Navien Dual-Fuel Residential Heat Pump Water Heater

Product Council

November 12, 2025

Agenda

Navien – Dual Fuel Residential Heat Pump Water Heater

- November 12, 2025 Product Council
  - Welcome
  - High-level overview of efficient gas water heating
  - Navien review of new dual fuel residential heat pump water heater
  - Questions & Discussion

Navien Visit – November 12

- Product Council – 8:30am – 10am PT
  - Open to all
- Utility Lunch Meeting – Noon – 2pm PT
  - Let us know if you want to attend either in person or online.

Introduction to gas and dual fuel heat pump water heaters

Gas Heat Pump Water Heaters – UEF 1.0 – 1.4 (~150-600W)

ANESI®

HeatAmp

VICOT

ROBUR®

Efficient Gas Water Heaters – UEF 0.9, (~100 watts)

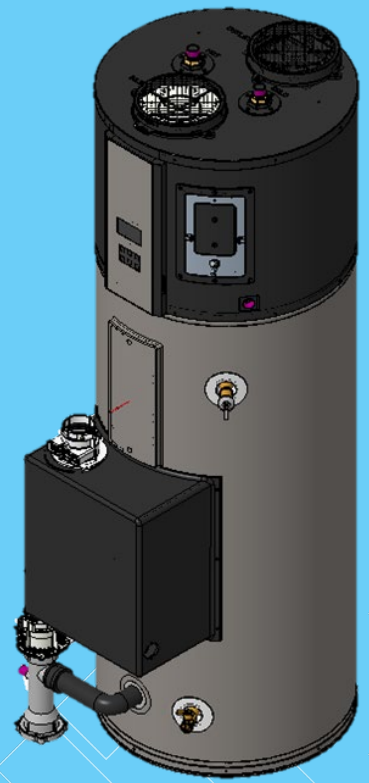
Stone Mountain Technologies (SMTI)

Anesi Gas Adsorpotion Heat Pump Specifications

Gas Input:	54,500 BTU/hr
Electric Input (120V, 15A)	Max : 690W Actual : 150-500W
Hydronic Flow:	8.5 gpm (nom.)
Heating Capacity:	78,000 BTU
CoP:	Rated : 1.43 Actual : 1.0 – 1.5
Configuration	Split system Variable speed
Refrigerant	Ammonia (R717) / Water
Size:	48” x 34” x 45” 550 lbs

Navien

Dual Fuel Hybrid Water Heater Specifications

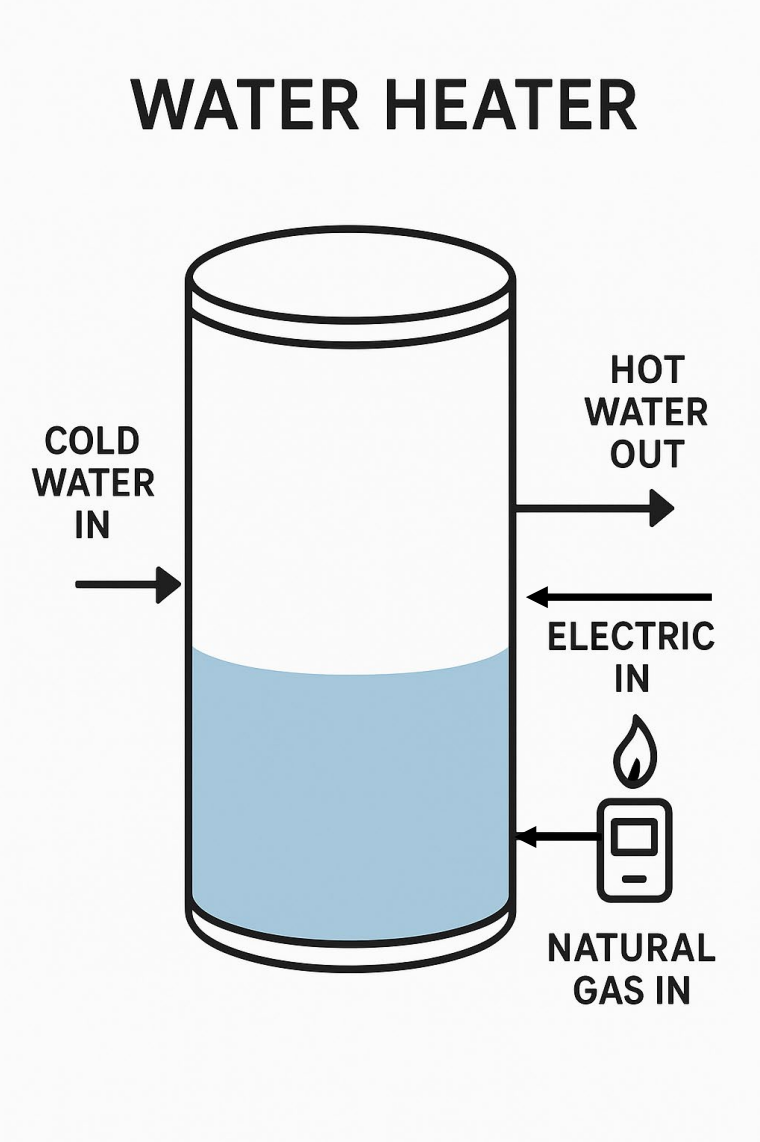


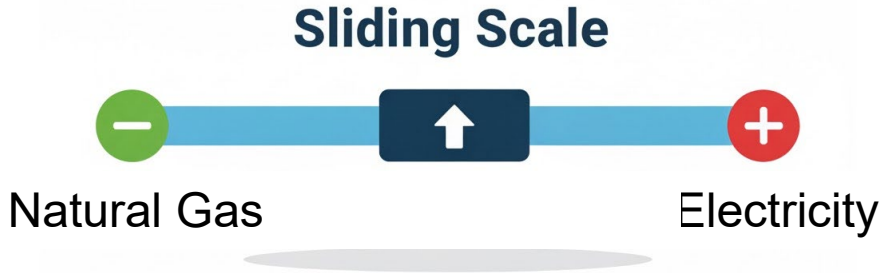
Tank Size	50 Gal	50 Gal
Gas Input	40 kBTU/hr	60 kBTU/hr
Electric Input (120V,15amp)	~400 Watts	~400 Watts
Electric Resistance	No	No
FHR	84 Gal	100 Gal
UEF	~3.5 (0.9 Gas, 3.9 Electric)	~3.5 (0.9 Gas, 3.9 Electric)
Size	21.7” x 63”	21.7” x 63”

Natural Gas Water Heater Summary Comparison

Product	*Navien* Dual Fuel	*Anesi* Gas Heat Pump	Typical High Efficiency Gas Water Heater	Typical Gas Water Heater
Type and Use	Dual-Fuel Water Heating	Gas Driven Heat Pump Space and Water	Gas Burner w/ extra heat exchanger and forced exhaust	Gas Burner Water Heating
Gas Input	40 kBTU/hr, 60 kBTU/hr	54.5 kBTU/hr	50kBTU/hr	40 kBTU/hr
Electric Input	~400 Watts	150-500 Watts	100 Watts	n/a
Efficiency	~3.50 (UEF)	1.43 (CoP)	0.90 UEF	0.64 (Federal Minimum)
Refrigerant	R-134a	R717	n/a	n/a

Dual Fuel Wherever you Look





Navien – Dual Fuel Hybrid Water Heater Products Introduction

2025.11.

Navien R&D

경동원 경동나비엔 경동에버런 경동폴리움 경동티에스

혁신의 50 50 확신의

Navien Product Offerings

Dual Fuel Hybrid Water Heater – Componets

※ This is a 120V plug-in type product.

Low Noise Fan

- Sirocco Fan (Low RPM & √120V 60Hz)
- Air Flow Direction → Upper Side

  ※ Due to the upward airflow direction, air noise is reduced.

Low Noise Compressor

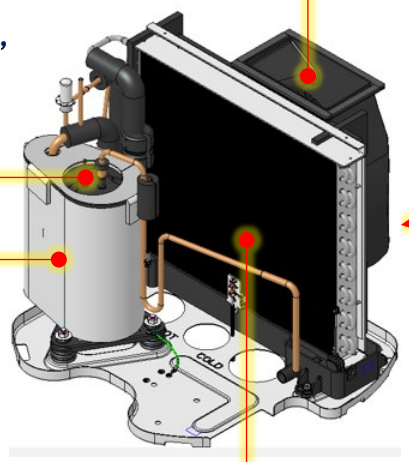
- Rotary Compressor
- √120V 60Hz

Sound Jacket

- Better Quality Sound Jacket

Durable (Ant Nest Corrosion Prevention)

- AL Coil & Fin Heat Exchanger

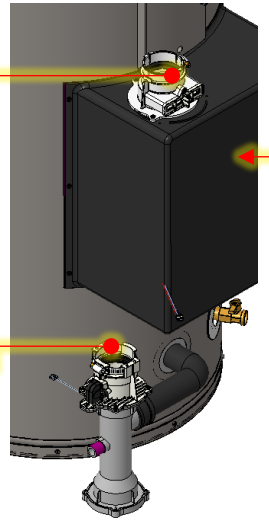


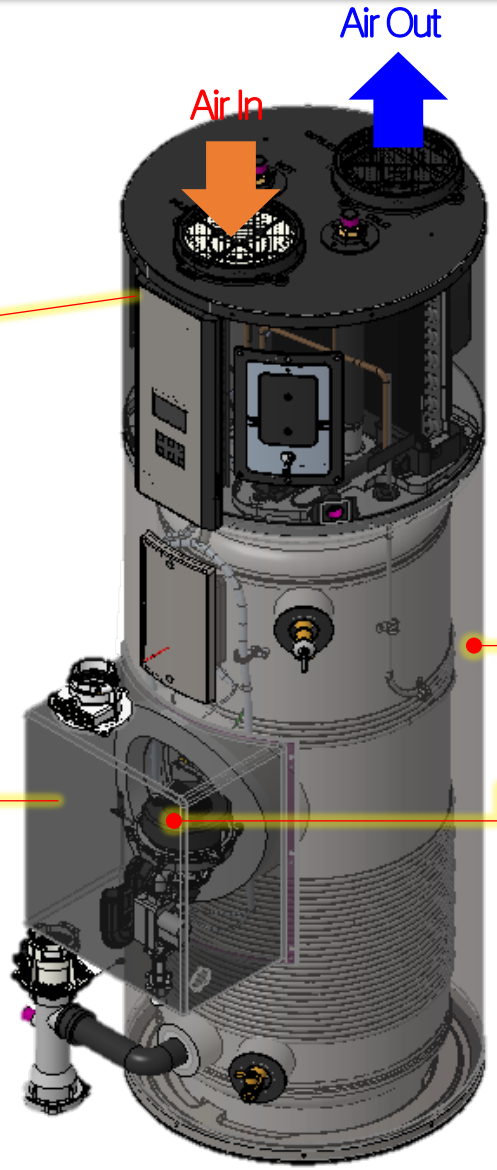
Intake Air Duct

- Direct Venting

Exhaust Duct & Condensate Trap

- Apply Vent Installation Detector (VID)
- Direct Venting

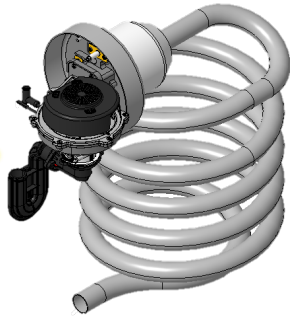




Hygienic, Durable

- Material : Stainless steel

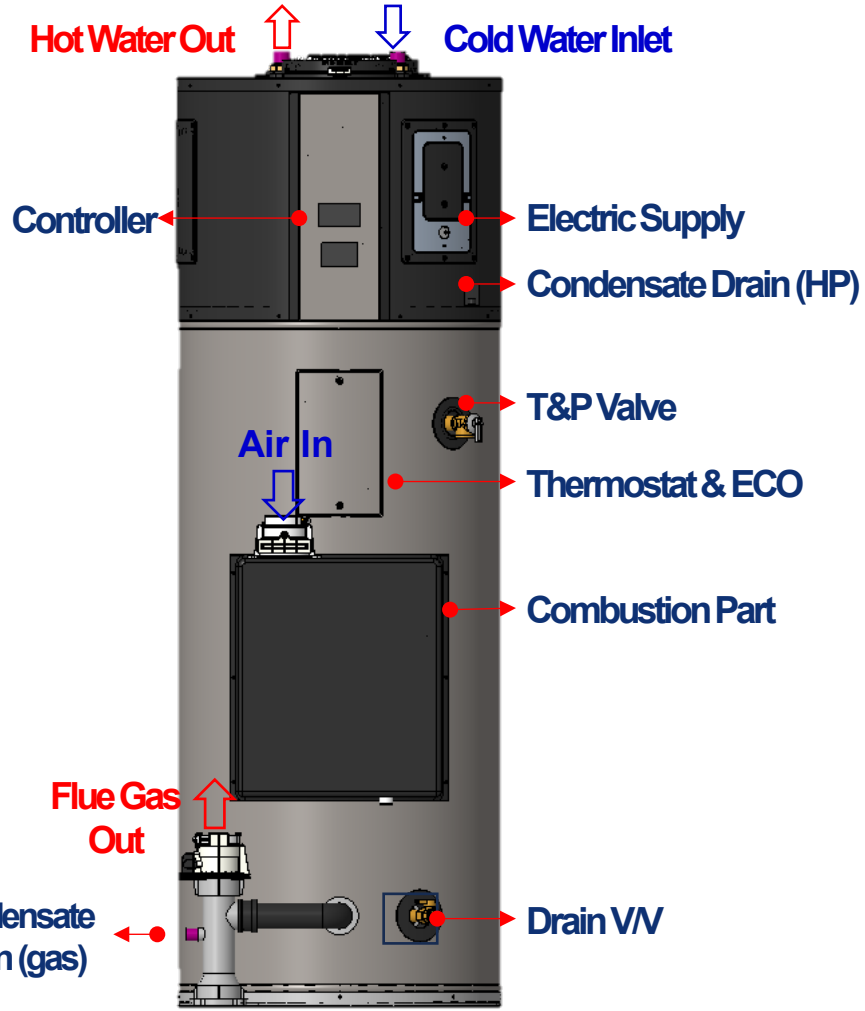
  ※ Excellent corrosion resistance and hygiene.
- Anode, Enamel Coating : Not Required
- Lighter than SPCC (Steel)

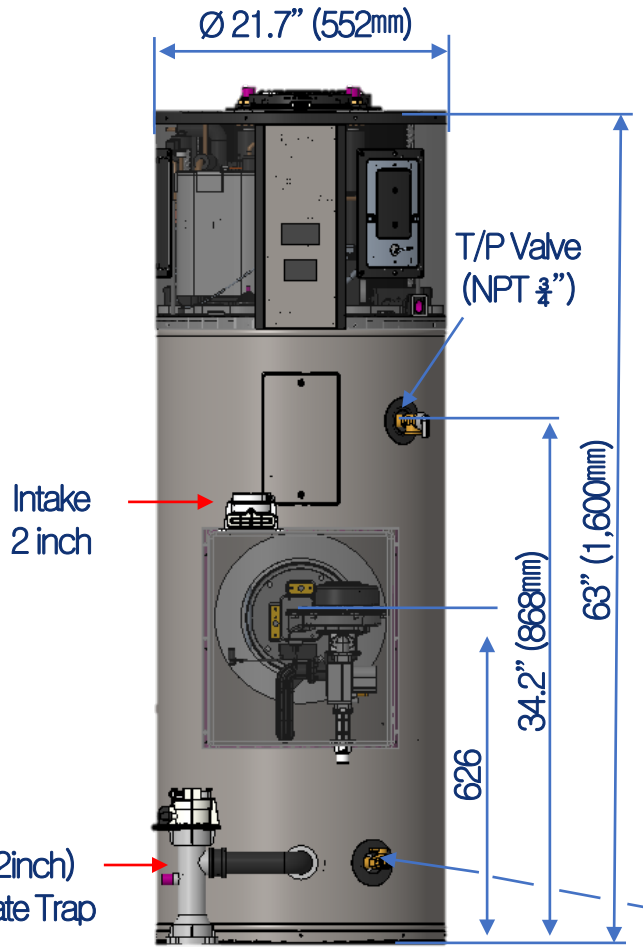


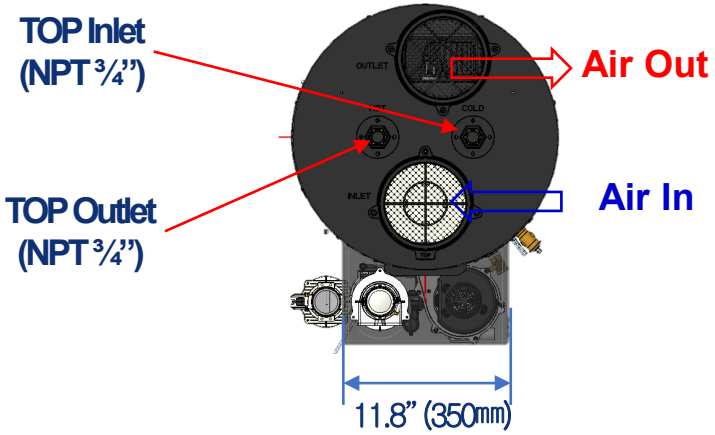
Premix Gas Combustion & High efficiency Condensing Heat Exchanger

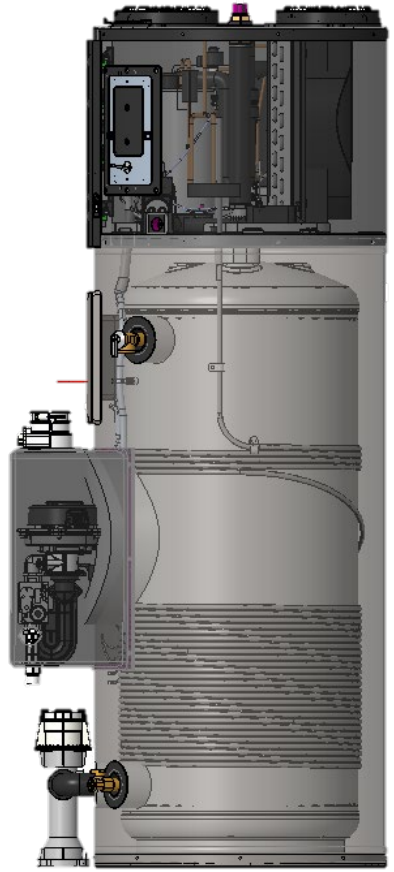
- Max 40k, 60k Btu/h with heat modulation
- √120V 60Hz Combustion Fan Motor

Dual Fuel Hybrid Water Heater – Layout









Dual Fuel Hybrid Water Heater – Specification

Nominal Volume	50gal	Gas Capacity	40,000 Btu/h 60,000 Btu/h
Type of Gas	Natural Gas	Manifold Pressure	40K : 0.02inch±0.01inch 60K : 0.04inch±0.01inch
Min. Inlet Gas Pressure	3.5”	Max. Inlet Gas Pressure	10.5”
Max. Water Pressure	150PSI	T&P Valve	150PSI, 210°F
Elctrical Rating	Volts 120 Hertz 60 Phase 1 ※ Plug - In		
Compressor	3.5A	Fan Motor	0.22A
Min Supply Circuit Ampacity	10A	Max. Fuse or Circuit BRK Size	15A
Refrigerant	R-134a	Refrigerant Factory Charge	800g

■ Heat Pump Operation Range

- Ambient 37°F(2.8°C) ~ 113°F(45°C) / - Water 50°F(10°C) ~ 149°F(65°C)

Dual Fuel Hybrid Water Heater – Performance

Type	Gas Storage			HPWH						Dual Fuel Hybrid HPWH	
	ATMO	Power vent	Condensing	240V			120V, Plug-in				
Company	A		R	R						120V, Plug-in & Condensing	
Image											
Capacity [Gal.]	**40**	40	40	40	**50**	**65**	80	50	**65**	**80**	**50**	
Input	40 kBtu/h	40 kBtu/h	50 kBtu/h		240V / Heater 4.5kW×2ea.			120V / No Heater			**40 kBtu/h**	**60 kBtu/h**
FHR [Gal.]	**70**	74	**88**	60	**67**	**75**	87	55	**63**	**84**	84	100
Recovery @90°F rise gallon per hour	**42**	45.2	**64**	26	**26**	**26**	26	12	**12**	**12**	50	74
UEF	0.64	0.68	**0.9**	3.83	3.88	4.05	4.07	3	3.3	3.5	**More Than 3.90**	
Size [mm]	**Φ508×1,626**	Φ559×1,260	Φ552×1,384	Φ514×1,582	**Φ565×1,568**	**Φ616×1,630**	Φ616×1,884	Φ565×1,575	**Φ616×1,651**	**Φ616×1,905**	Φ552 × 1,600	

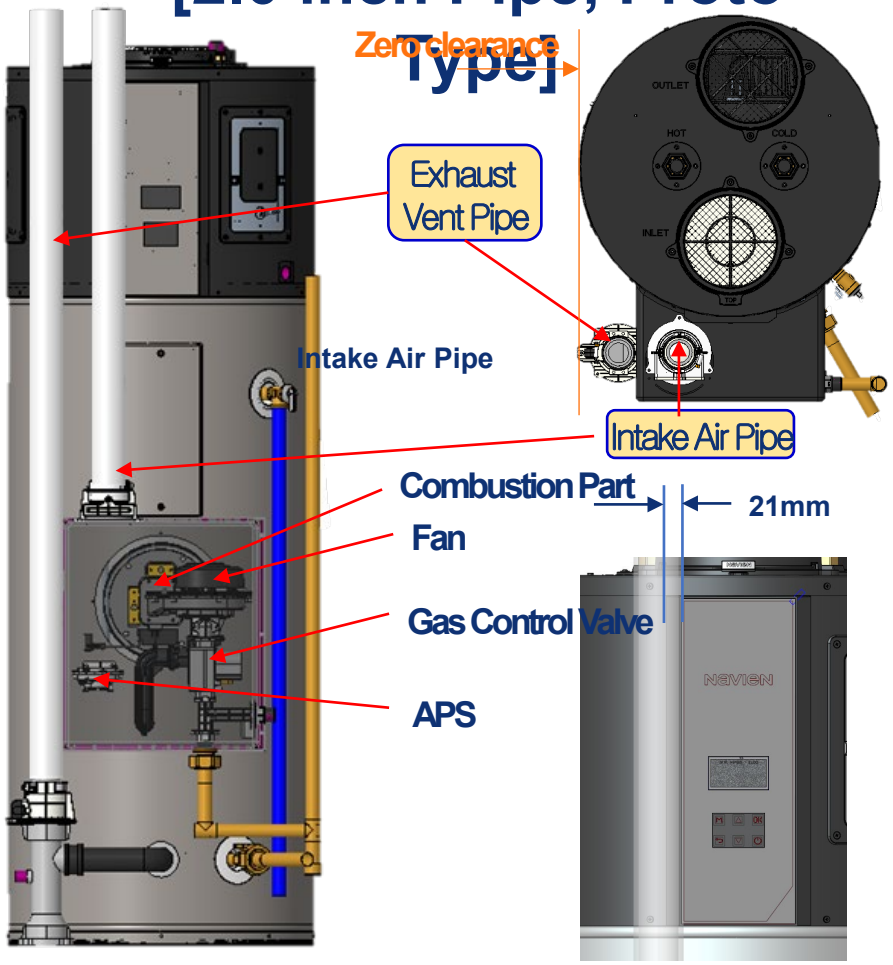
- For equivalent FHR as a 40-Gal gas water heater, a 240V 50-or 65-Gal HPWH is needed

- For a 120V Plug-In, a 80-Gal HPWH is needed

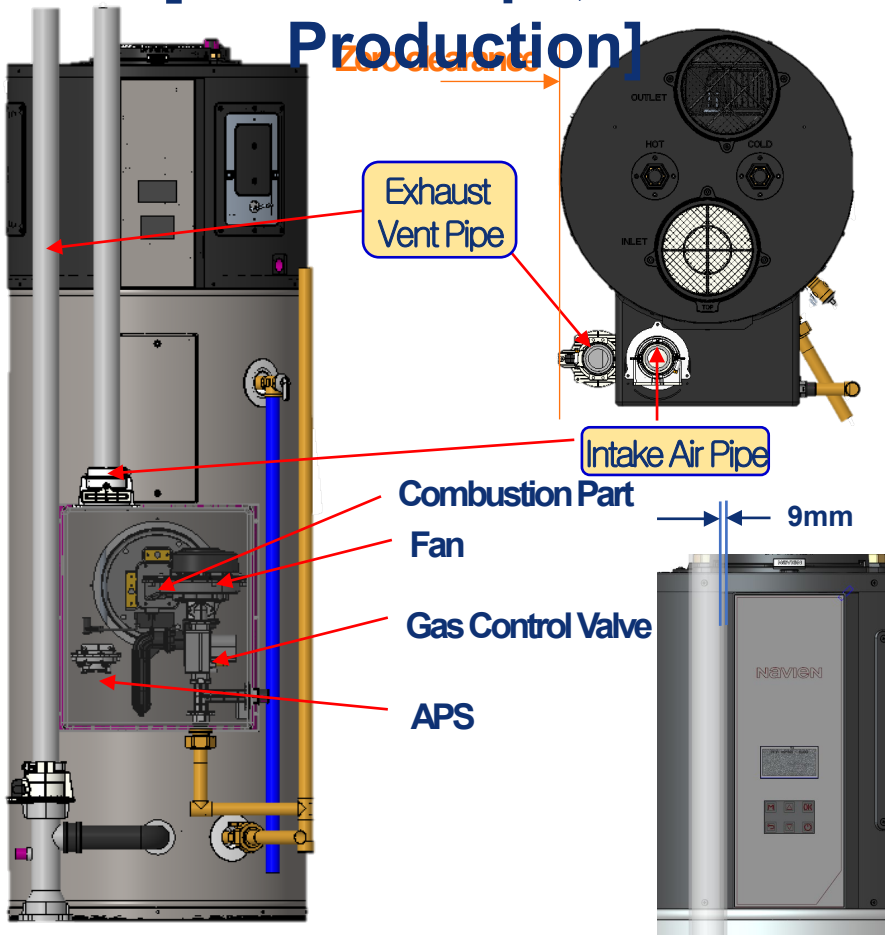
※ No panel up grade / Short Recovery Time / High UEF Efficiency /Installation space equivalent to gas storage products

Dual Fuel Hybrid Water Heater – Zero Clearance Design

[2.0 inch Pipe, Proto Type]



[1.5 inch Pipe, Mass Production]



- Front-access installation available for gas piping, drain piping, and intake/exhaust pipes.
- Gas piping is configurable for left or right-side installation based on site conditions.

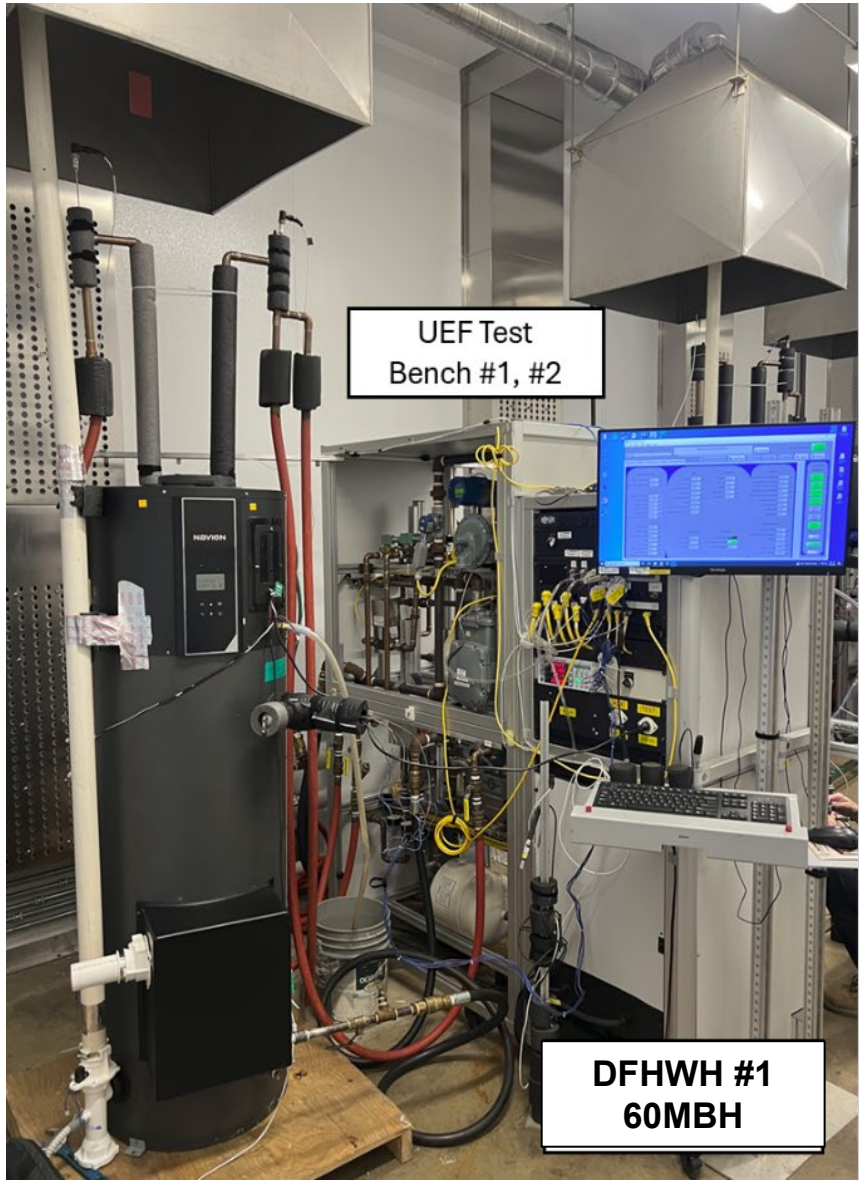
Dual Fuel Hybrid Water Heater – CSA Test

Laboratory : CSA Cleveland
Test Room : Environmental Chamber & LNG
Test Sample : DFHWH 40MBH & 60MBH
Test Condition :

Test Condition	
Ambient	67.5°F ± 1°F
Win	58°F ± 2°F

Test List :

	40MBH	60MBH
FHR	O	O
UEF (HP)	O	O
UEF (gas)	O	O



Dual Fuel Hybrid Water Heater – Test Report [FRH]

40MBH FHR : 82.9gallon

Header Information			
Manufacturer:	Navien	Date Tested:	2025-11-03
Model Number:	Sample 1	Date Sample Rec.:	
Serial Number:	N/A	Test Station #:	Cleveland - 2
Test Procedure:	DOE UEF 1st Hour (Storage)	Heating Medium:	Nat/LP gas
Test Procedure(s):	- 10 CFR Part 430 Subpart B Appendix E (all Water Heaters) - CAN/CSA P.3-15 (Gas and Oil Water Heaters)		
Software Version	3.37.0827.25	Operator:	Ashley Cocita
Data File Name:	UEFFHRgasST_2-Navien0002-2804.csv		
Report File Name:	40MBH FHR 82.9.xlsx		
AHRI Reference Number:		AHRI Test Number:	
Report Version:	9.10.2025		

First Hour Test Data Inputs

Was the final draw already initiated at 1hr? No — Measured Input [MBtu/h]: — *(gas only)*

Draw (include all draws)	1	2	3	4	5	6
Draw duration [mm:ss]	0:13:32	0:13:42	0:00:29			
Volume Drawn (gal.):	41.18	41.69	1.58			
Min Flow Rate [GPM]	2.97	2.98	2.97			
Max Flow Rate [GPM]	3.06	3.06	3.00			
Inlet water temperature min. (°F):	57.96	57.94	58.08			
Inlet water temperature max. (°F):	58.14	58.29	58.11			
Inlet water temperature avg (°F)	58.05	58.05	58.10			
Cut Off Temperature [°F]	106.56	105.94	105.94			
T^*_{max} outlet [°F]	121.72	121.27	96.92			
Temperature drop in outlet[°F]	15.16	15.33	-9.03			
Average T^*_{del} [°F]	120.13	119.53	93.17			
Density, ρ [lbs/gallon]	8.25	8.25	8.30			
Mass of the water removed[lbs]	339.73	343.99	13.11			

Draws completed, n	3	*include last draw*	
Partial Credit Given	No	Percent water withdrawn[%]	71.34
Avg Ambient Temp[°F]	68.58	Average R.H.[%]	48.74

$$F_{hr} = \sum_{i=1}^{n-1} V_i + \frac{V_n(\overline{T}_{del,\,n} - T_{min,\,n-1})}{(\overline{T}_{del,\,n-1} - T_{min,\,n-1})}$$

1st-Hr Rating, F_{hr}	82.9	gallons
Draw Pattern:	High Usage	

CSA GROUP

60MBH FHR : 99.7gallon

Header Information			
Manufacturer:	Navien	Date Tested:	2025-11-03
Model Number:	Sample 2	Date Sample Rec.:	
Serial Number:	N/A	Test Station #:	Cleveland - 1
Test Procedure:	DOE UEF 1st Hour (Storage)	Heating Medium:	Nat/LP gas
Test Procedure(s):	- 10 CFR Part 430 Subpart B Appendix E (all Water Heaters) - CAN/CSA P.3-15 (Gas and Oil Water Heaters)		
Software Version	3.37.0827.25	Operator:	Ashley Cocita
Data File Name:	UEFFHRgasST_1-Navien0001-2819.csv		
Report File Name:	60MBH FHR 99.7.xlsx		
AHRI Reference Number:		AHRI Test Number:	
Report Version:	9.10.2025		

First Hour Test Data Inputs

Was the final draw already initiated at 1hr? Yes — Measured Input [MBtu/h]: — *(gas only)*

Draw (include all draws)	1	2	3	4	5	6
Draw duration [mm:ss]	0:13:06	0:09:59	0:09:53			
Volume Drawn (gal.):	39.69	30.05	29.91			
Min Flow Rate [GPM]	2.92	2.95	2.96			
Max Flow Rate [GPM]	3.04	3.02	3.04			
Inlet water temperature min. (°F):	57.45	57.43	57.52			
Inlet water temperature max. (°F):	57.68	58.10	58.22			
Inlet water temperature avg (°F)	57.57	57.57	57.66			
Cut Off Temperature [°F]	108.87	107.61	107.28			
T^*_{max} outlet [°F]	123.91	122.85	122.35			
Temperature drop in outlet[°F]	15.05	15.24	15.07			
Average T^*_{del} [°F]	120.90	121.02	120.45			
Density, ρ [lbs/gallon]	8.25	8.25	8.25			
Mass of the water removed[lbs]	327.37	247.85	246.73			

Draws completed, n	3	*include last draw*	
Partial Credit Given	N/A	Percent water withdrawn[%]	64.47
Avg Ambient Temp[°F]	67.72	Average R.H.[%]	50.71

$$F_{hr} = \sum_{i=1}^{n-1} V_i + \frac{V_n(\overline{T}_{del,\,n} - T_{min,\,n-1})}{(\overline{T}_{del,\,n-1} - T_{min,\,n-1})}$$

1st-Hr Rating, F_{hr}	99.7	gallons
Draw Pattern:	High Usage	

CSA GROUP

Dual Fuel Hybrid Water Heater – Test Report [UEF – HP mode]

40MBH UEF : 3.82 (Recovery Efficiency : 4.25)

Header Information			
Manufacturer:	Navien	Date Tested:	2025-11-05
Model Number:	Sample 1 (40k)	Date Sample Rec.:	2025-10-31
Serial Number:	N/A	Test Station #:	Cleveland - 2
Test:	DOE UEF 24h (Storage)	Heating Medium:	Heat Pump with Tank
Test Procedure(s):	- 10 CFR Part 430 Subpart B Appendix E (all Water Heaters) - CAN/CSA P.3-15 (Gas and Oil Water Heaters)		
Software Version	3.37.0827.25	Operator:	Ashley Cocita
Data File Name:	UEFSIMgasST_2-Navien0002-2810.csv		
Report File Name:	40k HP only UEF - UEFSIMgasST_2-Navien0002-2810_Report.xlsx		
Material number	40185139	Project Number:	80273494 (sample 1 of 2)
Report Version:	9.10.2025		

6.3.1 Storage Tank Capacity		
Measured Storage Volume, V_{st}	47.00	gall.
6.3.2 Recovery Efficiency		
Draw # that the first recovery period ended, **frp**	4	
Mean tank temperature at the start of the 24hr test, **T_0**	118.61	°F
Max Mean Tank Temp after Cut-out following 1st recovery period, **$T_{max,1}$**	119.28	°F
Density of stored hot water, **rho_2**	8.25	lbs/gall.
Specific heat of stored water, **C_{p_2}**	0.9987	Btu/lb·°F
Total Energy Used from the start of the 24hr test and following first recovery period, **Q_r**	4547	Btu
Mass removed during the first recovery period, **M_{1_sum}**	321.24	lbs
Specific Heat of withdrawn water during the first recovery period, **CP1_avg**	0.9988	Btu/lb·°F
average water outlet temperature from the start of the 24hr test to the end of the first recovery period, **Tdel_1avg**	117.50	°F
average water inlet temperature from the start of the 24hr test to the end of the first recovery period, **Tin_1avg**	58.06	°F
Recovery Efficiency, **η_r**	4.25	
6.3.5 Adjusted Daily Water Heater Consumption		
Energy used to heat the water, **Qhw**	9790	Btu/day
6.3.6 Uniform Energy Factor		
Actual Uniform Energy Factor, **UEF**	3.820	

60MBH UEF : 3.82 (Recovery Efficiency : 4.15)

Header Information			
Manufacturer:	Navien	Date Tested:	2025-11-03
Model Number:	Sample 2	Date Sample Rec.:	
Serial Number:	N/A	Test Station #:	Cleveland - 1
Test:	DOE UEF 24h (Storage)	Heating Medium:	Heat Pump
Test Procedure(s):	- 10 CFR Part 430 Subpart B Appendix E (all Water Heaters) - CAN/CSA P.3-15 (Gas and Oil Water Heaters)		
Software Version	3.37.0827.25	Operator:	Ashley Cocita
Data File Name:	UEFSIMelecST_1-Navien0001-2823.csv		
Report File Name:	60MBH E-Saver UEF 3.82.xlsx		
AHRI Reference Number:		AHRI Test Number:	
Report Version:	9.10.2025		

6.3.1 Storage Tank Capacity		
Measured Storage Volume, Vst	46.50	gall.
6.3.2 Recovery Efficiency		
Draw # that the first recovery period ended, frp	4	
Mean tank temperature at the start of the 24hr test, T_0	117.95	°F
Max Mean Tank Temp after Cut-out following 1st recovery period, Tmax,1	119.47	°F
Density of stored hot water, rho_2	8.25	lbs/gall.
Specific heat of stored water, Cp_2	0.9987	Btu/lb·°F
Total Energy Used from the start of the 24hr test and following first recovery period, Qr	4677	Btu
Mass removed during the first recovery period, M1_sum	320.91	lbs
Specific Heat of withdrawn water during the first recovery period, CP1_avg	0.9987	Btu/lb·°F
average water outlet temperature from the start of the 24hr test to the end of the first recovery period, Tdel_1avg	116.49	°F
average water inlet temperature from the start of the 24hr test to the end of the first recovery period, Tin_1avg	57.73	°F
Recovery Efficiency, ηr	4.15	
6.3.5 Adjusted Daily Water Heater Consumption		
Energy used to heat the water, Qhw	10041	Btu/day
6.3.6 Uniform Energy Factor		
Actual Uniform Energy Factor, UEF	3.820	

Dual Fuel Hybrid Water Heater – Test Report [UEF – gas mode]

40MBH UEF : 0.888 (Recovery Efficiency : 0.94)

Header Information			
Manufacturer:	Navien	Date Tested:	2025-11-03
Model Number:	Sample 1	Date Sample Rec.:	
Serial Number:	N/A	Test Station #:	Cleveland - 2
Test:	DOE UEF 24h (Storage)	Heating Medium:	Nat/LP gas
Test Procedure(s):	- 10 CFR Part 430 Subpart B Appendix E (all Water Heaters) - CAN/CSA P.3-15 (Gas and Oil Water Heaters)		
Software Version	3.37.0827.25	Operator:	Ashley Cocita
Data File Name:	UEFSIMgasST_2-Navien0002-2806.csv		
Report File Name:	40MBH Gas Only UEF 0.888.xlsx		
AHRI Reference Number:		AHRI Test Number:	
Report Version:	9.10.2025		

6.3.1 Storage Tank Capacity		
Measured Storage Volume, V_{st}	47.00	gall.

6.3.2 Recovery Efficiency		
Draw # that the first recovery period ended, **frp**	3	
Mean tank temperature at the start of the 24hr test, $T_{\_0}$	120.00	°F
Max Mean Tank Temp after Cut-out following 1st recovery period, $T_{max,1}$	118.20	°F
Density of stored hot water, **rho_2**	8.25	lbs/gall.
Specific heat of stored water, C_{p_2}	0.9987	Btu/lb·°F
Total Energy Used from the start of the 24hr test and following first recovery period, Q_r	15452	Btu
Mass removed during the first recovery period, $M_{1\ sum}$	246.96	lbs
Specific Heat of withdrawn water during the first recovery period, **CP1_avg**	0.9987	Btu/lb·°F
average water outlet temperature from the start of the 24hr test to the end of the first recovery period, **Tdel_1avg**	119.60	°F
average water inlet temperature from the start of the 24hr test to the end of the first recovery period, **Tin_1avg**	58.10	°F

$$\eta_r = \left(\frac{M_1 C_{p1}\left(\overline{T}_{del,1} - \overline{T}_{in,1}\right)}{Q_r}\right) + \left(\frac{V_{st}\rho_2 C_{p2}\left(\overline{T}_{max,1} - \overline{T}_0\right)}{Q_r}\right)$$

Recovery Efficiency, η_r	0.94	

6.3.4 Daily Water Heating Energy Consumption		
The daily water heating energy consumption, **Qd**	48453	Btu

6.3.6 Uniform Energy Factor		
Actual Uniform Energy Factor, **UEF**	0.888	

Draw Pattern: High-Usage

60MBH UEF : 0.929 (Recovery Efficiency : 1.02)

Header Information			
Manufacturer:	Navien	Date Tested:	2025-11-04
Model Number:	Sample 2	Date Sample Rec.:	
Serial Number:	N/A	Test Station #:	Cleveland - 1
Test:	DOE UEF 24h (Storage)	Heating Medium:	Nat/LP gas
Test Procedure(s):	- 10 CFR Part 430 Subpart B Appendix E (all Water Heaters) - CAN/CSA P.3-15 (Gas and Oil Water Heaters)		
Software Version	3.37.0827.25	Operator:	Ashley Cocita
Data File Name:	UEFSIMgasST_1-Navien0001-2824.csv		
Report File Name:	60MBH Gas Only UEF 0.929.xlsx		
AHRI Reference Number:		AHRI Test Number:	
Report Version:	9.10.2025		

6.3.1 Storage Tank Capacity		
Measured Storage Volume, V_{st}	46.50	gall.

6.3.2 Recovery Efficiency		
Draw # that the first recovery period ended, **frp**	1	
Mean tank temperature at the start of the 24hr test, $T_{\_0}$	105.66	°F
Max Mean Tank Temp after Cut-out following 1st recovery period, $T_{max,1}$	108.71	°F
Density of stored hot water, **rho_2**	8.27	lbs/gall.
Specific heat of stored water, C_{p_2}	0.9985	Btu/lb·°F
Total Energy Used from the start of the 24hr test and following first recovery period, Q_r	14771	Btu
Mass removed during the first recovery period, $M_{1\ sum}$	222.26	lbs
Specific Heat of withdrawn water during the first recovery period, **CP1_avg**	0.9987	Btu/lb·°F
average water outlet temperature from the start of the 24hr test to the end of the first recovery period, **Tdel_1avg**	119.96	°F
average water inlet temperature from the start of the 24hr test to the end of the first recovery period, **Tin_1avg**	57.57	°F

$$\eta_r = \left(\frac{M_1 C_{p1}\left(\overline{T}_{del,1} - \overline{T}_{in,1}\right)}{Q_r}\right) + \left(\frac{V_{st}\rho_2 C_{p2}\left(\overline{T}_{max,1} - \overline{T}_0\right)}{Q_r}\right)$$

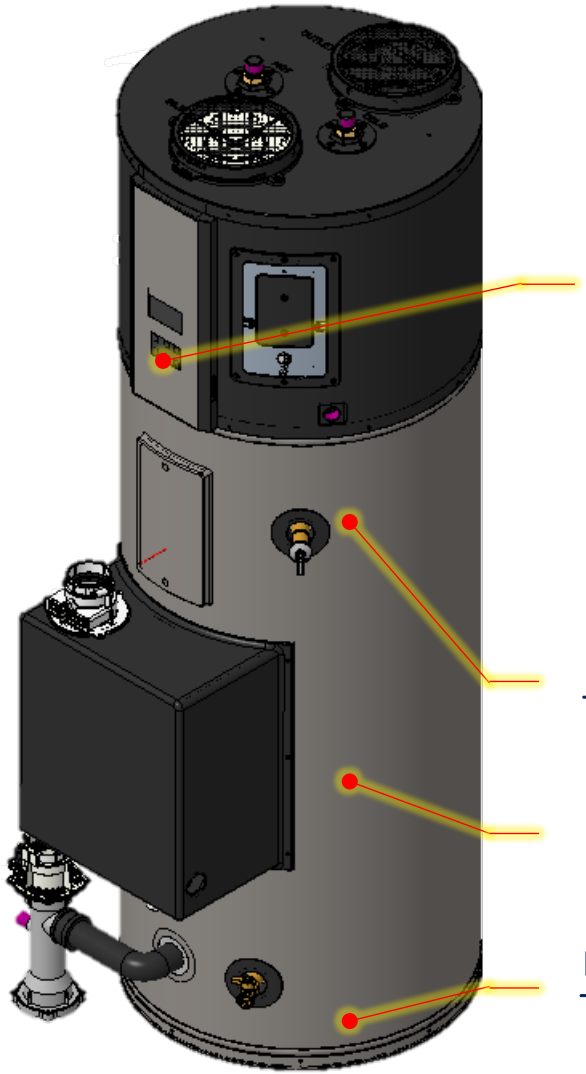
Recovery Efficiency, η_r	1.02	

6.3.5 Adjusted Daily Water Heater Consumption		
Energy used to heat the water, **Qhw**	41126	Btu/day

6.3.6 Uniform Energy Factor		
Actual Uniform Energy Factor, UEF	0.929	

Draw Pattern: High-Usage

Dual Fuel Hybrid Water Heater – Control Panel



Smart Connectivity & FOTA (Firmware over the air)

- Built-in Wi-Fi powered by NaviLink® for remote monitoring & control
- Always maintain New Software up to date via FOTA automatically.

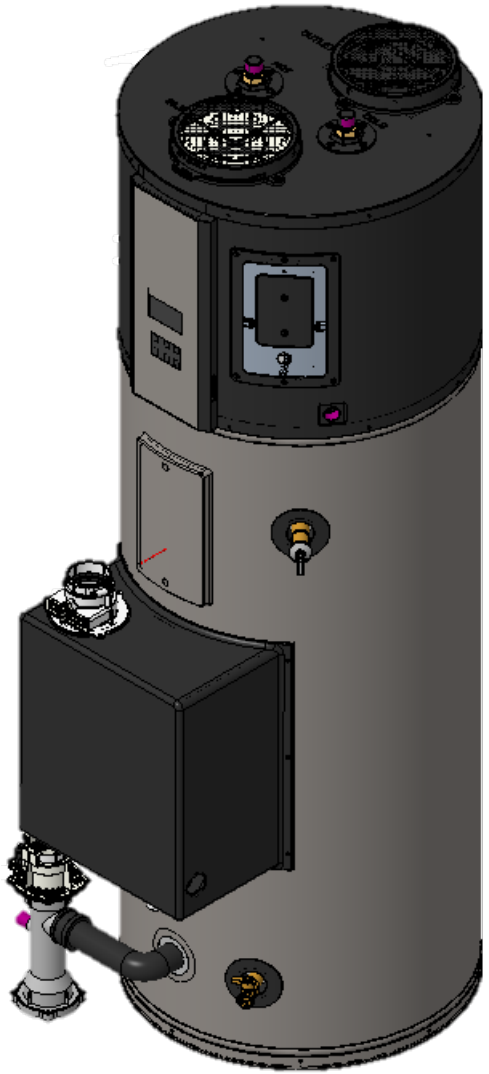
Easy-to-use LED display

- User-friendly control panel for adjusting temperature & settings

Smart Load Sensing (for ultimate efficiency & performance)

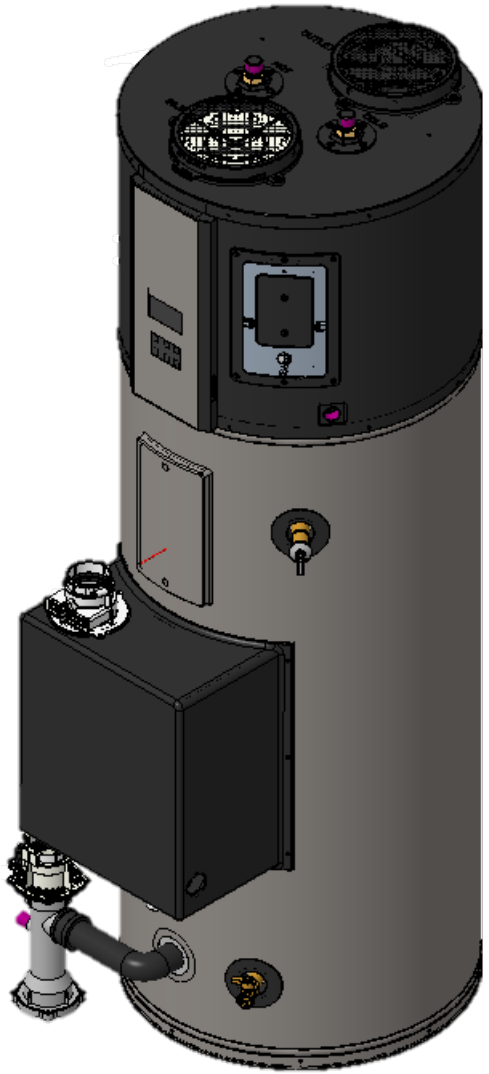
- Calculates hot water load using an additional temperature sensor.
- When high demand is detected, the gas burner is promptly activated to boost First Hour Rating (FHR).
- When demand is low, only the heat pump operates to maximize Uniform Energy Factor (UEF).
- Patent Application in Progress

Dual Fuel Hybrid Water Heater – Functional Key Features (1/2)



Major	Minor	Description	
Operation Mode	Heat Pump	• Maximizes energy savings by **using only the heat pump**. Best for efficiency, but with a longer recovery time (depending on ambient temperature).	
	Gas	• **Uses only gas** for the fastest recovery time.	
	E-Saver	• The default mode, balancing efficiency and performance by using the **heat pump as the primary heat source with gas backup for faster recovery**.	HP & Gas Simultaneous operation
	Hi-Dem	• **Prioritizes faster hot water recovery** by more actively using the gas alongside the heat pump.	
	Cost Saver	• **Switches between heat pump and gas** at the balance point where real-time energy **cost is minimized**. • This mode is associated with the **'TOU' feature**.	HP & Gas Switching operation

Dual Fuel Hybrid Water Heater – Functional Key Features (2/2)



Major	Minor	Description
Primary Feature	Anti-Legionella	• The Anti-Legionella function periodically heats water to eliminate Legionella bacteria and ensure hygienic operation, a feature common in Europe.
	Demand Response	• DFHWH switches to gas mode during demand response events, turning off the heat pump to eliminate electricity use while ensuring continuous hot water supply.
	Intelligent Tank Heating	• Navien DFHWH uses an intelligent algorithm to learn hot water usage patterns and reduce energy consumption.
	Recirculation	• Navien DFHWH with Recirculation Pump Kit automatically switches to recirculation mode, reducing energy consumption while ensuring continuous hot water supply.

Questions?

Thank You!

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