

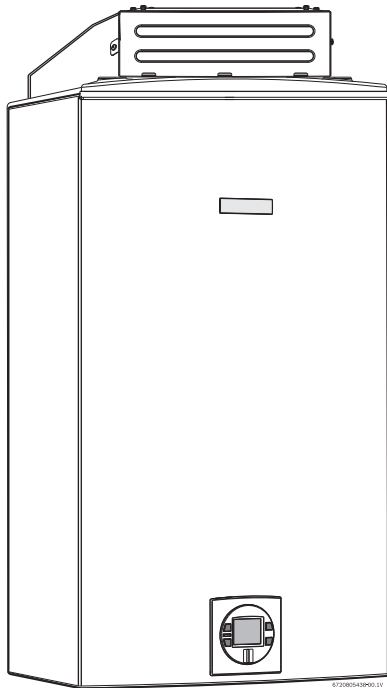
940ESO Tankless Water Heater

Engineering
Submittal
Sheet



BOSCH

Overview and Certifications



Massachusetts
Plumbing Board
Approved

Engineering Specifications

Water heater shall be a Model Therm 940 ESO for outdoor installation. Plant shall consist of ___Model Therm 940 ESO NG/LP tankless outdoor water heaters as manufactured by Bosch Thermotechnology Corp. Heater shall be CSA/ANSI Z21.10.3 listed. Heater shall have an input of 199 MBH with a gross output of 160.5 MBH when fired with natural gas. Unit shall operate with a minimum of 82% ANSI Z-21 efficiency. Tankless water heater shall have a recovery of 257 gallons per hour at a 77°F temperature rise. Tankless water heater shall have Low NOx emissions and is 2012 SCAQMD NOx certified to rule 1146.2.

CONSTRUCTION

Water heater shall be gas fired, tankless design with a modulating power burner and negative pressure gas valve. Burner shall be capable of 10:1 turndown of firing, without loss of combustion efficiency. Primary heat exchanger/combustion chamber shall incorporate a multi pass copper tube and fin design with internal

turbulators. Heat exchanger shall be rated for maximum working pressure not less than 150 psig. Water heater shall be equipped with a modulating water valve to improve temperature stability. Exhaust terminal shall be of corrosion resistant metal mounted on top of the appliance.

The water heater control system shall be a single printed circuit board in water-resistant plastic enclosure. The entire system shall be Underwriters Laboratories approved.

The control system shall contain: embedded control board incorporating LCD display to read temperature, and tactile buttons for output power, temperature, and programming control; CPU board which houses all control functions; power transformer; ignition spark module; and unique connections for each sensor or component. The control board shall be field replaceable. The combustion safeguard/flame monitoring system shall utilize spark ignition and a rectification type flame

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sensor. The control panel hardware shall support wireless remote communications if the wireless module is installed. The controls shall include extensive self-diagnostic capabilities that incorporate a minimum of 18 separate fault codes and 8 programmable system categories.

The water heater comes equipped with power cord and shall operate on 120V/1/60Hz electrical service.

INSTALLATION

All aspects of installation of Water Heater Plant shall be in strict accordance with manufacturer's instructions. Materials shall conform to all manufacturer's recommendations including a manufacturer listed vent system.

Water heater plant piping shall be field constructed of materials as specified. Water heater shall be installed with individually isolating shutoff valves for service and maintenance, and a hot water hose connection for field testing. Unit shall have an ASME approved temperature/pressure relief valve with a setting of 150 psig. Water heater shall require a minimum gas pressure of 3.5" W.C. (Natural Gas) at 1,000 scfh (full load rated capacity).

MODE OF OPERATION

Heater shall include integral factory wired operating controls to control all operation and energy input. Control of discharge water temperature shall be set through an internal setpoint with a field adjustment of 100°F to 140°F. A high temperature accessory shall be available that when installed allows for field selectable discharge set point temperatures between 100°F and 184°F. Heater shall be capable of maintaining the outlet temperature within an accuracy of $\pm 2^\circ\text{F}^*$. This shall be accomplished by modulation of firing rate from 100% to 10% of rated input. Unit shall operate with an Inverse Efficiency Curve, with maximum efficiency achieved at minimum firing input.

CONTROLS INTEROPERABILITY

The control board may be linked to other Bosch tankless water heaters through the use of a cascading kit. This accessory shall cause the unit to perform as described above while activating or deactivating other units in the system. Additional Bosch tankless water heaters shall be plumbed in parallel and located near the main unit.

WARRANTY

The heat exchangers shall carry a 15-year limited warranty against leakage due to defects in materials or workmanship or corrosion in a residential, non-direct recirculation system, subject to the manufacturer's water quality requirements. All other parts and components shall carry a 5 year limited warranty against defects in materials or workmanship.

OR

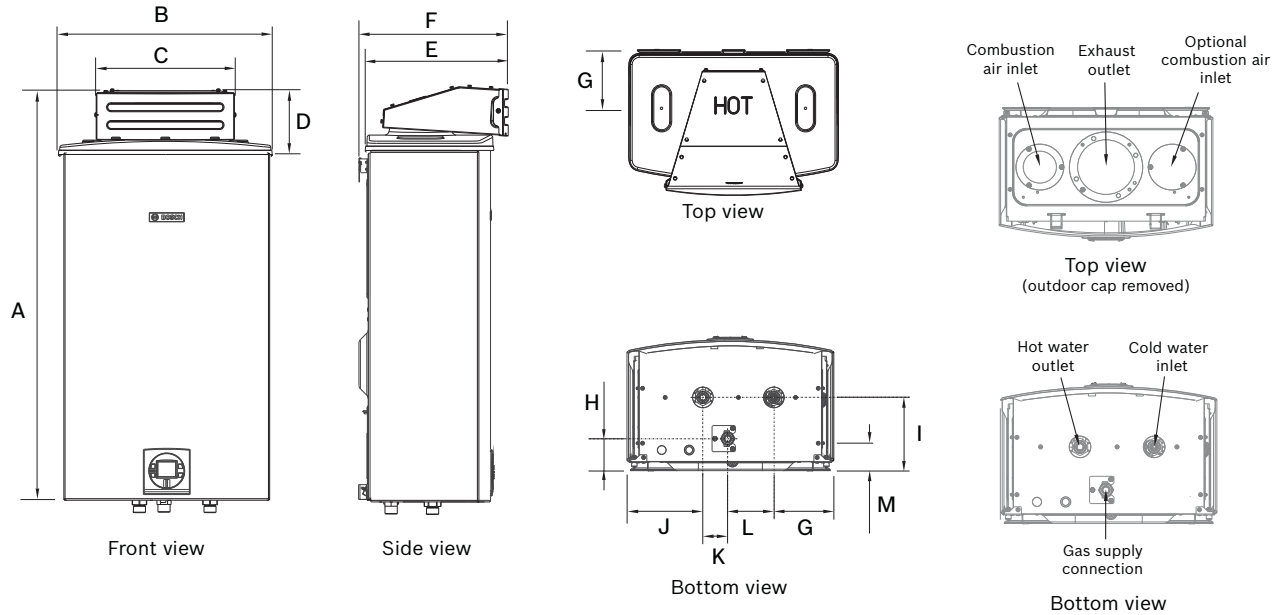
The heat exchangers shall carry a 5-year limited warranty against leakage due to defects in materials or workmanship or corrosion in a commercial installation, subject to the manufacturer's water quality requirements. All other parts and components shall carry a 5 year limited warranty against defects in materials or workmanship.

* based on static stability test

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Dimensions and Connections



Dimensions

	Unit	A	B	C	D	E	F	G	H	I	J	K	L	M
Value	Inches	35 $\frac{5}{16}$	18 $\frac{3}{4}$	12 $\frac{7}{8}$	5 $\frac{5}{8}$	12 $\frac{1}{2}$	12 $\frac{7}{8}$	5 $\frac{1}{4}$	2 $\frac{3}{4}$	6 $\frac{5}{16}$	6 $\frac{1}{2}$	2 $\frac{1}{16}$	4 $\frac{1}{16}$	2 $\frac{5}{16}$

Performance Data

	Unit	Value
Maximum gas input	BTU	199,000
Minimum input	BTU	19,900
Maximum output	BTU	160,500
Minimum output	BTU	18,300
Thermal efficiency	%	82

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Operational Data		
	Unit	Value
940 ESO NG / Natural Gas - part number	-	7738000001
940 ESO LP / Liquid Propane - part number	-	7738000002
Weight	lbs	67
Electrical voltage mains	VAC / Hz	120 / 60
Power consumption max load	A	≤ 2.5
Power consumption idle	mA	40
Min. Inlet gas pressure NG / LP	Inch W.C.	3.5 / 8
Max. Inlet gas pressure NG / LP	Inch W.C.	10.5 / 13
Maximum Output Temperature	° F	140
Max. Working pressure	psi	150
Min. Working pressure	psi	30
Min. Activation rate	GPM	0.5
Relief valve pressure rating	psi	150

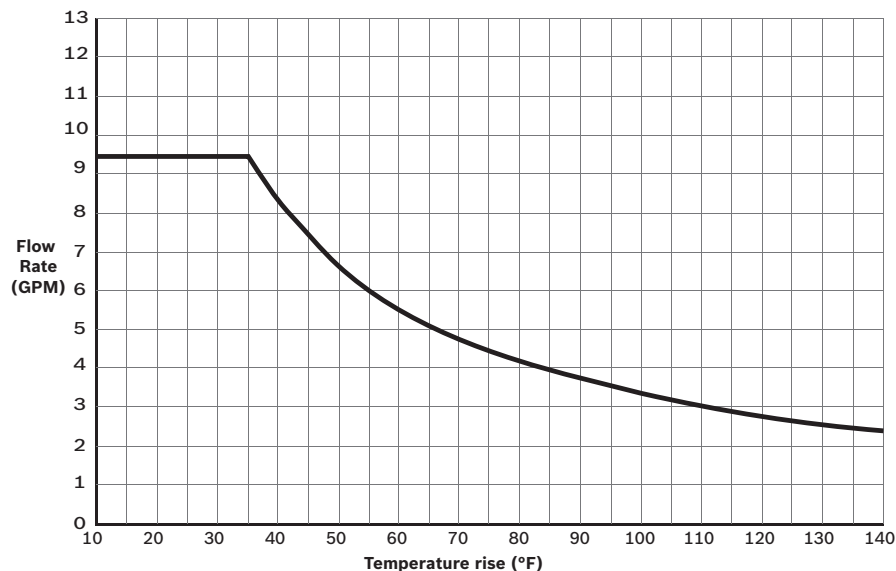
Clearances

The diagram illustrates the required clearances for the tankless water heater installation. It shows the unit mounted on a wall with various clearances labeled A through G. A is the clearance from the front cover, B is from an opening, C is from a window, D is from an adjacent wall, E is from a gutter or eaves, F is from the ground, and G is from a gas meter or regulator.

Item	Description	Unit	Minimum clearance
A	Directly below or adjacent to an opening; operable windows, doors and any fresh air openings	Inch	≥ 12
B			
C			
D	From any adjacent wall	Inch	≥ 12
E	Below a gutter, sanitary pipework, eaves or overhang	Inch	≥ 36
F	Above ground		≥ 12
G	From a gas meter or gas regulator	Inch	≥ 36

* 24 inch clearance from front cover recommended for servicing.

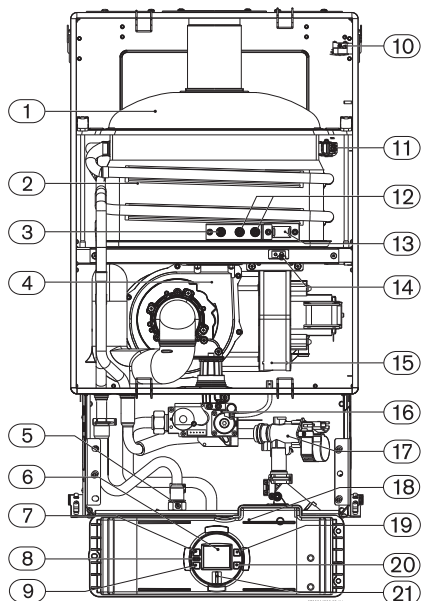
Water Heating Capacity Curve



Water Heating Capacity Data

Temperature Rise °F	Flow Rate GPM
35	9.4
45	7.3
55	6.0
65	5.1
75	4.4
90	3.7
100	3.3
120	2.8
140	2.4

Tankless Components



Components Legend

- 1 Flue gas collector
- 2 Heat exchanger
- 3 Flame sensor
- 4 Primary fan (Mixer)
- 5 Outlet temperature sensor
- 6 LCD display
- 7 On/Off button
- 8 Reset button
- 9 Program button
- 10 Flue gas limiter
- 11 Heat exchanger overheat sensor (ECO)
- 12 Ignition electrodes
- 13 Observation window
- 14 Backflow temperature sensor
- 15 Secondary air fan
- 16 Gas valve
- 17 Water valve with engine and temperature sensor
- 18 Control unit
- 19 Up button
- 20 Down button
- 21 LED