoor sensor or outdoor sensor.

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.

Legend:

S1 = Slab Sensor 079

Z1 = tekmar Zone Valve 700-703



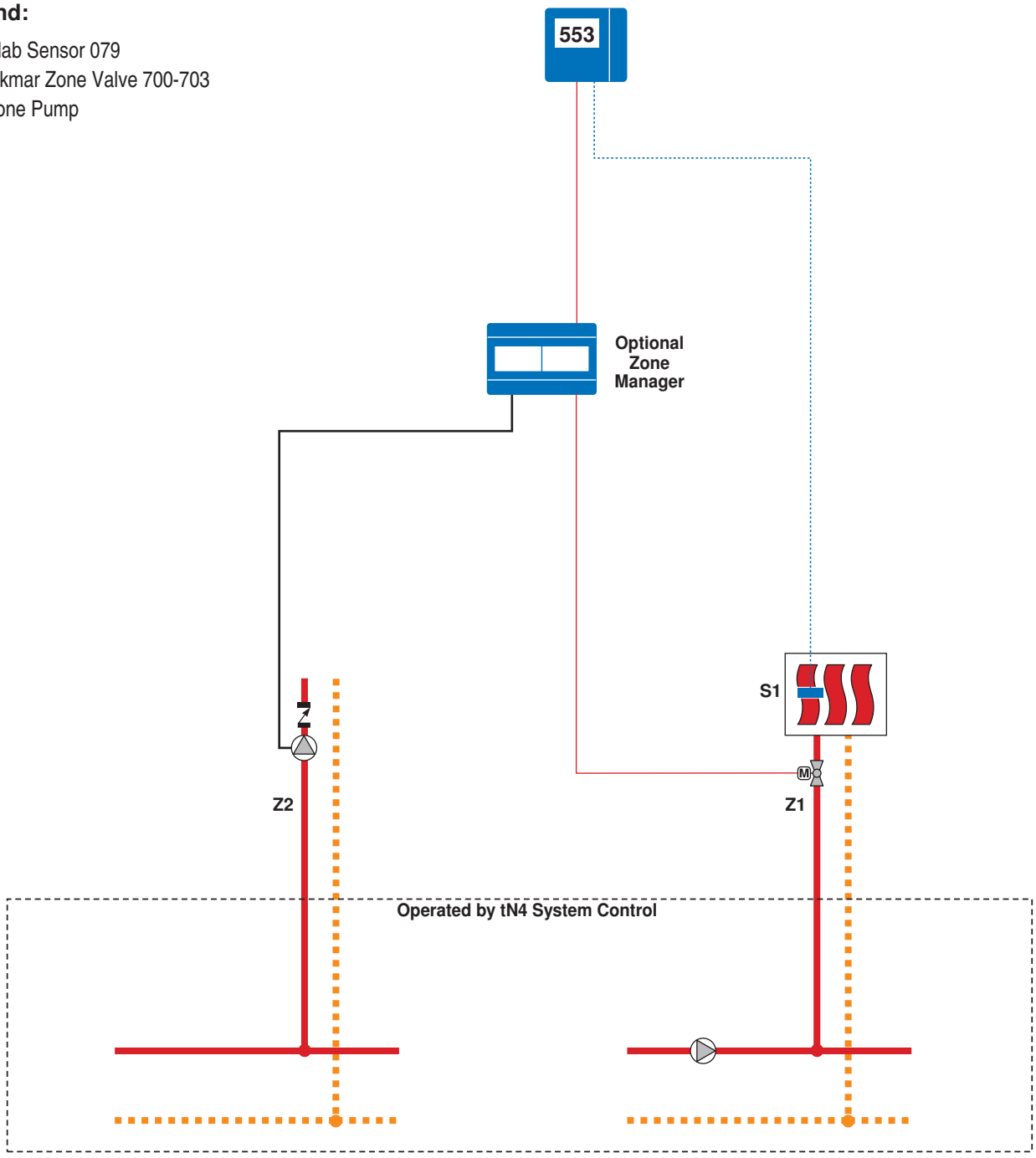
Application A 553-1

System Description: The tekmarNet® Thermostat 553 operates two heating stages for a single zone. The two heating stages can both be hydronic, or can be mixture of hydronic and non-hydronic. In hydronic heating systems, the first heat stage and the tekmarNet® bus can connect to a Zone Manager, while the second heat stage can connect to the same or different Zone Manager. In non-hydronic heating systems, the first heat stage or second heat stage contact can directly connect to the heating equipment. The 553 provides two auxiliary sensor inputs to allow the connection of an optional floor sensor, indoor sensor, outdoor sensor, duct sensor or coil sensor.

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.

Legend:

S1 = Slab Sensor 079
Z1 = tekmar Zone Valve 700-703
Z2 = Zone Pump



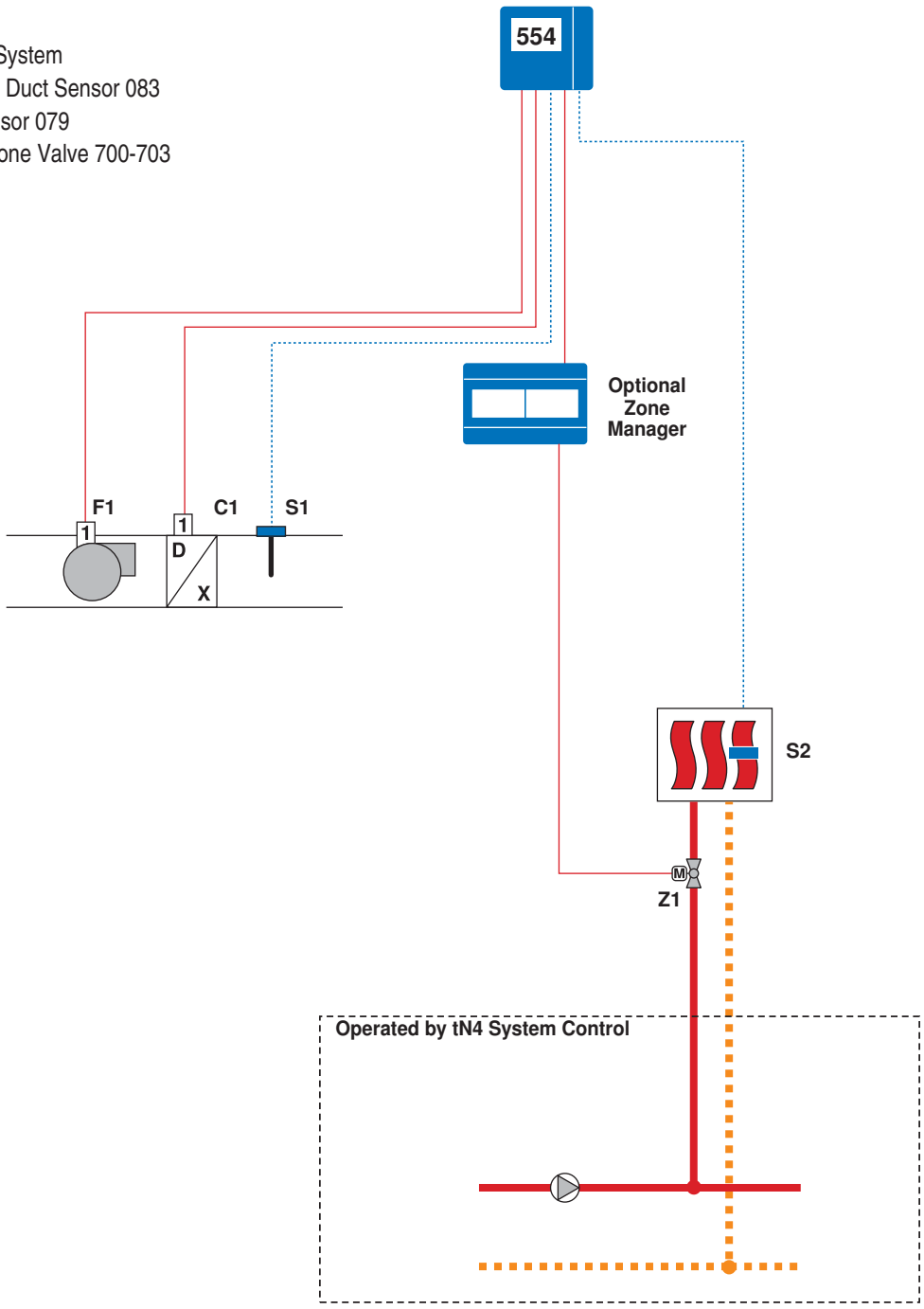
Application A 554-1

System Description: The tekmarNet® Thermostat 554 operates a single heating zone, a single cooling system, and a single fan. In hydronic heating systems, the 554 can connect to a Zone Manager, which provides power and a tekmarNet® bus connection. In non-hydronic applications, the 554 can be directly connected to the heating equipment. The 554 can connect directly to the cooling and the fan equipment. The 544 provides two auxiliary sensor inputs to allow the connection of an optional **fl**oor sensor, indoor sensor, outdoor sensor, duct sensor or coil sensor.

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.

Legend:

C1 = Cooling System
F1 = Fan S1 = Duct Sensor 083
S2 = Slab Sensor 079
Z1 = tekmar Zone Valve 700-703



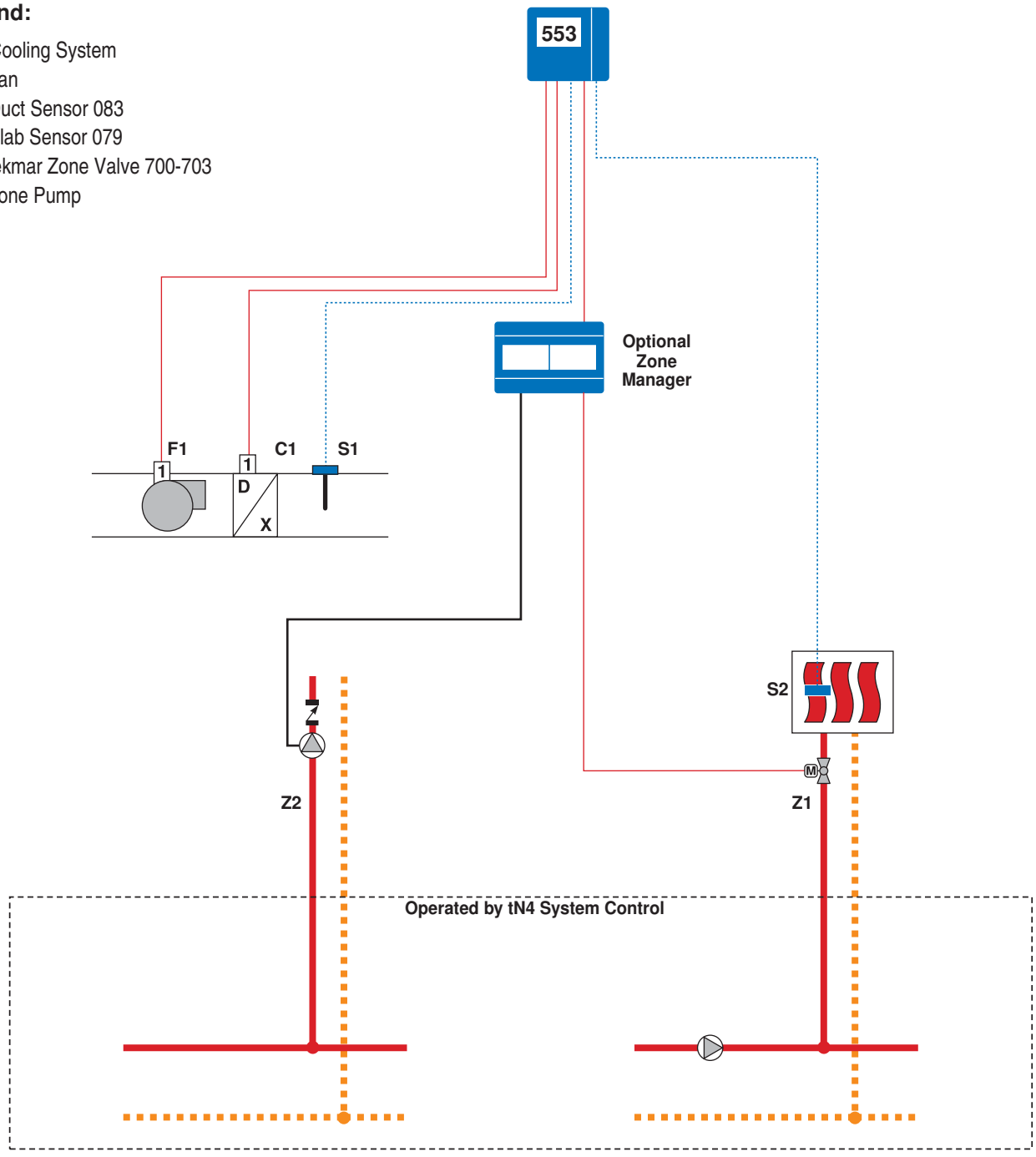
Application A 553-2

System Description: The tekmarNet® Thermostat 553 operates two hydronic heating stages, a single cooling system, and a single fan. The first heat stage and tekmarNet® bus can connect to a Zone Manager. The second heat stage can connect to the same or different Zone Manager. The 553 directly connects to the cooling and fan equipment. The 553 can be assigned as a cooling group master and operate the cooling system on behalf of a group of tekmarNet® Thermostats assigned as members of the cooling group. The 553 provides two auxiliary sensor inputs to allow the connection of an optional floor sensor, indoor sensor, outdoor sensor, coil sensor, or duct sensor. The optional duct sensor can be used to provide freeze protection of the cooling coil. Thee 553 also has a built-in humidity sensor.

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.

Legend:

C1 = Cooling System
F1 = Fan
S1 = Duct Sensor 083
S2 = Slab Sensor 079
Z1 = tekmar Zone Valve 700-703
Z2 = Zone Pump



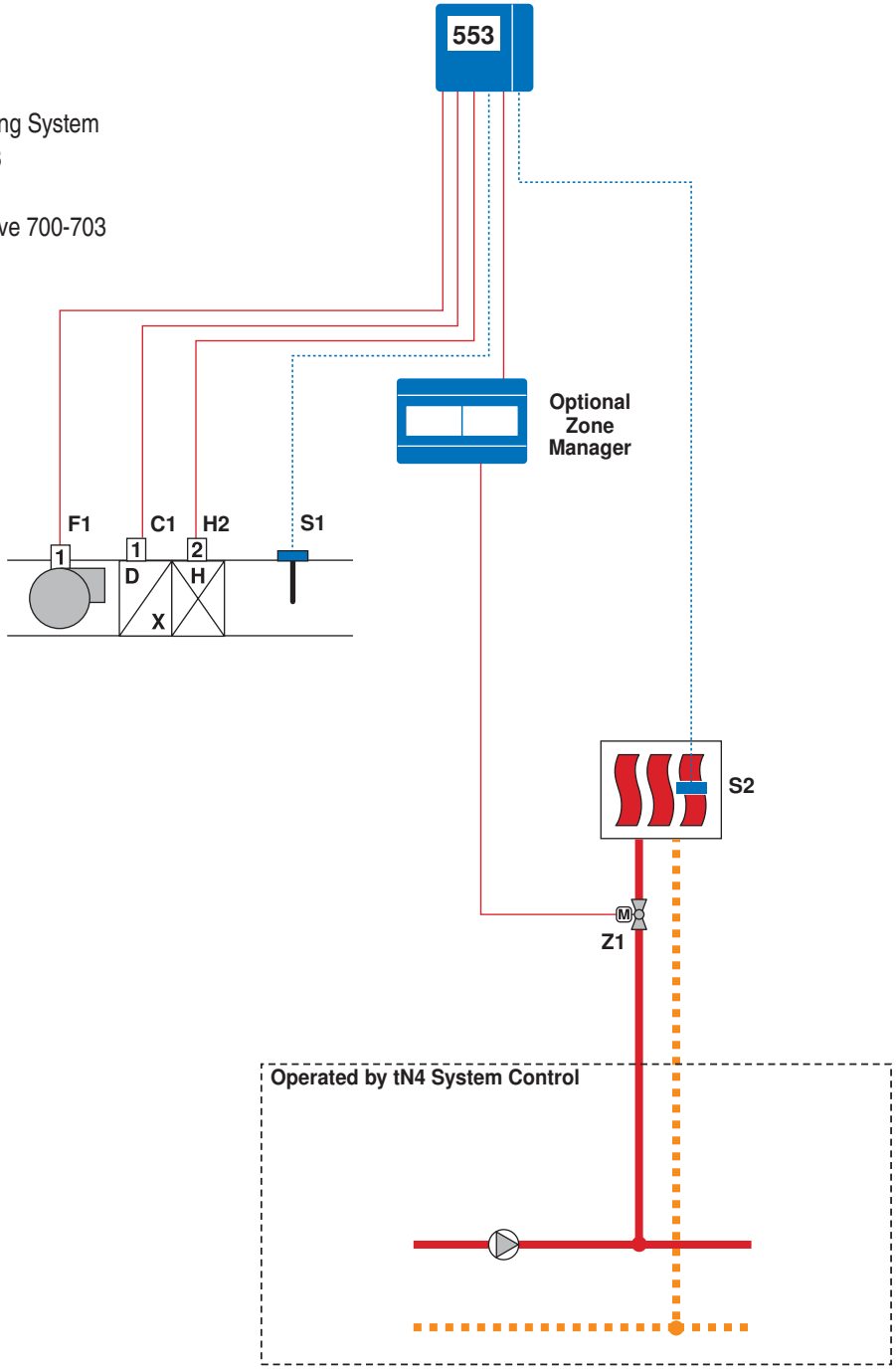
Application A 553-3

System Description: The tekmarNet® Thermostat 553 operates two heating stages, a single cooling system, and a single fan. The first heat stage is hydronic and can connect to a Zone Manager together with the tekmarNet® bus. The second heat stage connects to a forced air heating system. The 553 directly connects to the cooling and fan equipment. The 553 can be assigned as a cooling group master and operate the cooling system on behalf of a group of tekmarNet® Thermostats assigned as members of the cooling group. The 553 provides two auxiliary sensor inputs to allow the connection of an optional floor sensor, indoor sensor, outdoor sensor, coil sensor, or duct sensor. The optional duct sensor can be used to provide freeze protection of the heating and cooling coil. The 553 also has a built-in humidity sensor.

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.

Legend:

C1 = Cooling System
F1 = Fan
H2 = Forced Air Heating System
S1 = Duct Sensor 083
S2 = Slab Sensor 079
Z1 = tekmar Zone Valve 700-703



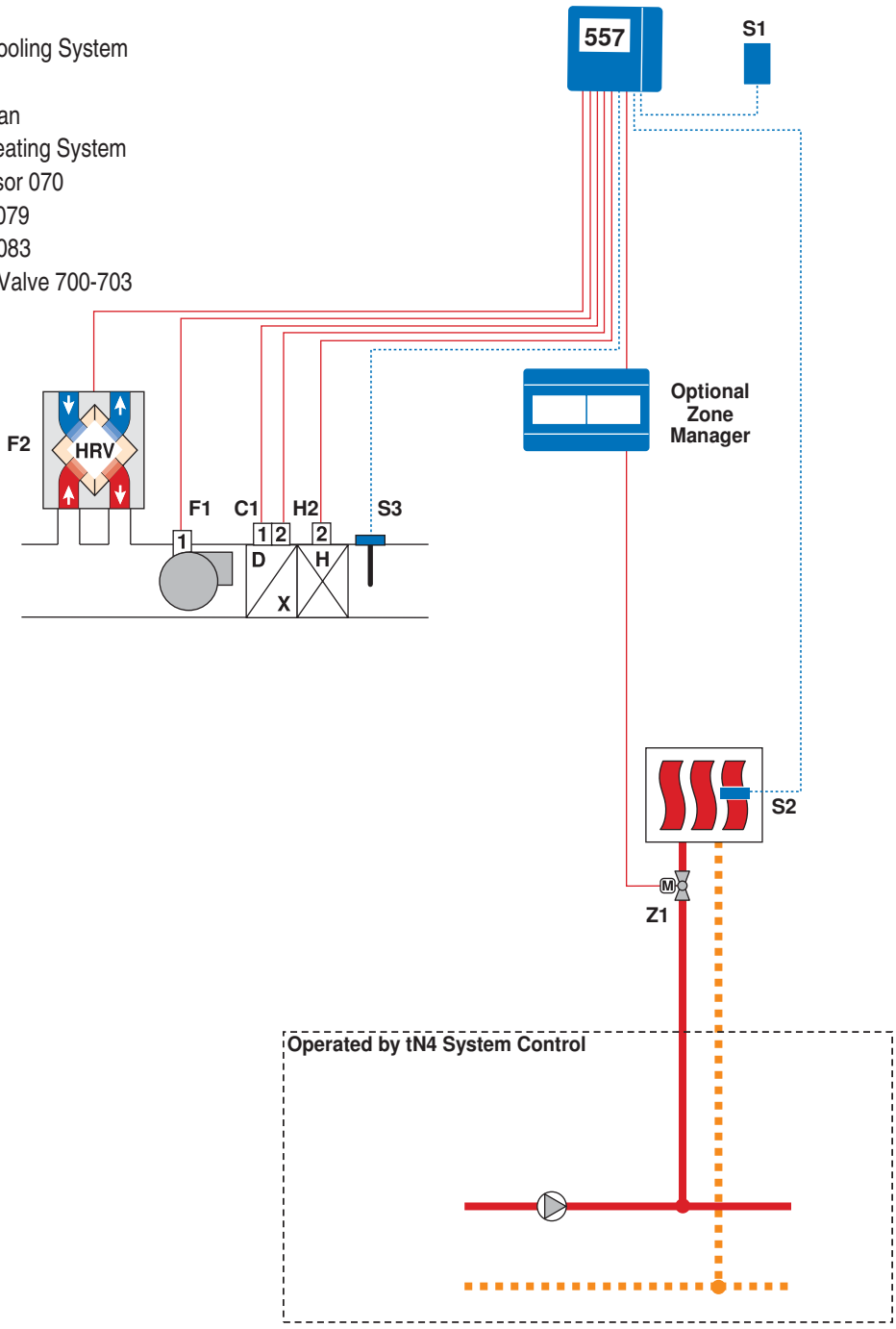
Application A 557-1

System Description: The tekmarNet® Thermostat 557 operates two heating stages, a two stage cooling system, a fan, and a heat recovery ventilation unit. The fi rst stage is hydronic heating, and can connect to a Zone Manager with the tekmarNet® bus. The second stage is forced air heating and connects directly with the forced air heating system. The 557 directly connects to the cooling and fan equipment. The 557 can be assigned as a cooling group master and operate the cooling system on behalf of a group of tekmarNet® Thermostats assigned as members of the cooling group. The 557 operates the main fan when the second stage heat or cooling systems are operating. The 557 operates a heat recovery ventilation unit fan and operates the main fan at the same time due to the primary-secondary ducting. The 557 provides three auxiliary sensor inputs to allow the connection of optional sensors: floor, indoor, outdoor, coil, duct or humidity. The optional duct sensor can be used to provide freeze protection of the heating and cooling coil. The 557 also has a built-in humidity sensor.

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.

Legend:

C1 = Two-Stage Cooling System
F1 = Fan
F2 = HRV / ERV Fan
H2 = Forced Air Heating System
S1 = Outdoor Sensor 070
S2 = Slab Sensor 079
S3 = Duct Sensor 083
Z1 = tekmar Zone Valve 700-703



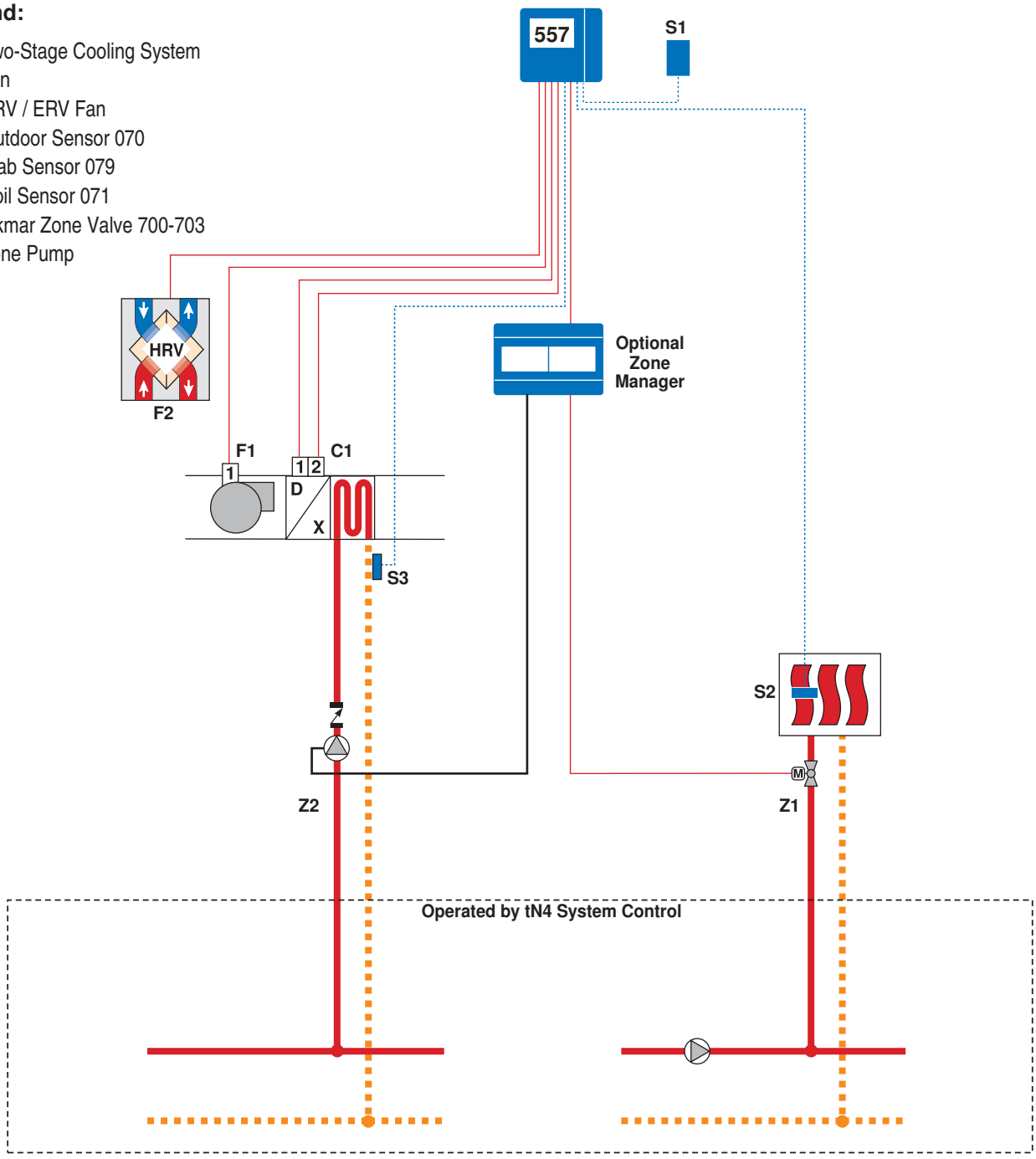
Application A 557-2

System Description: The tekmarNet® Thermostat 557 operates two heating stages, a two stage cooling system, a fan, and a heat recovery ventilation unit. The first stage is hydronic heating, and can connect to a Zone Manager together with the tekmarNet® bus. The second stage is a hydronic fan coil unit and can connect to a different Zone Manager. The 557 directly connects to the cooling and fan equipment. The 557 can be assigned as a cooling group master and operate the cooling system on behalf of a group of tekmarNet® Thermostats assigned as members of the cooling group. The 557 operates the main fan at the same time the second stage heat or cooling systems are operating. The 557 operates a heat recovery ventilation unit that is ducted separately from the heating and cooling system and is dedicated for ventilation. The 557 provides three auxiliary sensor inputs to allow the connection of optional sensors: floor sensor, indoor, outdoor, coil, duct or humidity sensor. The optional duct sensor can be used to provide freeze protection of the heating and cooling coil. The 557 has also has a built-in humidity sensor.

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.

Legend:

C1 = Two-Stage Cooling System
F1 = Fan
F2 = HRV / ERV Fan
S1 = Outdoor Sensor 070
S2 = Slab Sensor 079
S3 = Coil Sensor 071
Z1 = tekmar Zone Valve 700-703
Z2 = Zone Pump



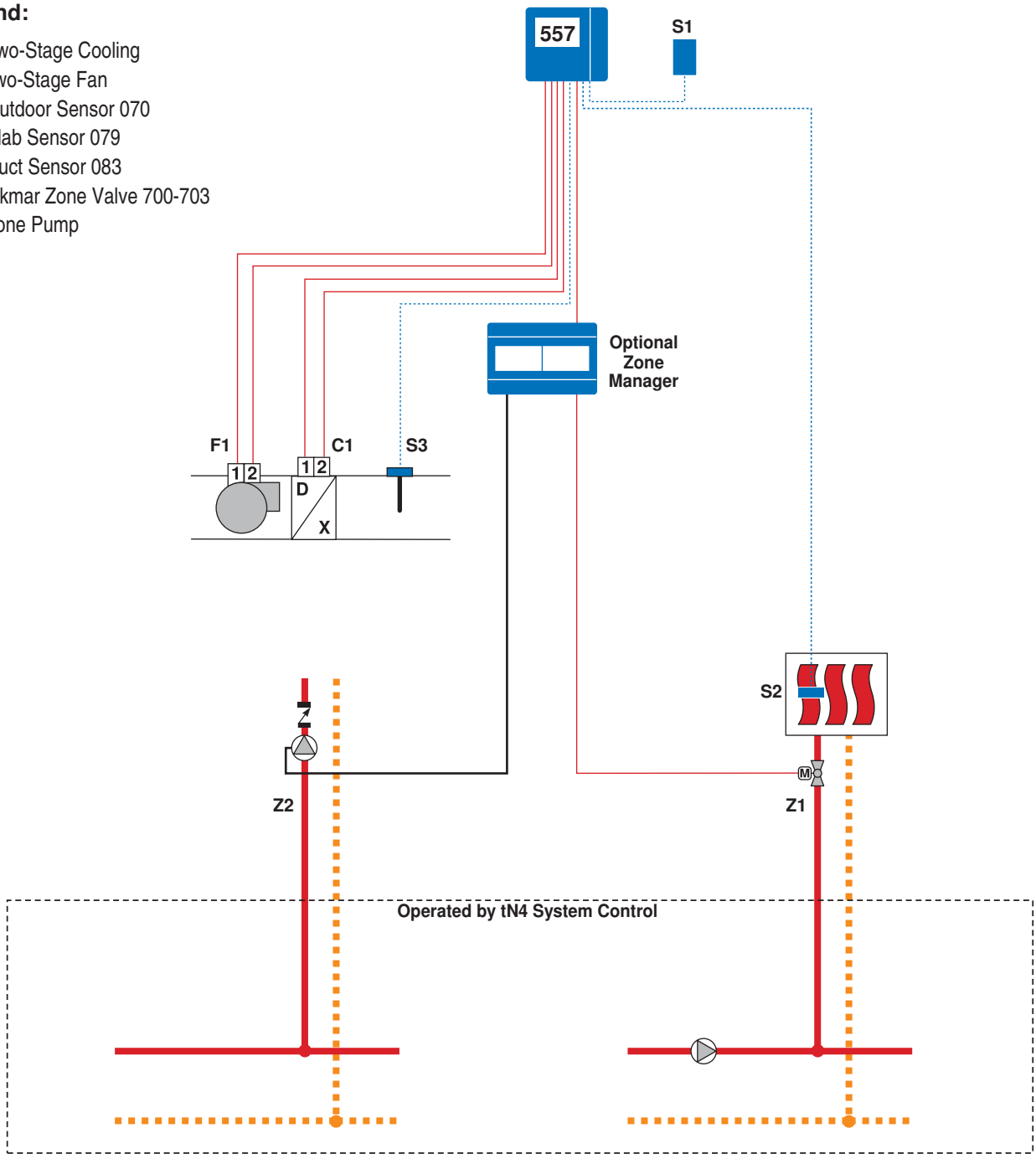
Application A 557-3

System Description: The tekmarNet® Thermostat 557 operates two heating stages, a two stage cooling system, and a two stage fan. The first stage is hydronic heating, and can connect to a Zone Manager together with the tekmarNet® bus. The second stage is hydronic heating and can connect to the same or different Zone Manager. The 557 directly connects to the cooling and fan equipment. The 557 can be assigned as a cooling group master and operate the cooling system on behalf of a group of tekmarNet® Thermostats assigned as members of the cooling group. The 557 operates the main fan at the same time the cooling system is operating. The fan operates at low speed for the first stage of cooling and at high speed for the second stage of cooling. Ventilation is provided by operating the fan at low speed after the cooling has shut off. The 557 provides three auxiliary sensor inputs to allow the connection of optional floor, indoor, outdoor, coil, duct or humidity sensor. The optional duct sensor can be used to provide freeze protection of the cooling coil. The 557 also has a built-in humidity sensor.

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.

Legend:

C1 = Two-Stage Cooling
F1 = Two-Stage Fan
S1 = Outdoor Sensor 070
S2 = Slab Sensor 079
S3 = Duct Sensor 083
Z1 = tekmar Zone Valve 700-703
Z2 = Zone Pump



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