

APPLICATIONS ENGINEERING

Vitodens 200-W B2HE **APPLICATION GUIDE**

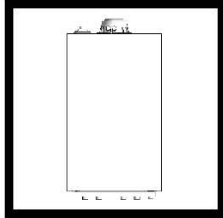
B2HE Series
Wall mounted gas-fired condensing boiler
85 to 199 MBH



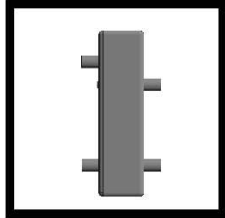
Component Index

Hydronic Components

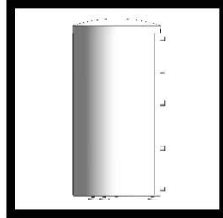
Electrical Components



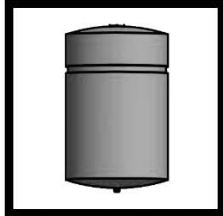
Boiler



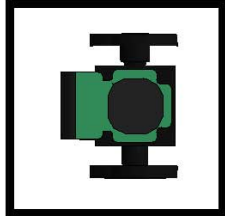
Low Loss Header



DHW Indirect Tank



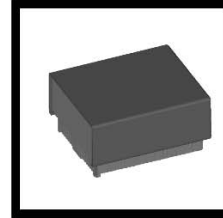
Expansion Tank



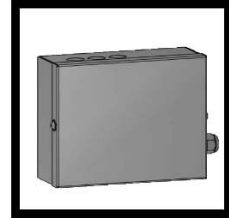
Circulator



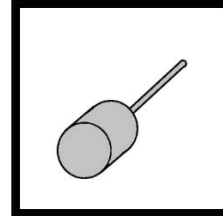
Mixing Valve



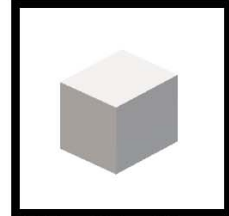
Outdoor Air Sensor



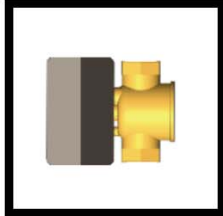
Mixing Valve Module



Temperature Sensor



Mixing Valve Motor



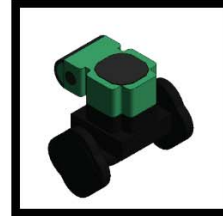
Zone Valve



Balancing Valve



Fill Valve



Circulator



Thermostat



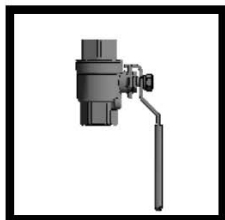
Backflow Preventer



Air Separator



Check Valve



Ball Valve

Index

General

Component Index.....	2
Boiler Overview.....	4
Boiler Dimensions.....	7
Boiler Piping Connections.....	9
Boiler Minimum Clearances.....	10

Boiler Applications

B2HE

One Boiler, Single Temperature with three Zone Circuits, DHW Connected to Boiler.....	11
One Boiler, Single Temperature with three Zone Circuits, DHW on system loop.....	13
One Boiler, Single Temperature with Zone Valves, DHW Connected to Boiler.....	15
One Boiler, Multiple Temperatures with three Mixing Valves and one Zone Circuit, DHW Connected to Boiler.....	17
One Boiler, Multiple Temperatures with one Mixing Valve and three Zone Circuits, DHW on System Loop.....	19
Two Boilers, Multiple Temperatures with one Mixing Valve and Zone Valves, DHW on System Loop.....	21
Two Boilers, Multiple Temperatures with one Mixing Valve and Zone Valves, DHW with Two Tanks on System Loop.....	23

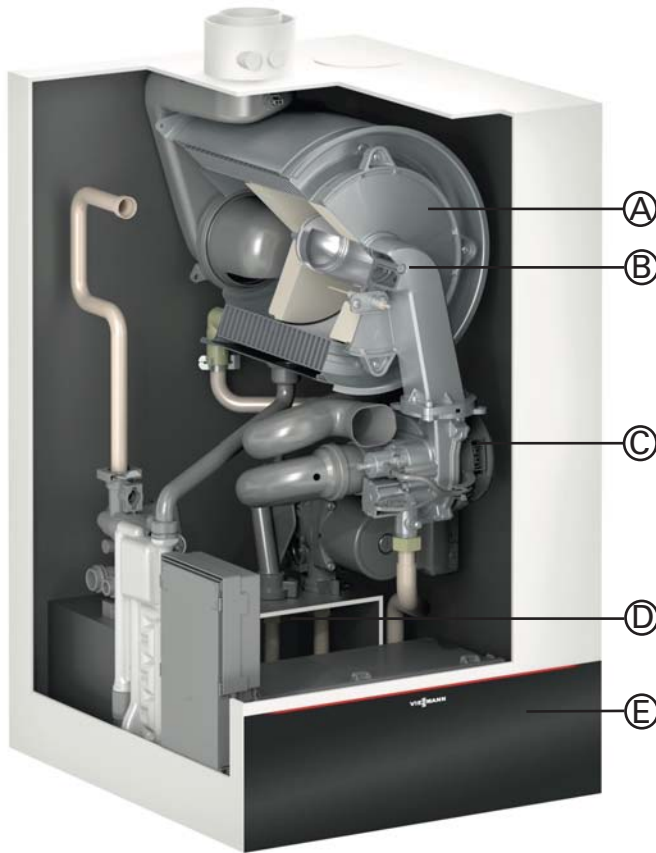
General

Gas Line Sizing Chart.....	25
Miscellaneous Links.....	26

General Information

Boiler Overview

[← Back to Index](#)



The B2HE boiler is a high efficiency, gas-fired condensing boiler with pre-mix modulating cylinder burners for natural gas (NG) or liquid propane (LP), with Inox-Radial heat exchanger made of high-grade stainless steel.

The B2HE 85-120 is designed for closed loop hot water heating systems with maximum supply water temperatures of 180°F for a maximum operating pressure of 45psig.

The B2HE 150-199 is designed for closed loop hot water heating systems with maximum supply water temperatures of 180°F for a maximum operating pressure of 60psig.

The pre-mix cylinder burners have an environmentally - friendly operation with a minimum modulation range of 10:1.

The B2HE's control platform is designed for system operation. The control has the ability to operate three circulator zones, up to three mixing valves for multiple water temperatures, and the ability to integrate into a building management system (BMS).

The onboard control can control up to 16 boilers.

- Ⓐ Inox-Radial stainless steel heat exchanger made from stainless steel -for high operational reliability and a long service life.
Large heating output in the smallest of spaces
- Ⓑ Modulating MatrixPlus cylinder burner for extremely clean combustion and quiet operation
- Ⓒ Variable speed combustion fan for quiet and economical operation
- Ⓓ Gas and water connections
- Ⓔ 7 in. color touch screen digital boiler control unit

General Information

Boiler Overview (Continued)

[← Back to Index](#)

Boiler Model No. 200-W B2HE		85	120	150	199
CSA input Natural Gas (NG)	MBH	8.5-85	8.5-120	14-150	14-199
	kW	2.5-24.9	2.5-35.2	4.1-44.0	4.1-58.3
CSA input Liquid Propane Gas (LPG)	MBH	14-85	14-120	22.7-150	22.7-199
	kW	4.1-24.9	4.1-35.2	6.7-44.0	6.7-58.3
CSA output/DOE *1 heating capacity NG	MBH	8-80	8-113	13-141	13-187
	kW	2.3-23.4	2.3-33.1	3.8-41.3	3.8-54.8
CSA output/DOE *1 heating capacity LPG	MBH	13-80	13-113	21-141	21-187
	kW	3.8-23.4	3.8-33.1	6.1-41.3	6.1-54.8
Net AHRI rating *2	MBH	70	98	123	163
	kW	20.5	28.7	36.0	47.8
Heat exchanger surface area	ft. ²	12.96	12.96	27.44	27.44
	m ²	1.20	1.20	2.55	2.55
Min. gas supply pressure					
Natural gas	"w.c.	4	4	4	4
Liquid propane gas	"w.c.	10	10	10	10
Max. gas supply pressure *3					
Natural gas and liquid propane gas	"w.c.	14	14	14	14
A.F.U.E.	%	95	95	95	95
Weight	lbs	108	108	179	179
	(kg)	49	49	81	81
Boiler water content	USG	1.02	1.02	2.5	2.5
	L	3.88	3.88	9.50	9.50
Boiler max. flow rate *4	GPM	5.3	6.2	9.3	10.6
	L/h	1204	1408	2112	2408
Max. operating pressure at 210°F (99°C)	psig	45	45	60	60
	bar	(3)	(3)	(4)	(4)
Boiler water temperature					
- Adjustable high limit (AHL) range space heating (steady state)	°F	68-180	68-180	68-180	68-180
	°C	20-82	20-82	20-82	20-82
DHW production	°F	194	194	194	194
	°C	90	90	90	90
- Fixed high limit (FHL)	°C (°F)	99 (210)	99 (210)	99 (210)	99 (210)
Boiler connections					
Boiler heating supply and return	NPTM	¾ in.	¾ in.	1 in.	1 in.
Pressure relief valve	NPTF	¾ in.	¾ in.	¾ in.	¾ in.
Drain valve	(male thread)	¾ in.	¾ in.	¾ in.	¾ in.
Boiler supply/return for indirect-fired DHW storage tank	NPT	¾ in.	¾ in.	1 in.	1 in.
Gas valve connection	NPTF	¾ in.	¾ in.	¾ in.	¾ in.

*1 Output based on 140°F (60°C), 120°F (49°C) system supply/return temperature.

*2 Net AHRI rating based on piping and pick-up allowance of 1.15.

*3 If the gas supply pressure exceeds the maximum gas supply pressure value, a separate gas pressure regulator must be installed upstream of the heating system.

*4 See "Waterside Flow" starting on page 8 in this manual.

General Information

Boiler Overview (Continued)

[← Back to Index](#)

Boiler Model No. 200-W B2HE		85	120	150	199
Dimensions					
Overall depth	in. (mm)	19 ¾ (500)	19 ¾ (500)	21 ¾ (550)	21 ¾ (550)
Overall width	in. (mm)	17 ¾ (450)	17 ¾ (450)	17 ¾ (450)	17 ¾ (450)
Overall height	in. (mm)	33 ¾ (859)	33 ¾ (859)	39 (989)	39 (989)
Flue gas *5					
Temperature (at boiler return temperature of 86°F (30°C))					
- at rated full load	°F (°C)	99 (37)	102 (39)	106 (41)	104 (40)
- at rated partial load	°F (°C)	95 (35)	95 (35)	111 (44)	113 (45)
Temperature (at boiler return temperature of 140°F (60°C))	°F (°C)	144 (62)	145 (63)	151 (66)	149 (65)
Flue gas parameters					
Mass flow rate					
- at rated heating output	lb/h	86.9	126.0	155.9	207.0
(DHW heating)	kg/h	39.4	57.1	70.7	93.9
- at partial load	lb/h	8.9	13.0	16.1	20.8
	kg/h	4.0	5.9	7.3	9.4
Max. condensate flow rate *6					
with natural gas and T _S /T _R = 122/86°F (50/30°C)					
	USG/h (L/h)	0.8 (3.2)	1.2 (4.4)	1.5 (5.5)	1.9 (7.4)
Condensate connection *7					
	hose nozzle Ø in	¾ in.	¾ in.	¾ in.	¾ in.
Boiler flue gas connection *8					
	Ø in (mm)	3 (80)	3 (80)	3 (80)	3 (80)
Combustion air supply connection					
	Coaxial Outer Ø in (mm)	5 (125)	5 (125))	5 (125))	5 (125))
	Single Ø in (mm)	3 (80)	3 (80)	3 (80)	3 (80)
Sound Rating					
- at maximum input	dB	52	59	51	55
- at minimum input	dB	34	34	31	31
NOx @ 3% O ₂ *9		< 20 ppm			

*5 Measured flue gas temperature with a combustion air temperature of 68°F (20°C).

*6 Based on maximum input rate.

*7 Requires ¾ inch (19 mm) tubing. See the Installation Instructions of the Vitodens 200-W, B2HE for details.

*8 For side wall vent installations (coaxial system):

Do not exceed max. equivalent length specified in the Installation Instructions of the Vitodens 200-W, B2HE Venting System.

The Vitodens 200-W B2HE can only be common vented with other Vitodens 200-W B2HE boilers of the same size and series.

Side wall co-axial vent installation must include Viessmann protective screen!

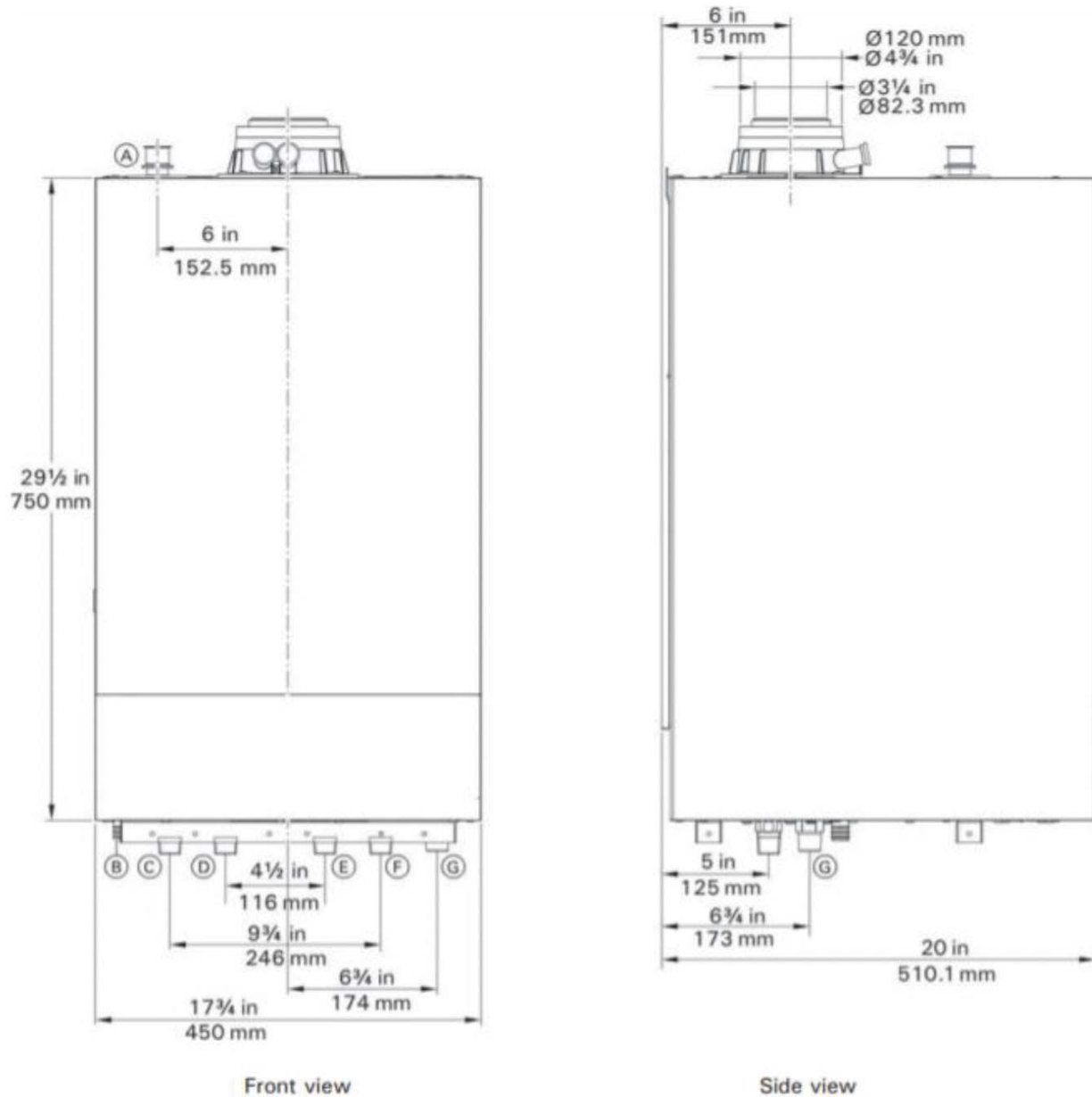
For details refer to the Installation Instructions for the Vitodens 200-W, B2HE Venting System.

For information regarding other Viessmann System Technology componentry, please reference documentation of respective product.

*9 The Vitodens 200 B2HE boilers are certified to the requirements of South Coast Air Quality Management District (SCAQMD) Rule 1146.2, Bay Area Air Quality Management District (BAAQMD) Regulation 9 Rule 6, and San Joaquin Valley Air Pollution Control District (SJVAPCD) Rule 4308.

Boiler Dimensions – Models 200-W 85/120

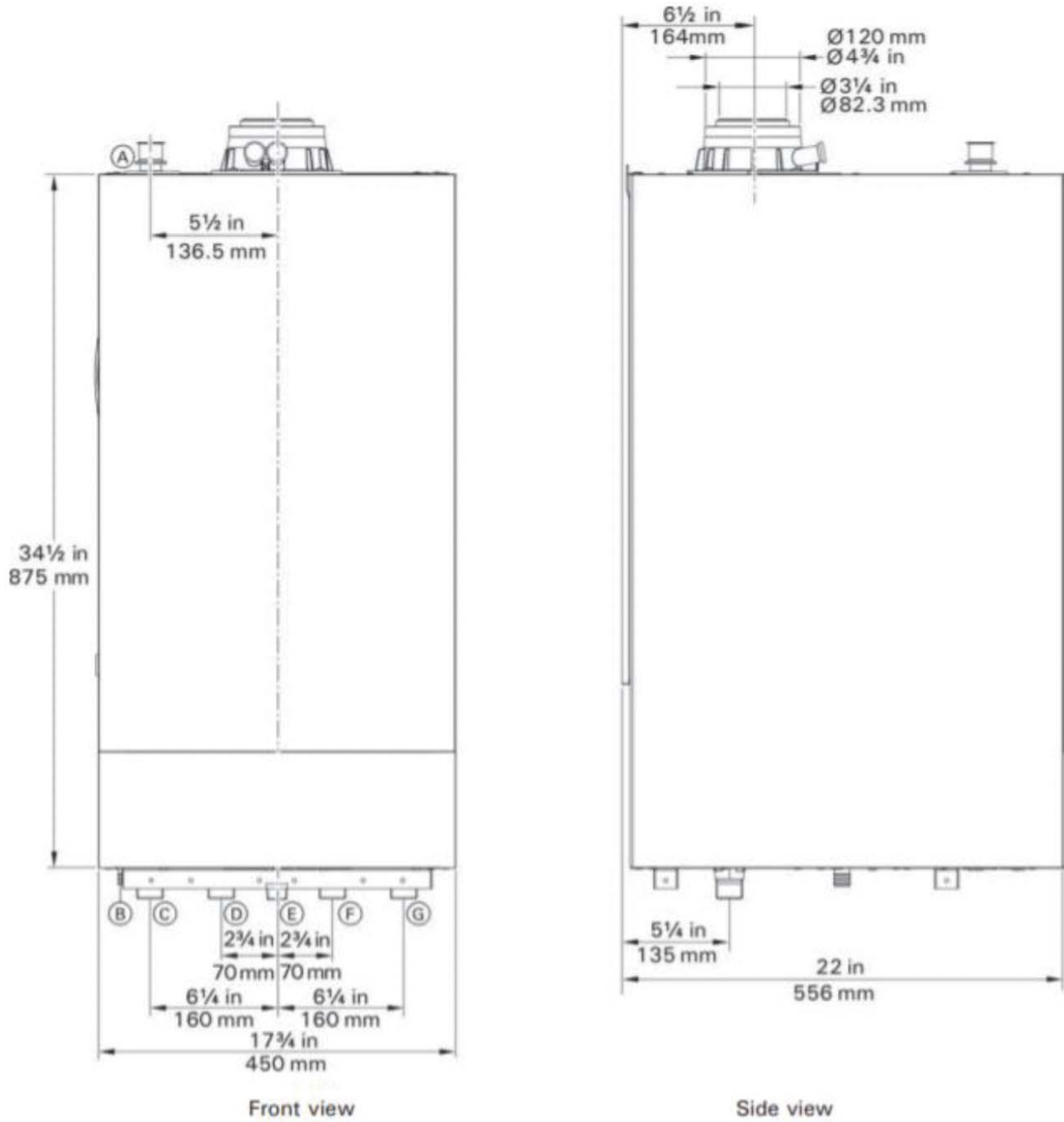
← Back to Index



- Ⓐ Safety valve, pressure gauge connection
- Ⓑ Condensate drain
- Ⓒ Heating system supply
- Ⓓ DHW tank heating supply
- Ⓔ DHW tank heating return
- Ⓕ Heating system return
- Ⓖ Fuel gas connection

Boiler Dimensions – Models 200-W 150/199

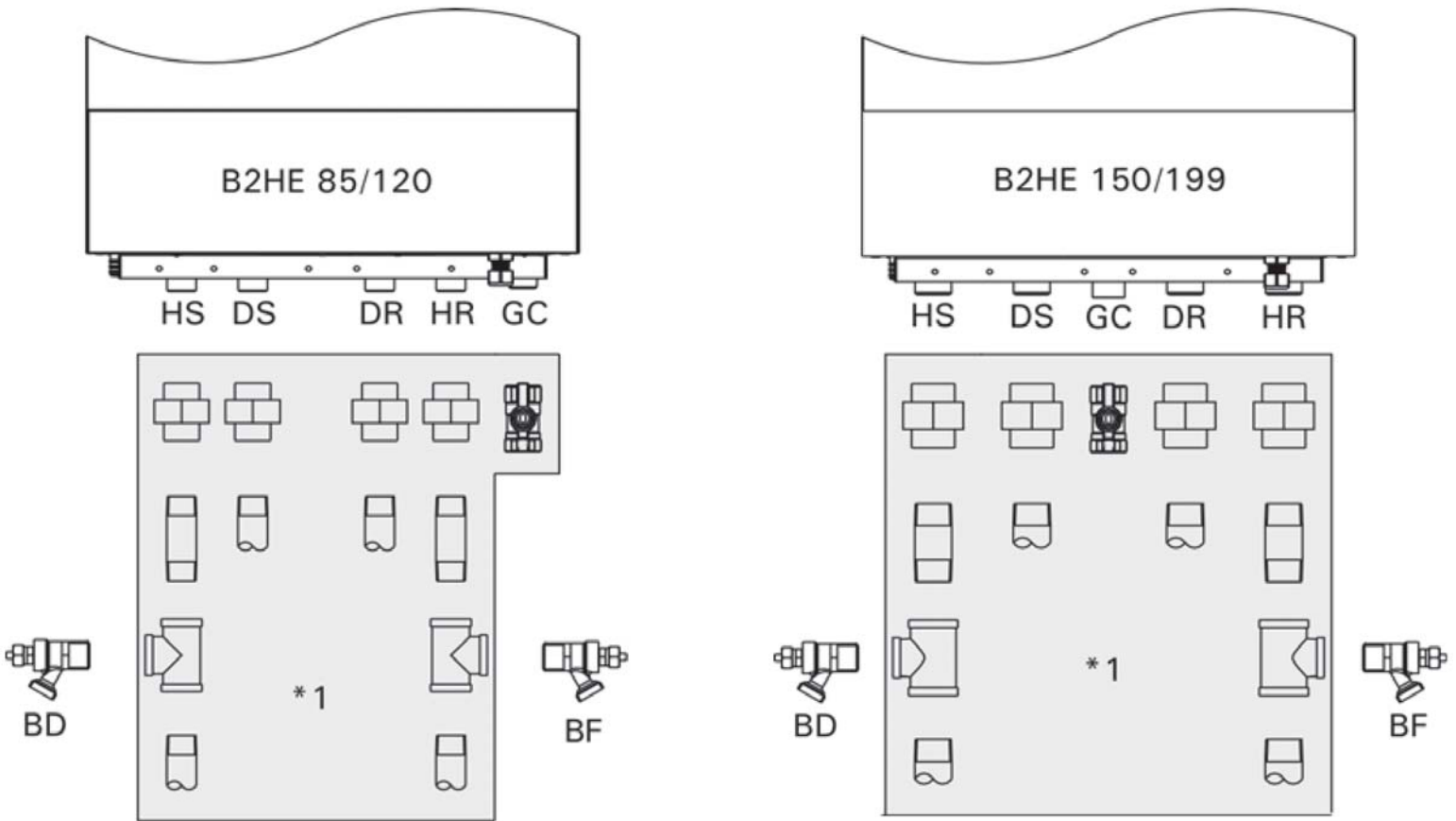
[← Back to Index](#)



- Ⓐ Safety valve, pressure gauge connection
- Ⓑ Condensate drain
- Ⓒ Heating system supply
- Ⓓ DHW tank heating supply
- Ⓔ Fuel gas connection
- Ⓕ DHW tank heating return
- Ⓖ Heating system return

Boiler Piping Connections

← Back to Index



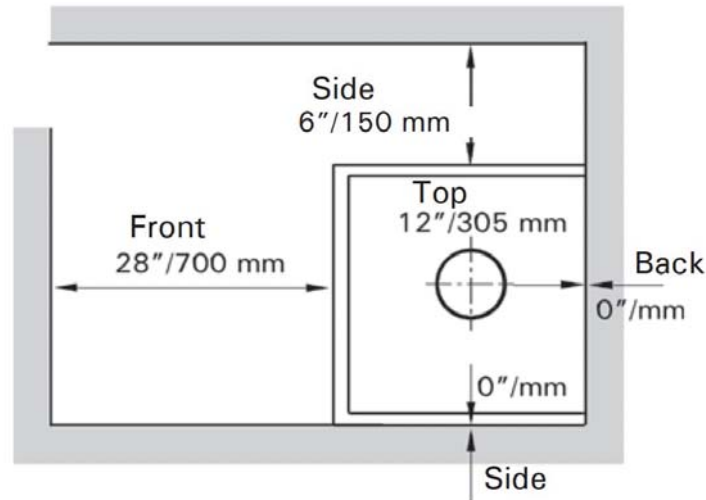
- DR Boiler heating return for domestic hot water tank heating
- DS Boiler heating supply for domestic hot water tank heating
- HR Heating System Return
- HS Heating System Supply
- BD Boiler Drain (supplied with boiler)
- GC Gas Connection
- PRV Pressure Relief Valve (supplied with boiler)
- BF Boiler Fill (supplied with boiler)
- PG Pressure Gauge (supplied with boiler)
- *1 Boiler fittings including gas shutoff valve are field supplied.

Note: Install a temperature gauge (field supplied) anywhere in the supply piping near the boiler (not shown).

Boiler Minimum Clearances

← Back to Index

Recommended minimum boiler service clearances



Minimum Clearances to Combustibles

Top	Front	Rear	Left	Right	Vent pipe * 1
0	0 AL, CL	0	0	0	0

AL = Alcove

CL = Closet

* 1 Refer to the Installation Instructions of the Vitodens 200-W, B2HE Venting System for details.

Note: The Vitodens boiler has passed the zero inches vent clearance to combustibles testing requirements dictated by the Harmonized Standard ANSI Z21.13. CSA 4.9 (latest edition) and therefore is listed for zero clearance to combustibles when vented with a single wall special venting system (AL-29-4C material). The zero inches vent clearance to combustibles for the Vitodens boiler supercedes the clearance to combustibles listing that appears on the special venting system label.

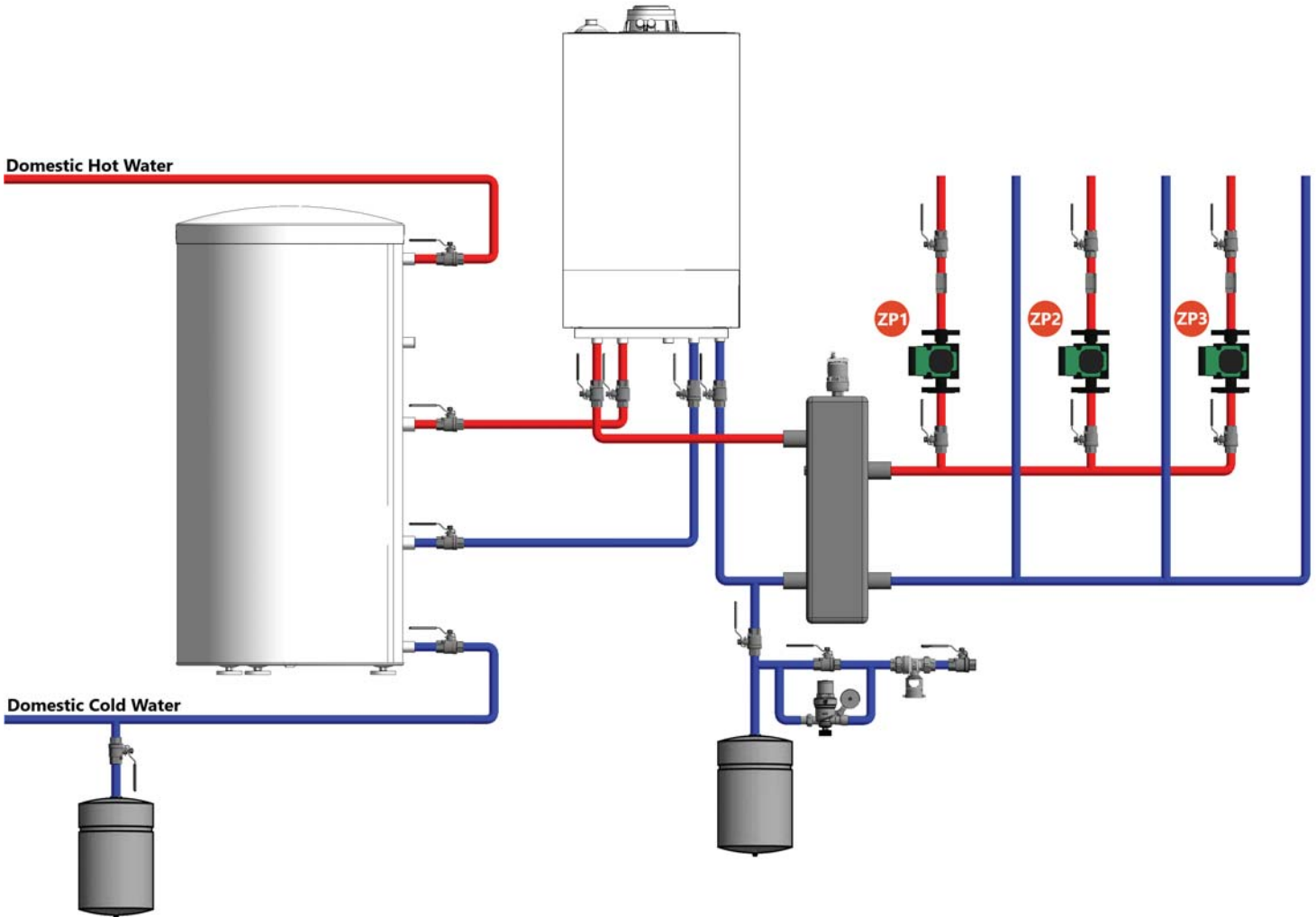
Vitodens 200-W

Application 1

[← Back to Index](#)

Primary secondary

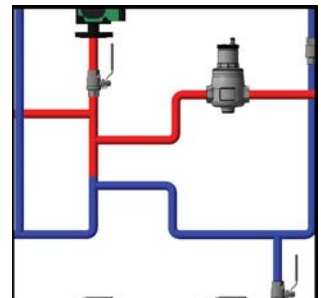
One Boiler, Single Temperature with three zone circuits, DHW connected to boiler.



Disclaimer: Tempering Valves are field supplied where required by local jurisdiction.

Disclaimer: Refer to Installation Instructions for boiler connections when installing Viessmann Boilers, these are conceptual drawings.

Closely Spaced Tees

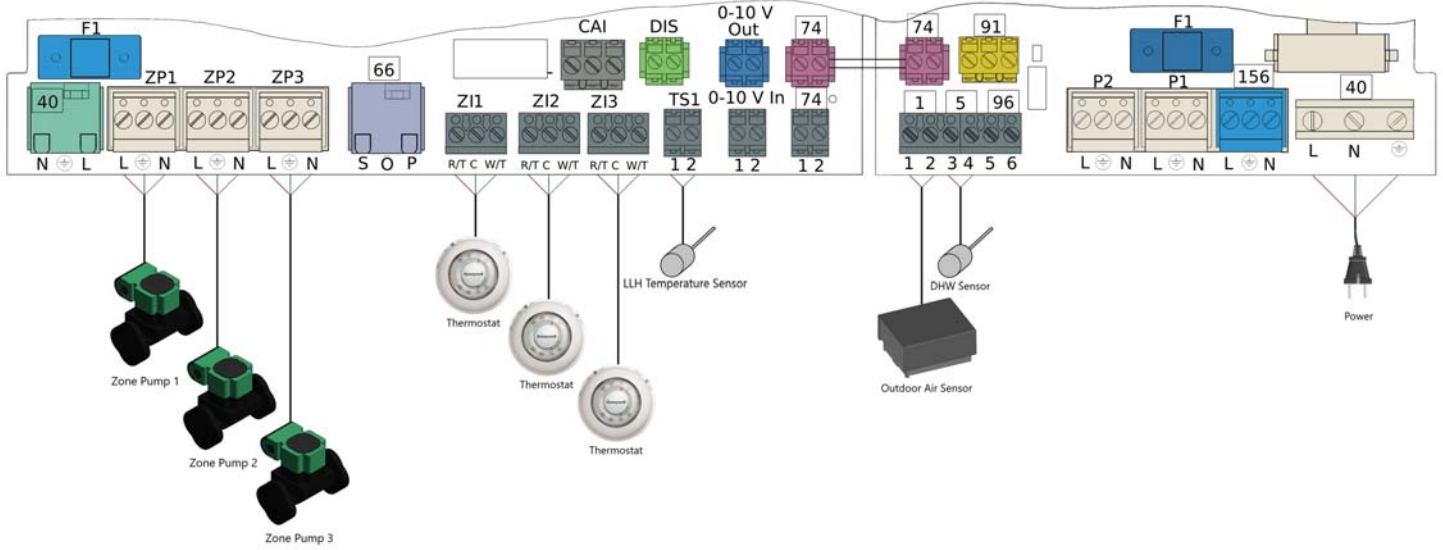


Vitodens 200-W Application 1

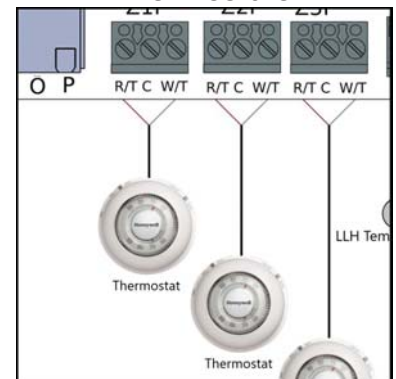
[← Back to Index](#)

Primary secondary

One Boiler, Single Temperature with three zone circuits, DHW connected to boiler.



Alternate Wiring for Thermostats



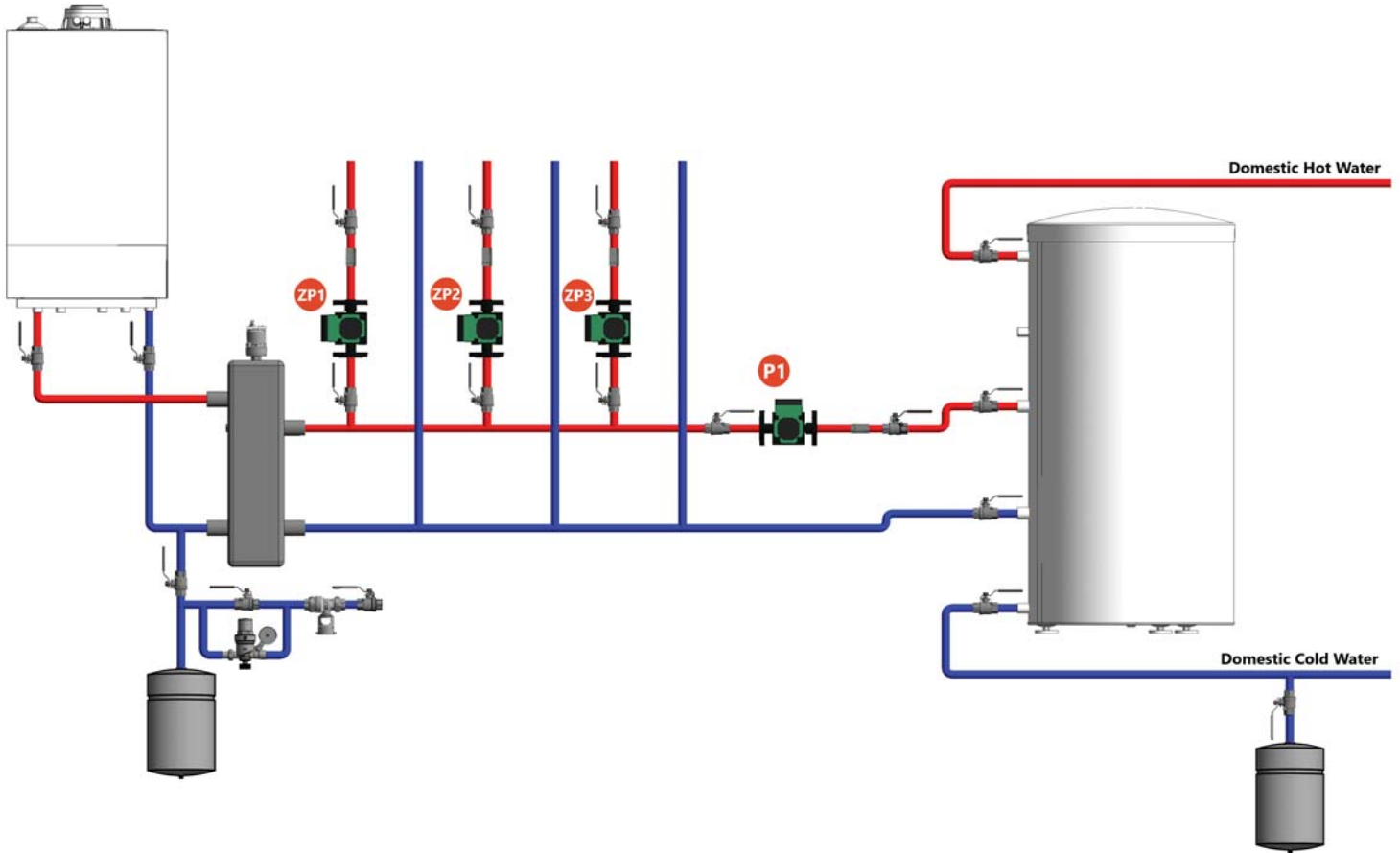
Vitodens 200-W

Application 2

[← Back to Index](#)

Primary secondary

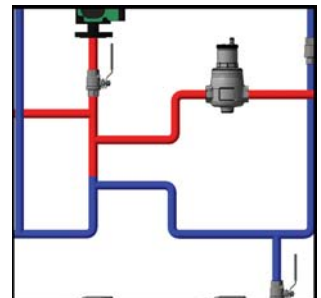
One Boiler, Single Temperature with three zone circuits, DHW on system loop.



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Closely Spaced Tees



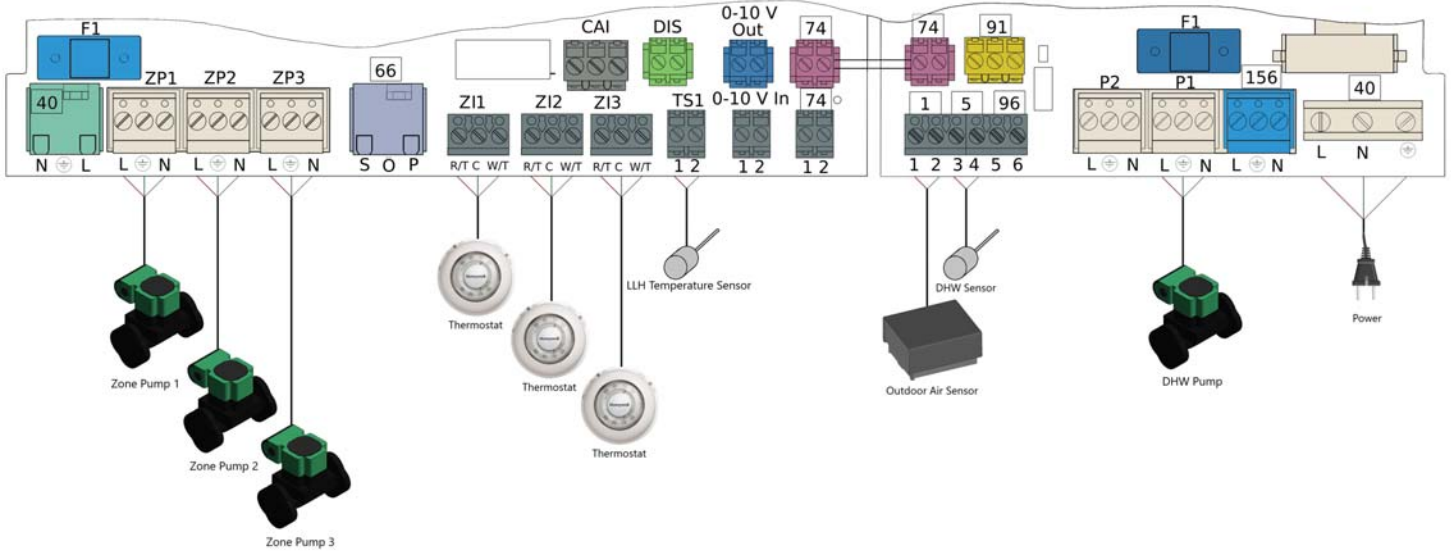
Vitodens 200-W

Application 2

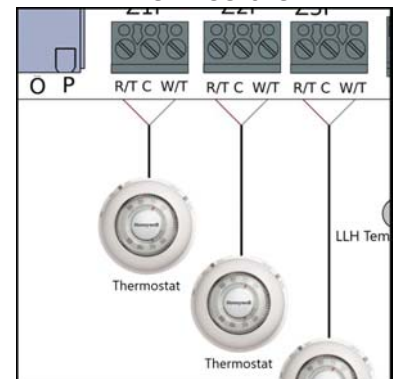
[← Back to Index](#)

Primary secondary

One Boiler, Single Temperature with three zone circuits, DHW on system loop.



Alternate Wiring for Thermostats



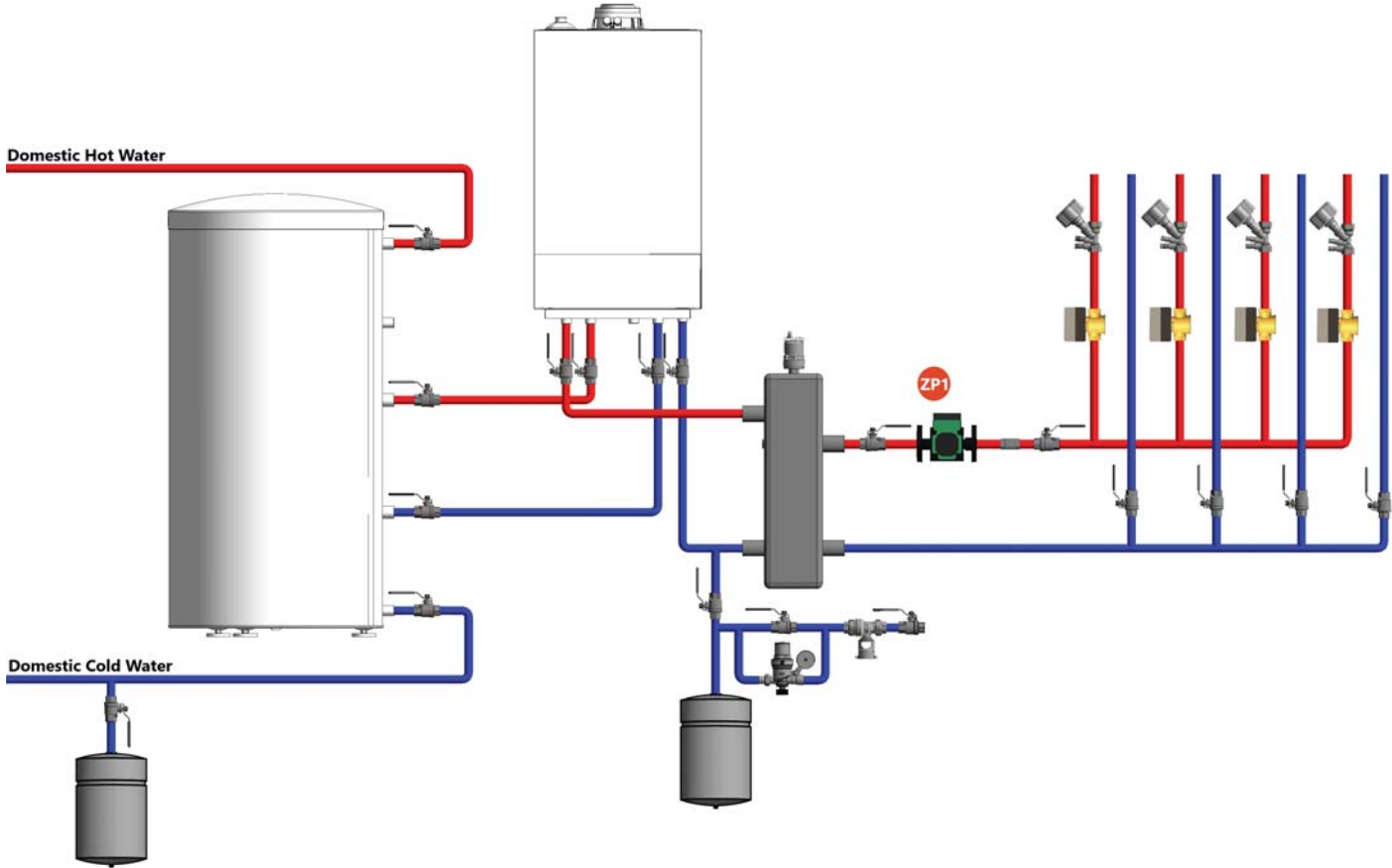
Vitodens 200-W

Application 3

[← Back to Index](#)

Primary secondary

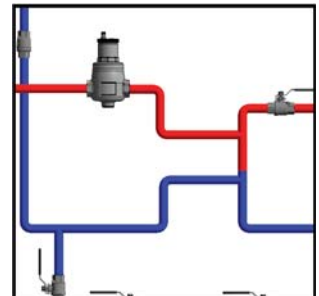
One Boiler, Single Temperature with zone valves,
DHW connected to boiler.



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Closely Spaced Tees

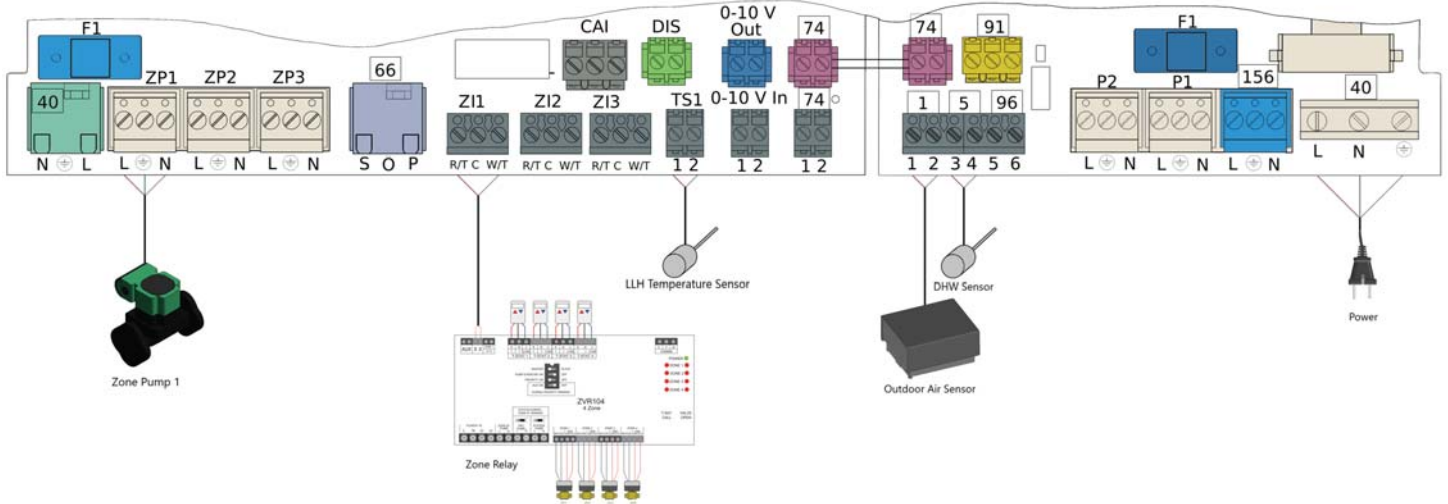


Vitodens 200-W Application 3

[← Back to Index](#)

Primary secondary

One Boiler, Single Temperature with zone valves,
DHW connected to boiler.



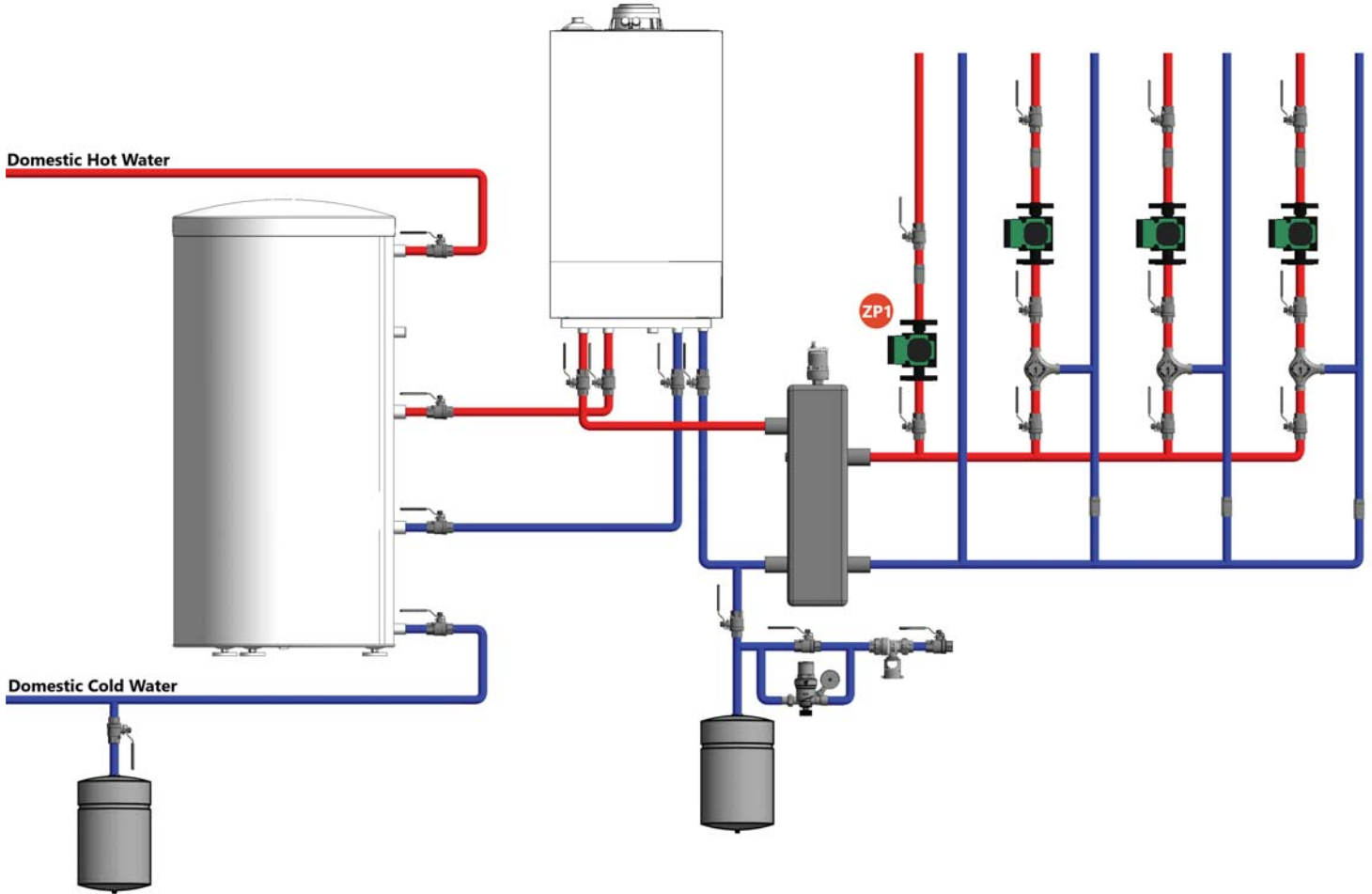
Vitodens 200-W

Application 4

[← Back to Index](#)

Primary secondary

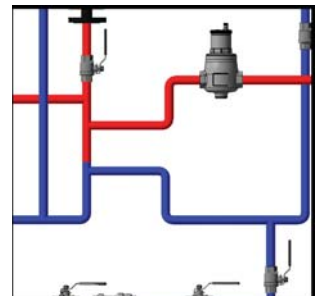
One Boiler, Multiple Temperatures with three Mixing Valves and one zone circuit, DHW connected to boiler.



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Disclaimer: Refer to Installation Instructions for boiler connections when installing Viessmann Boilers, these are conceptual drawings.

Closely Spaced Tees

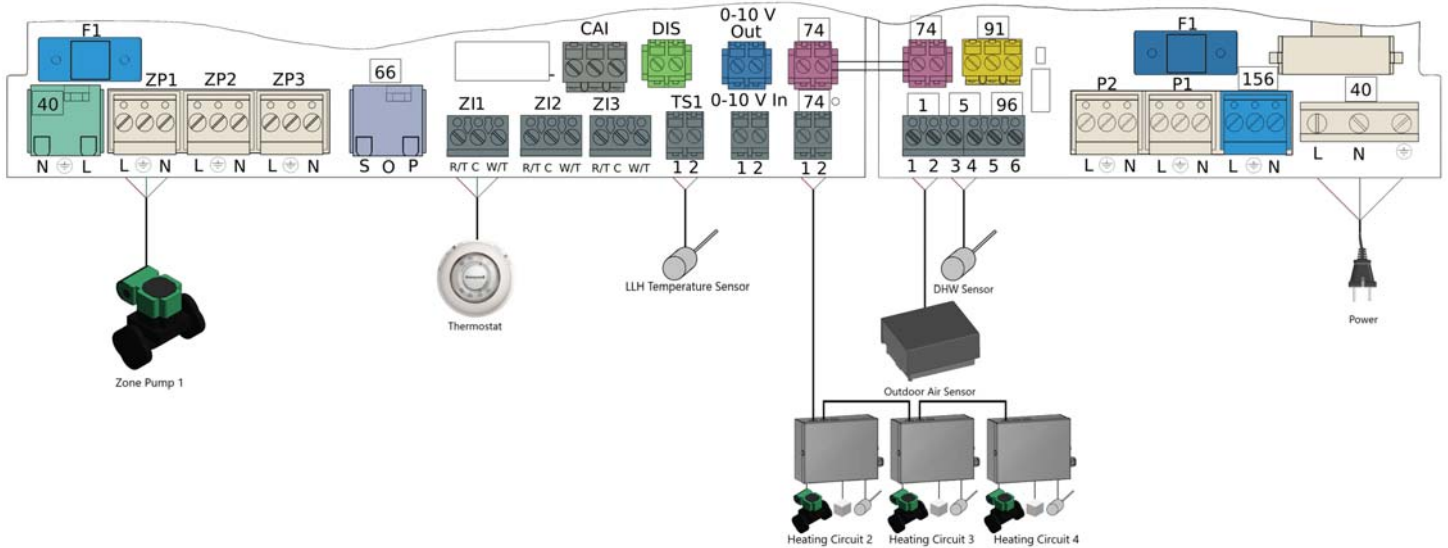


Vitodens 200-W Application 4

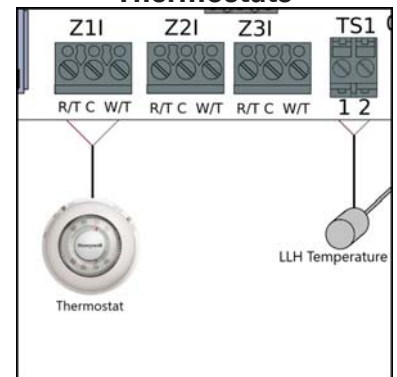
[← Back to Index](#)

Primary secondary

One Boiler, Multiple Temperatures with three Mixing Valves and one zone circuit, DHW connected to boiler.



Alternate Wiring for Thermostats



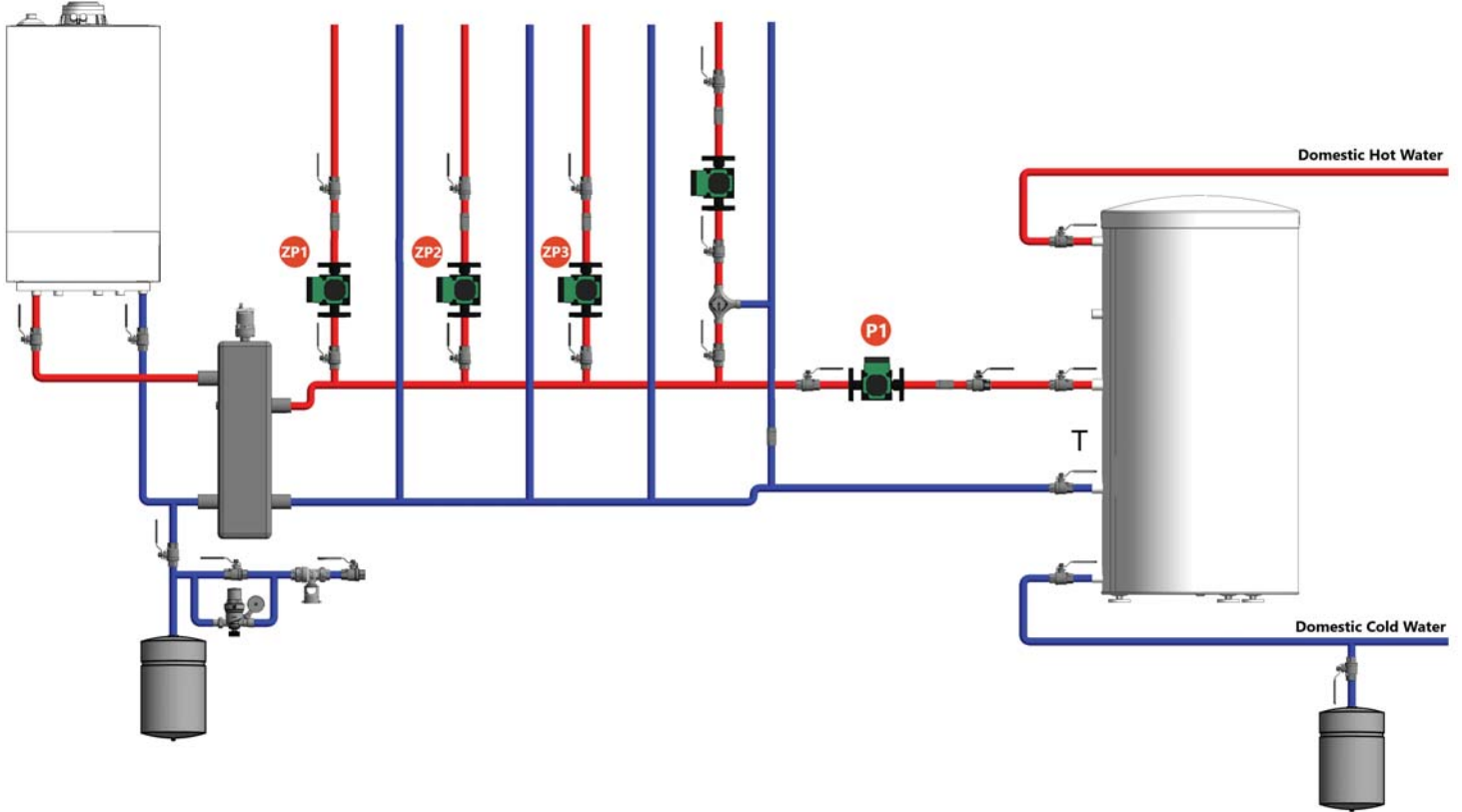
Vitodens 200-W

Application 5

[← Back to Index](#)

Primary secondary

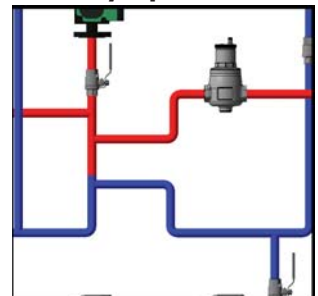
One Boiler, Multiple Temperatures with one Mixing Valve and three zone circuits, DHW on system loop.



Disclaimer: Tempering Valves are field supplied where required by local jurisdiction.

Disclaimer: Refer to Installation Instructions for boiler connections when installing Viessmann Boilers, these are conceptual drawings.

Closely Spaced Tees

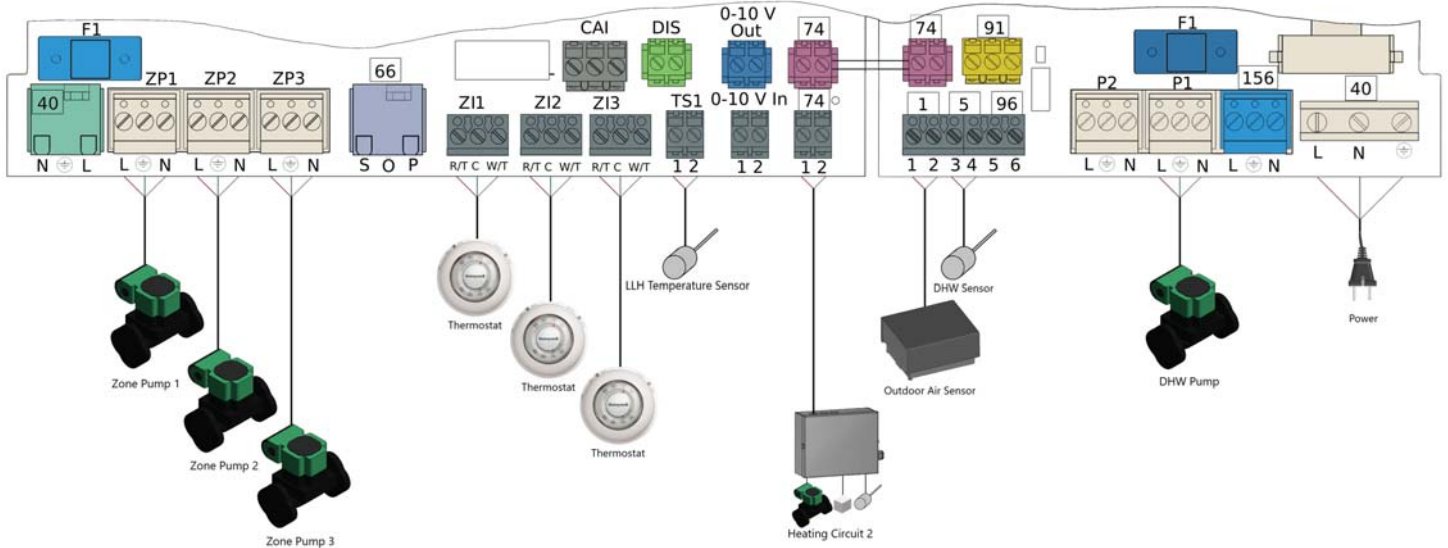


Vitodens 200-W Application 5

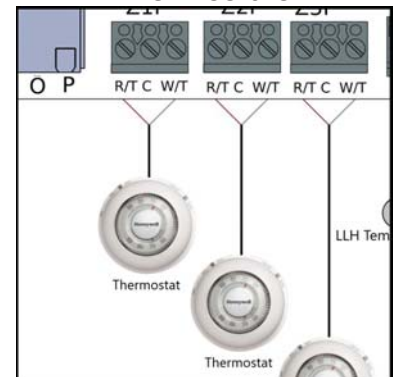
[← Back to Index](#)

Primary secondary

One Boiler, Multiple Temperatures with one Mixing Valve and three zone circuits, DHW on system loop.



Alternate Wiring for Thermostats



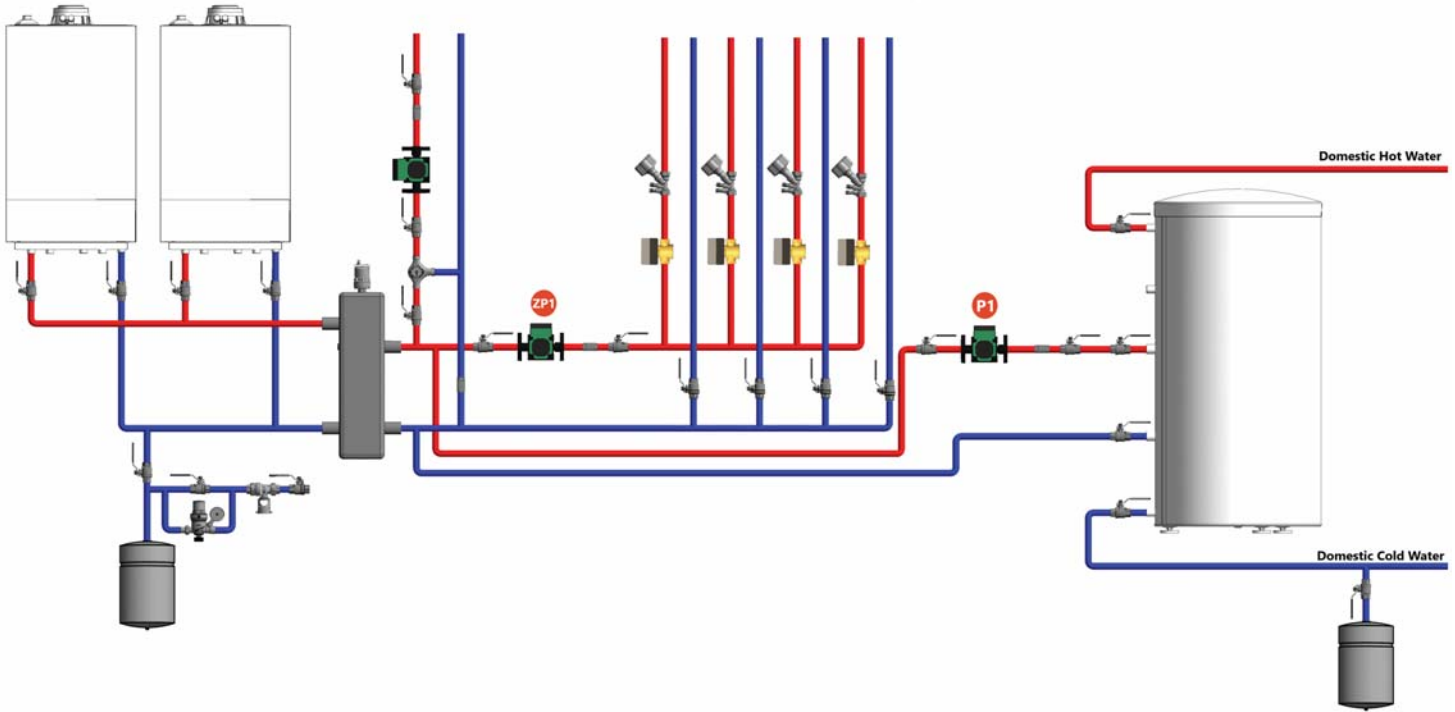
Vitodens 200-W

Application 6

[← Back to Index](#)

Primary secondary

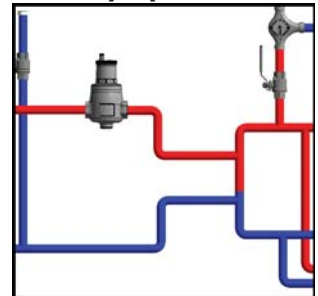
Two Boilers, Multiple Temperatures with one mixing valve and zone valves, DHW on system loop.



Disclaimer: Tempering Valves are field supplied where required by local jurisdiction.

Disclaimer: Refer to Installation Instructions for boiler connections when installing Viessmann Boilers, these are conceptual drawings.

Closely Spaced Tees



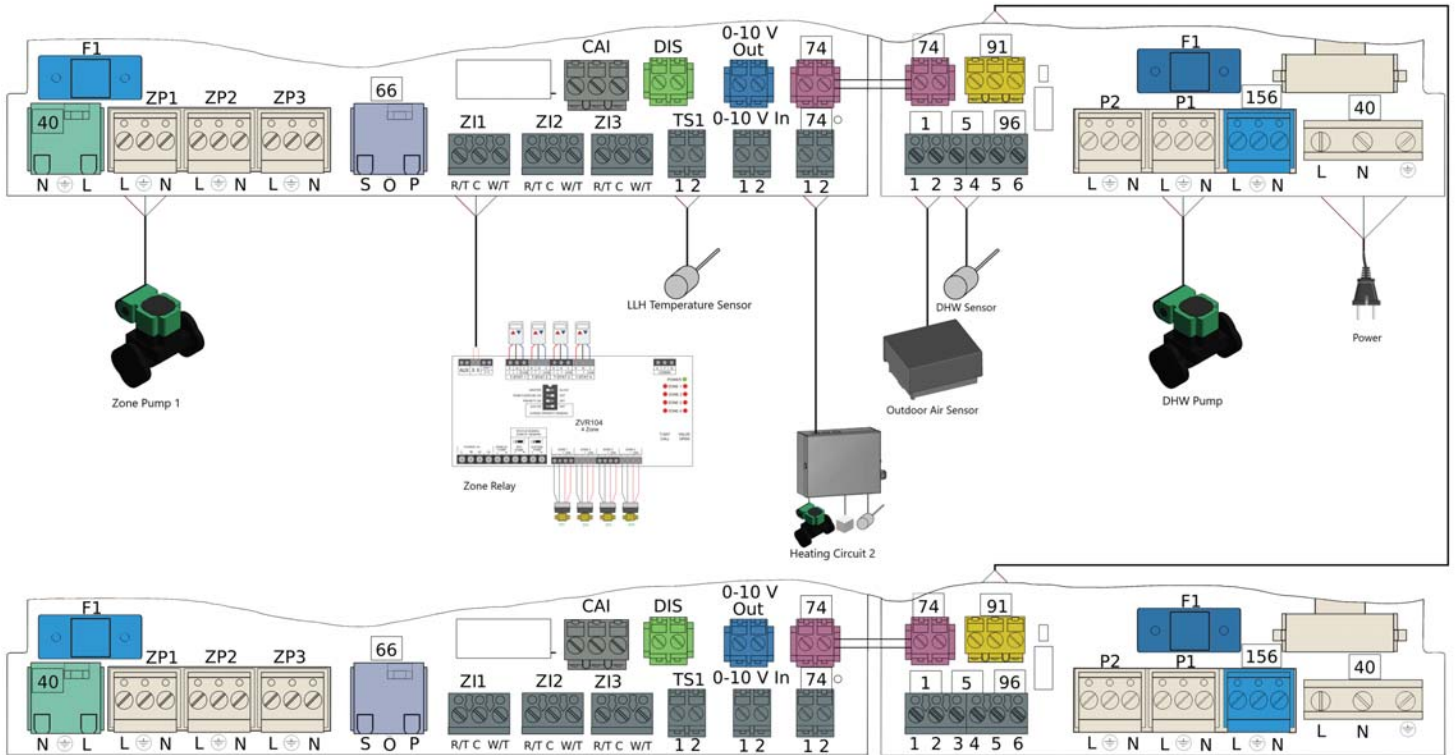
Vitodens 200-W

Application 6

[← Back to Index](#)

Primary secondary

Two Boilers, Multiple Temperatures with one mixing valve and zone valves, DHW on system loop.



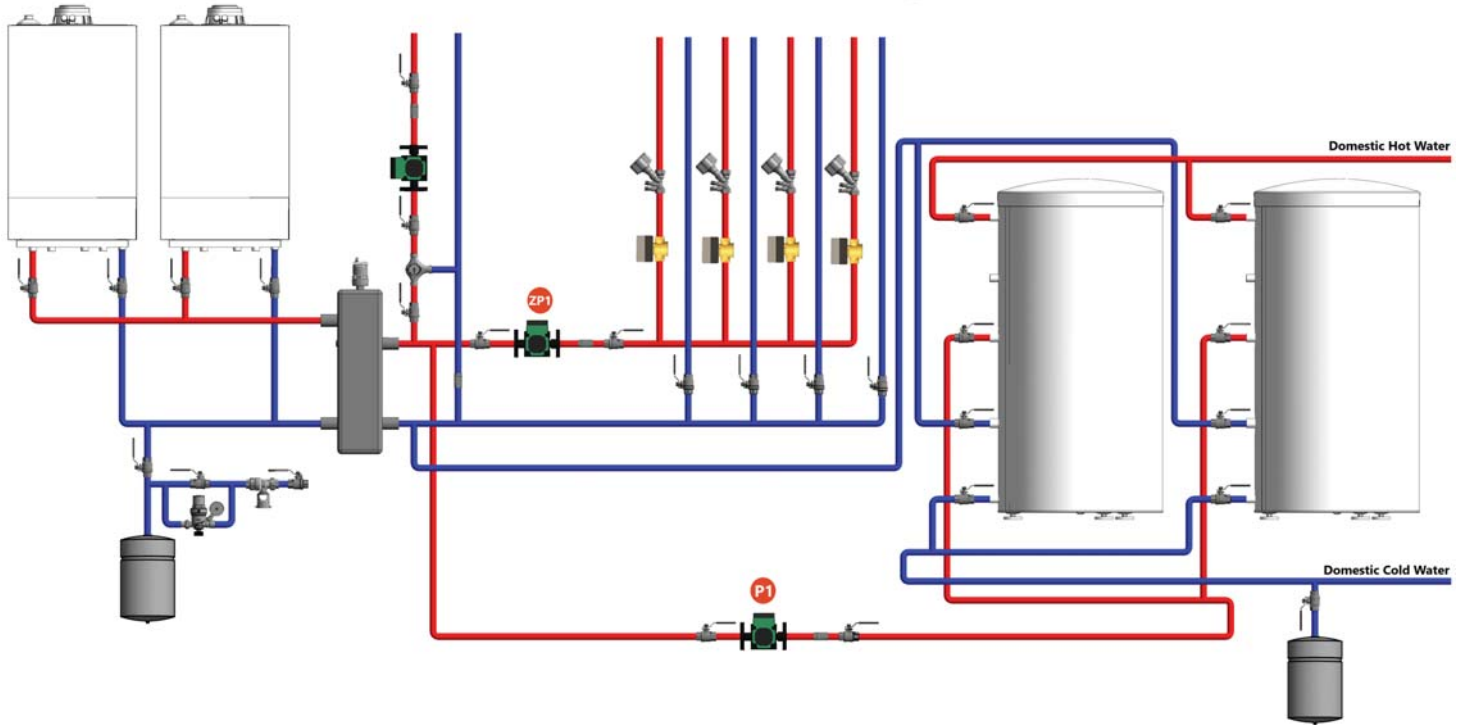
Vitodens 200-W

Application 7

[← Back to Index](#)

Primary secondary

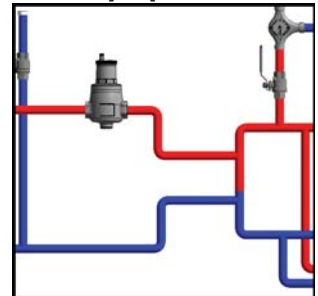
Two Boilers, Multiple Temperatures with one mixing valve and zone valves, DHW with two tanks on system loop.



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Closely Spaced Tees

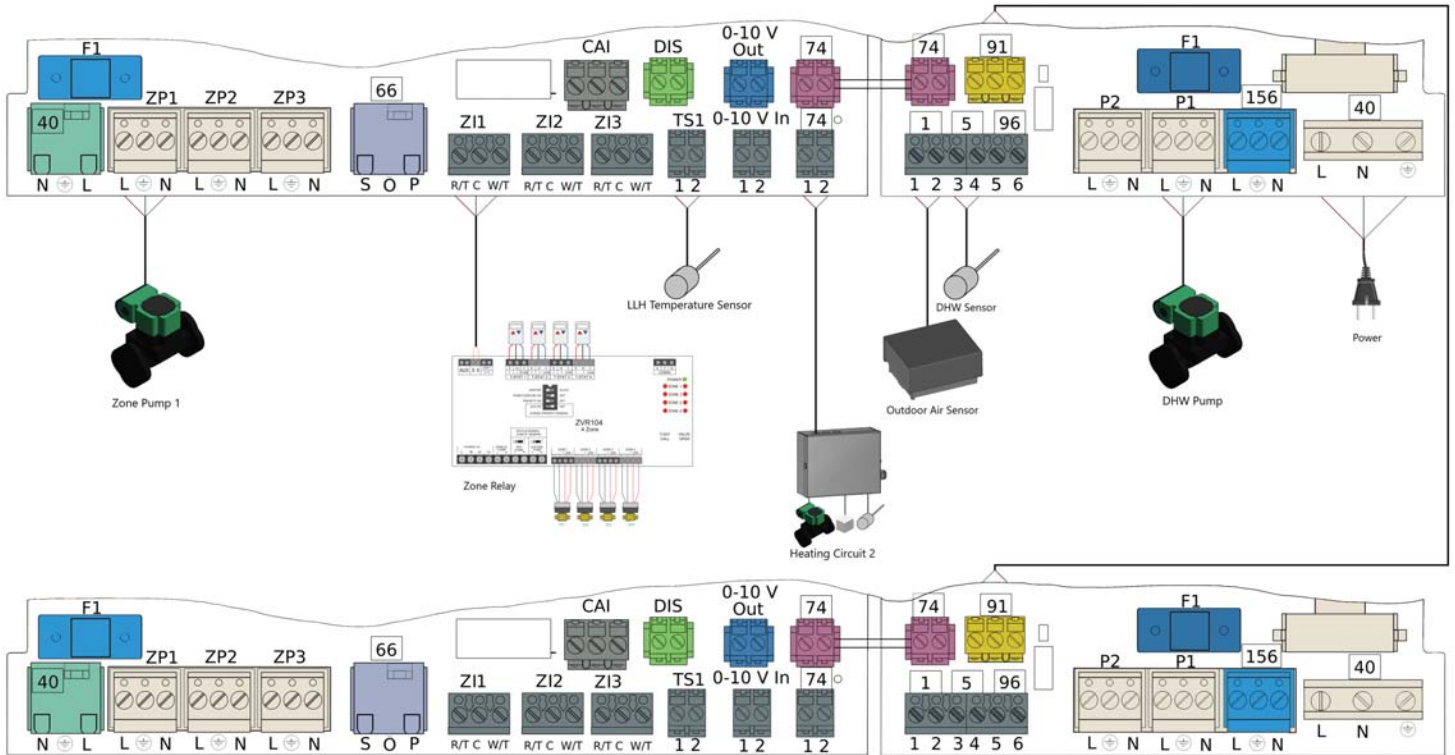


Vitodens 200-W Application 7

[← Back to Index](#)

Primary secondary

Two Boilers, Multiple Temperatures with one mixing valve and zone valves, DHW with two tanks on system loop.



Vitodens 200-W

Gas Line Sizing Chart

[← Back to Index](#)

Schedule 40 Metallic Pipe		Gas		Natural					
		Inlet Pressure		Less than ½ psi					
		Pressure Drop		0.3 in. w.c.					
		Specific Gravity		0.6					
		Pipe Size (in.)							
Nominal	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
Actual ID	0.622	0.824	1.049	1.38	1.61	2.067	2.469	3.068	4.062
Length (ft.)	MBH								
10	131	273	514	1,060	1,580	3,050	4,860	8,580	17,500
20	90	188	353	726	1,090	2,090	3,340	5,900	12,000
30	72	151	284	583	873	1,680	2,680	4,740	9,660
40	62	129	243	499	747	1,440	2,290	4,050	8,270
50	55	114	215	442	662	1,280	2,030	3,590	7,330
60	50	104	195	400	600	1,160	1,840	3,260	6,640
70	46	95	179	368	552	1,060	1,690	3,000	6,110
80	42	89	167	343	514	989	1,580	2,790	5,680
90	40	83	157	322	482	928	1,480	2,610	5,330
100	38	79	148	304	455	877	1,400	2,470	5,040
125	33	70	131	269	403	777	1,240	2,190	4,460
150	30	63	119	244	366	704	1,120	1,980	4,050
175	28	58	109	224	336	648	1,030	1,820	3,720
200	26	54	102	209	313	602	960	1,700	3,460
250	23	48	90	185	277	534	851	1,500	3,070

[← Back to Index](#)

- [Quick Start Guide](#)
- [Technical Data Manual](#)
- [Wiring Guide](#)

