

Hamilton 3VO Submittal

- BOILER** Models H3H 750-4000 **WATER HEATER** Models H3D 750-4000

Job _____
 Engineer _____
 Contractor _____
 Prepared By _____ Date _____
 Model _____ Input _____ Unit Tag _____

- 100% factory fire tested**
- Efficiency: up to 99.8% (based on incoming water)**
- Maximum outlet temperature: 210° F**
- Lifetime thermal shock proof heat exchanger**
- 10 year water heater/15 year boiler heat exchanger warranty**
- 18 month parts warranty**
- 5:1 Full modulation turndown ratio**
- Self-diagnostic, operating, and data management HOT™ Controls:**
 - Gas, water, fan, and condensate drain pressures, and (6) temperature points monitored
- Low cost, secure, private cellular connection for all historical and live operating data management and two-way communication available**



3VO™
750,000-4,000,000 BTU

Heat Exchanger

- ASME H Stamped (standard)
- ASME HLW Stamped (future option)
- ASME inspected and stamped for 160 PSIG max working pressure
- National Board registered
- All 316L Stainless construction
- Individually replaceable straight tubes
- Completely serviceable, water and fire sides

ASME Pressure Relief Valve

- 125 PSI standard
- _____ PSI special applications, not to exceed 125 PSI

UL 795/CSA 3.4-ETL Listed

- Water Heaters
UL 795, and CSA 3.4
- Hot Water Boiler
AHRI, UL 795, and CSA 3.4

HOT™ Controller

- 120V 1 PH (750-3000)
- 240/480V 3 PH (3500-4000)
- Direct spark ignition w/integrated flame sensor
- Modbus digital control system (standard)
- High Limit Control, Manual Reset
 - 198° F—Standard
 - 155° F—Low Temp
 - 210° F—High Temp
- Front mounted on/off power switch
- Live monitoring and control based on:
 - Inlet gas pressure
 - Fan outlet pressure
 - Vent connection pressure and temperature
 - Inlet and outlet water pressures and temperatures
 - Up to (8) additional temperature sensors

Gas Train

- Manual Gas Shut-Off Valve(s)
- Negative Pressure Gas Valve(s)
- Fuel—Field Adjustable w/No Parts
 - Natural Gas
 - Propane Gas
- CSD-1
- No De-rate up to 9000'

Burner

- 316L Stainless Steel Premix
- Ultra-Low NO_x: Less than 13 PPM, adjusted for 3% O₂

Construction

- Indoor construction (standard)
- Outdoor construction (optional)
- Front Controls
- Modular Cabinet
- Rear Water Connections
- Rear Exhaust & Inlet Air Connections
- Automatic Air Vents

Venting System Information

- Vent Termination
 - PVC at setpoints up to 140° F
 - CPVC
 - Stainless Steel
 - Polypropylene
- Direction of Termination
 - Vertical
Estimated Vertical Height: _____ ft
 - Horizontal

Certified Seismic Rated Mounting

Optional Controls

- Low Water Cut Off
- Gateway Communication—BMS
 - LONWorks
 - BACnet MS/TP

122 other protocols—C/F

Additional Manual Reset High Limit

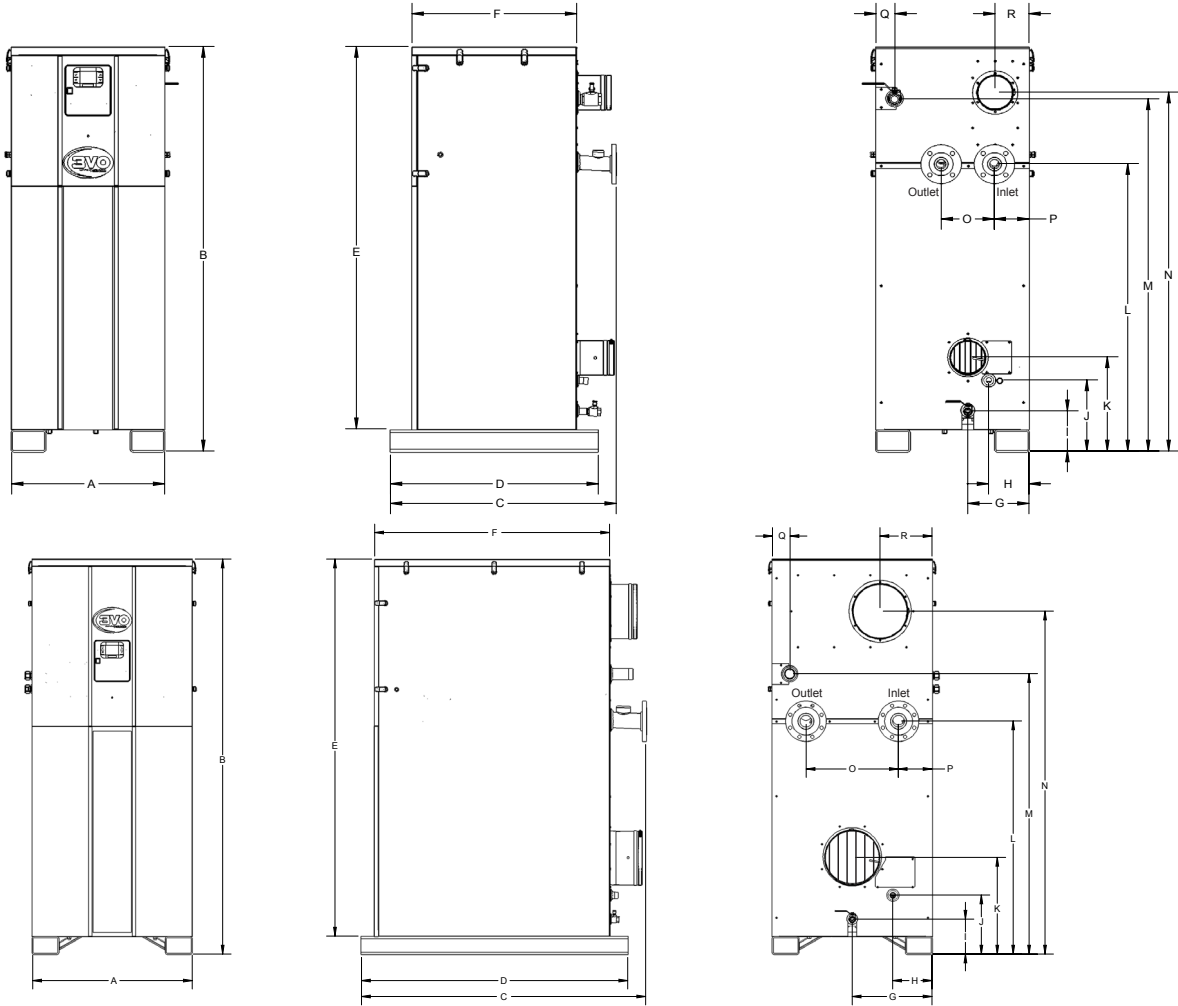
Options

- Certified System—UL 795
Model Number _____
(includes all items listed below)
- Recirculating Pump _____
Note: pumps are sized and supplied by factory as standard, providing 15% additional head for system connection piping.
- Condensate Neutralizer/Drain
(highly recommended for all systems)
- Electrical Panel w/Service Disconnects
- Common Gas Manifold
- Pre-Plumbed Piping Manifold
- Expansion Tank _____ - _____ PSI



Hamilton 3VO Models 750-4000

Model _____



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Water Conn.	Gas Conn.	Flue Outlet & Inlet Air	Condensate Conn.	Boiler Drain Conn.
750	26.5"	73"	39"	36"	69"	28.5"	10.5"	5"	7"	13"	17"	52"	63.5"	64.5"	9"	6"	3.5"	6"	2.5"	1.25"	5"	0.75"	3 @ 0.75"
850	26.5"	73"	39"	36"	69"	28.5"	10.5"	5"	7"	13"	17"	52"	63.5"	64.5"	9"	6"	3.5"	6"	2.5"	1.25"	6"	0.75"	3 @ 0.75"
1000	26.5"	73"	39"	36"	69"	28.5"	10.5"	5"	7"	13"	17"	52"	63.5"	64.5"	9"	6"	3.5"	6"	2.5"	1.25"	6"	0.75"	3 @ 0.75"
1500	32"	80"	53"	47.5"	76"	41"	13"	7.5"	7.5"	13"	21.5"	52"	61.5"	68.5"	13.5"	7"	3.5"	10"	3"	1.5"	7"	1.0"	3 @ 0.75"
2000	32"	80"	53"	47.5"	76"	41"	13"	7.5"	7.5"	13"	21.5"	52"	61.5"	68.5"	13.5"	7"	3.5"	10"	3"	1.5"	8"	1.0"	3 @ 0.75"
2500	32"	80"	53"	47.5"	76"	41"	13"	7.5"	7.5"	13"	21.5"	52"	61.5"	68.5"	13.5"	7"	3.5"	10"	3"	2.0"	10"	1.0"	3 @ 0.75"
3000	35.5"	88"	63"	59.5"	84"	52.5"	18"	8.5"	8"	13"	21.5"	52"	62.5"	76.5"	20.5"	7.5"	4"	11.5"	4"	2.0"	10"	1.0"	3 @ 0.75"
3500	35.5"	88"	63"	59.5"	84"	52.5"	18"	8.5"	8"	13"	21.5"	52"	62.5"	76.5"	20.5"	7.5"	4"	11.5"	4"	2.0"	10"	1.0"	3 @ 0.75"
4000	35.5"	88"	63"	59.5"	84"	52.5"	18"	8.5"	8"	13"	21.5"	52"	62.5"	76.5"	20.5"	7.5"	4"	11.5"	4"	2.0"	12"	1.0"	3 @ 0.75"

Model	Input BTU/hr	Output BTU/hr @ 54°F incoming water	Output BTU/hr @ 120°F incoming water	GPH Recovery @ 100°FΔT	Water Flow Rate & Pressure Drop @ 50°FΔT	Water Flow Rate & Pressure Drop @ 20°FΔT	Shipping Weight
750	747,684	736,469	669,177	884	28.5 @ 0.9'	71.3 @ 4.8'	1431 lbs
850	848,561	835,833	767,948	1,003	32.3 @ 1.0'	80.8 @ 5.7'	1451 lbs
1000	1,000,754	985,743	915,690	1,183	38.0 @ 1.3'	95.0 @ 7.0'	1463 lbs
1500	1,536,244	1,513,200	1,397,982	1,817	57.0 @ 1.1'	142.6 @ 6.19'	1639 lbs
2000	1,993,316	1,963,416	1,803,951	2,357	76.0 @ 1.5'	190.1 @ 8.2'	1688 lbs
2500	2,554,213	2,515,900	2,298,792	3,020	95.0 @ 1.7'	237.6 @ 9.5'	1731 lbs
3000	3,025,288	2,979,909	2,753,012	3,577	114.0 @ 1.6'	285.1 @ 8.9'	1860 lbs
3500	3,437,291	3,385,732	3,093,562	4,065	133.1 @ 2.1'	332.6 @ 11.2'	1925 lbs
4000	4,000,000	3,940,000	3,600,000	4,643	148.0 @ 2.4'	370.1 @ 13.3'	2500 lbs

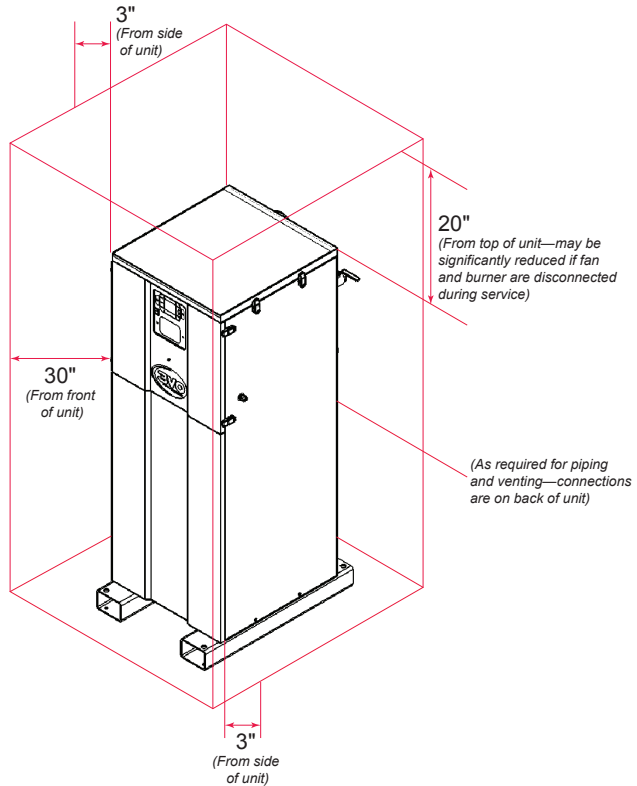
RECOMMENDED SERVICE CLEARANCES

RECOMMENDED SERVICE CLEARANCES

NOTE: The 3VO is rated at zero clearance to combustibles.

Multiple 3VO appliances may be installed within 3" of each other without compromising service clearance, 12" minimum is recommended for ease of wiring between units.

Holes in the rectangular tube bases can be fitted with supplied leveling bolts or can be used for standard or Seismic anchoring.



VENTING THE 3VO

Please note: You MUST confirm local codes as related to venting materials, required markings, etc. Parts of Canada have very specific vent material requirements.

Model	Vent Diameter	Standard Vent Type	Optional Vent Type	Minimum Combined Vent Length	Maximum Combined Length
750	5"	Stainless	Plastic	6' + (2) 90° elbows	100 ^{1*}
850	6"	Stainless	Plastic	6' + (2) 90° elbows	100 ^{1*}
1000	6"	Stainless	Plastic	6' + (2) 90° elbows	100 ^{1*}
1500	7"	Stainless	Plastic	6' + (2) 90° elbows	100 ^{1*}
2000	8"	Stainless	Plastic	6' + (2) 90° elbows	100 ^{1*}
2500	10"	Stainless	Plastic	6' + (2) 90° elbows	100 ^{1*}
3000	10"	Stainless	Plastic	6' + (2) 90° elbows	100 ^{1*}
3500	10"	Stainless	Plastic	6' + (2) 90° elbows	100 ^{1*}
4000	12"	Stainless	Plastic	6' + (2) 90° elbows	100 ^{1*}

¹For lengths greater than 100', consult factory.

Note: For concrete construction or to meet certain fire codes, exhaust and inlet piping at the wall penetration to the EVO must be CPVC Schedule 40 or 80 or Stainless. The balance from the penetrated wall to the outside may be PVC Schedule 40 or 80.

ELECTRICAL CHARACTERISTICS FOR 3VO PRODUCTS

Model	Voltage Required	Boiler	Boiler Pump	Voltage and Total Amps
750	120V Single Phase	120V@12A	120V@6A	120V@18A
750	240V Split Phase	240V@9A	240V@3A	240V@12A
850	120V Single Phase	120V@12A	120V@6A	120V@18A
850	240V Split Phase	240V@9A	240V@3A	240V@12A
1000	240V Split Phase	240V@9A	240V@3A	240V@12A
1500	240V Split Phase	240V@11A	240V@3A	240V@14A
2000	240V Split Phase	240V@11A	240V@5A	240V@14A
2500	240V Split Phase	240V@14A	240V@5A	240V@19A
3000	240V Split Phase	240V@14A	240V@8A	240V@22A
3500	480V Three Phase and 240V Split Phase	480V@6A and 240V@6A	240V@8A	480V@6A and 240V@14A
3500	480V Three Phase and 240V Split Phase	480V@6A and 240V@6A	480V@5A	480V@11A and 240V@6A
4000	480V Three Phase and 240V Split Phase	480V@6A and 240V@6A	240V@8A	480V@6A and 240V@14A
4000	480V Three Phase and 240V Split Phase	480V@6A and 240V@6A	480V@5A	480V@11A and 240V@6A

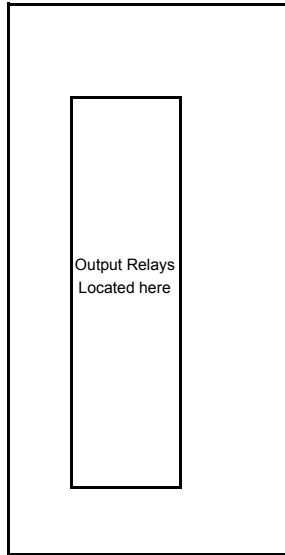
Notes:

1. If customer chooses larger pump other than our default pump, Total Amps must be adjusted.
2. 240V Split Phase requires 120V-L1, 120V-L2, N, GND
3. 480V Current Draw will increase if Hamilton Engineering is providing a transformer in an electrical package to convert 480V to 240V.

ELECTRICAL REQUIREMENTS AND CONNECTIONS

3VO Terminal Wiring Models 3500–4000

Back side of appliance display panel



Heat Demand	1	Terminal Block #1
Heat Demand	2	
Fault/Service	3	
Fault/Service	4	
E-Stop	5	
E-Stop	6	
PWM Pump Output	7	
PWM Pump Ground	8	
External Sensor	9	
External Sensor	10	
Tank Sensor	11	
Tank Sensor	12	

1	Additional Safety	Terminal Block #2
2	Additional Safety	
3	Cascade In (A)	
4	Cascade In (B)	
5	Cascade Out (A)	
6	Cascade Out (B)	
7	Outdoor Sensor	
8	Outdoor Sensor	
9	0–10 Vdc (+)	
10	0–10 Vdc (-)	
11	Room Thermostat	
12	Room Thermostat	

Empty	1	Terminal Block #3
Empty	2	
Pump P1 L	3	
Pump P1 N	4	
Pump P1 G	5	
Pump P3 L	6	
Pump P3 N	7	
Pump P3 G	8	
3-Way NO/P2 L	9	
3-Way N/P2 N	10	
3-Way NC	11	
3-Way G/P2 G	12	

1	Power In 115VAC L	Terminal Block #4
2	Auxillary 115VAC L	
3	Auxillary 115VAC L	
4	Auxillary 115VAC L	
5	Auxillary 115VAC L	
6	Power In 115VAC N	
7	Auxillary 115VAC N	
8	Auxillary 115VAC N	
9	Auxillary 115VAC N	
10	Auxillary 115VAC N	
11	Auxillary 115VAC N	
12	Power In 115VAC G	

1	P3 Relay Load	Terminal Block #5
2	P3 Relay Line	
3	P3 Relay Control N	
4	P3 Relay Control L	
5	3-Way NO/P2 Relay Load	
6	3-Way NC Relay Load	
7	3-Way/P2 Relay Line	
8	3-Way NC Relay Control L	
9	3-Way NO/P2 Relay Control L	
10	3-Way/P2 Relay Control N	

Terminal Block 1

Terminals 1 & 2	Heat Enable/Disable (Dry Contact)
Terminals 3 & 4	Fault alarm (Dry Contact)
Terminals 5 & 6	E-Stop (remote switch) <i>current carrying - 0-5VDC</i>
Terminals 7 & 8	For use with PWM boiler pump only
Terminals 9 & 10	Load (piping, Low Loss Header) sensor (T6) 10k Ohm
Terminals 11 & 12	Tank sensor (T3) here - 10K Ohm

Terminal Block 2

Terminals 1 & 2	Additional safety circuit
Terminals 3 & 4	Cascade in
Terminals 5 & 6	Cascade Out
Terminals 7 & 8	T4 Outdoor Sensor - 10k Ohm
Terminal 9	0 - 10 VDC (+)
Terminal 10	0 - 10 VDC (-)
Terminals 11 & 12	Room Thermostat

Terminal Block 3

Terminals 1–3	Power to P1 Pump - 3 phase
Terminal 4	<i>Not used for 3 phase</i> - Neutral to P1 Pump
Terminal 5	Ground to P1 Pump
Terminal 6–8	Power to P3 115v pump or relay for 3 phase
Terminal 9	Line P2 Pump or NO terminal on 3 way valve - 115v
Terminal 10	Neutral on P2 Pump or 3 way valve 115v
Terminal 11	NC terminal on 3 way valve - 115v
Terminal 12	Ground on P2 pump or 3 way valve - 115v

Terminal Block 4

Terminal 1–5	115v Line - <i>factory wired on 3 phase models</i>
Terminal 6–11	115v Neutral - <i>factory wired on 3 phase models</i>
Terminal 12	115v Ground - <i>factory wired on 3 phase models</i>

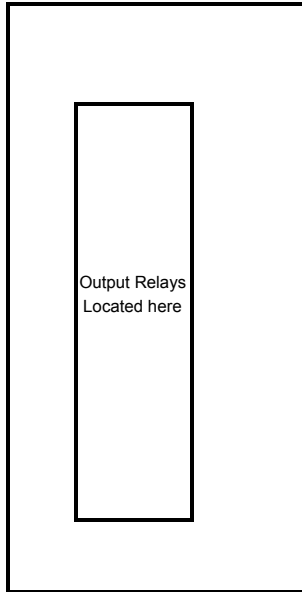
Terminal Block 5

Terminals 1–10	Factory Wired as standard - Relay Switching
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ELECTRICAL REQUIREMENTS AND CONNECTIONS

3VO Terminal Wiring Models 3500–4000

Back side of appliance display panel



Heat Demand	1	Terminal Block #1
Heat Demand	2	
Fault/Service	3	
Fault/Service	4	
E-Stop	5	
E-Stop	6	
PWM Pump Output	7	
PWM Pump Ground	8	
External Sensor	9	
External Sensor	10	
Tank Sensor	11	
Tank Sensor	12	

1	Additional Safety	Terminal Block #2
2	Additional Safety	
3	Cascade In (A)	
4	Cascade In (B)	
5	Cascade Out (A)	
6	Cascade Out (B)	
7	Outdoor Sensor	
8	Outdoor Sensor	
9	0–10 Vdc (+)	
10	0–10 Vdc (-)	
11	Room Thermostat	
12	Room Thermostat	

Pump P1 L1	1	Terminal Block #3
Pump P1 L2	2	
Pump P1 L3	3	
Pump P1 N	4	
Pump P1 G	5	
Pump P3 L	6	
Pump P3 N	7	
Pump P3 G	8	
3-Way NO/P2 L	9	
3-Way N/P2 N	10	
3-Way NC	11	
3-Way G/P2 G	12	

1	Power In 115VAC L	Terminal Block #4
2	Auxillary 115VAC L	
3	Auxillary 115VAC L	
4	Auxillary 115VAC L	
5	Auxillary 115VAC L	
6	Power In 115VAC N	
7	Auxillary 115VAC N	
8	Auxillary 115VAC N	
9	Auxillary 115VAC N	
10	Auxillary 115VAC N	
11	Auxillary 115VAC N	
12	Power In 115VAC G	

1	P3 Relay Load	Terminal Block #5
2	P3 Relay Line	
3	P3 Relay Control N	
4	P3 Relay Control L	
5	3-Way NO/P2 Relay Load	
6	3-Way NC Relay Load	
7	3-Way/P2 Relay Line	
8	3-Way NC Relay Control L	
9	3-Way NO/P2 Relay Control L	
10	3-Way /P2 Relay Control N	

Terminal Block 1

Terminals 1 & 2	Heat Enable/Disable (Dry Contact)
Terminals 3 & 4	Fault alarm (Dry Contact)
Terminals 5 & 6	E-Stop (remote switch) <i>current carrying - 0-5VDC</i>
Terminals 7 & 8	For use with PWM boiler pump only
Terminals 9 & 10	Load (piping, Low Loss Header) sensor (T6) 10k Ohm
Terminals 11 & 12	Tank sensor (T3) here - 10K Ohm

Terminal Block 2

Terminals 1 & 2	Additional safety circuit
Terminals 3 & 4	Cascade in
Terminals 5 & 6	Cascade Out
Terminals 7 & 8	T4 Outdoor Sensor - 10k Ohm
Terminal 9	0 - 10 VDC (+)
Terminal 10	0 - 10 VDC (-)
Terminals 11 & 12	Room Thermostat

Terminal Block 3

Terminals 1–3	Power to P1 Pump - 3 phase
Terminal 4	<i>Not used for 3 phase</i> - Neutral to P1 Pump
Terminal 5	Ground to P1 Pump
Terminal 6–8	Power to P3 115v pump or relay for 3 phase
Terminal 9	Line P2 Pump or NO terminal on 3 way valve - 115v
Terminal 10	Neutral on P2 Pump or 3 way valve 115v
Terminal 11	NC terminal on 3 way valve - 115v
Terminal 12	Ground on P2 pump or 3 way valve - 115v

Terminal Block 4

Terminal 1–5	115v Line - <i>factory wired on 3 phase models</i>
Terminal 6–11	115v Neutral - <i>factory wired on 3 phase models</i>
Terminal 12	115v Ground - <i>factory wired on 3 phase models</i>

Terminal Block 5

Terminals 1–10	Factory Wired as standard - Relay Switching
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