

Fig. 1 GFX-STAR™ system enhances heat recovery of GFX system covered by U.S. Patent #4,619,311.

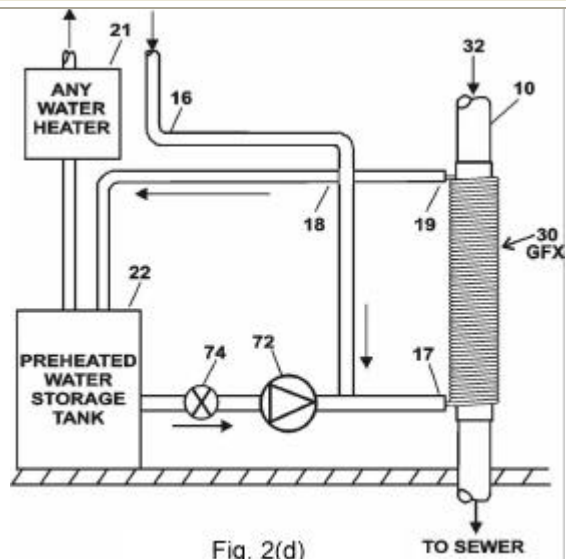


Fig. 2(d)

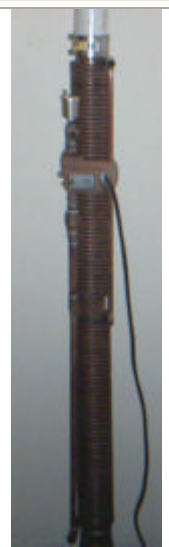


Fig. 3  
GFX-STAR™  
Model  
GS-S3-60-  
008

GFX-STAR™ system for use in homes with a tank type water heater that has too little storage capacity, is located too far from the GFX, or uses a tankless, solar, point-of-use, heat pump, indirect, geothermal, or some other type of water heating system.



Top of Model  
GS-G4-52-006

“Delta-T” controller energizes pump when recoverable energy enters drain inlet. (GFX: Model G3-52-4, a 52” long, 4-coil special evaluated in Duluth, MN Triplex by ORNL; Pump: TACO Model 006-B4-4; Controller: Thermomax Model USDT 2005.

Fig. 4

Fig. 5

Fig. 4 Close-up of Fig. 3 unit showing bronze circulating pump (Taco 008-BC6), automatic air vent (Taco Hy-Vent) & check valve on a Model S3-60 GFX.

**Pump Power**

Taco 008: 1/25 HP (97 Watts/115 VAC Full Load)

Taco 006: 1/40 HP (60 Watts/115 VAC Full Load)

**Control Options:** Manual, semi-automatic (appliance timer, wireless remote), fully automatic with differential temperature controller of Fig. 5.

**Performance w/ Model S3-60 GFX**

Pump Off & Shower On (Conventional GFX Mode)			
Coil Flow GPM	Drain Flow GPM	CDR** Ratio	DHR- Efficiency*
2¼	Equal Flow	1	57%
Pump & Shower On			
4.3	2¼	1.9	67%
Pump On, Shower Off, Bathtub Draining			
4	2	2	70%
4	4	1	47%

**Performance w/ Model S3-30 GFX**

Pump Off & Shower On			
Coil Flow GPM	Drain Flow GPM	CDR** Ratio	DHR- Efficiency*
2¼	Equal Flow	1	39%
Pump & Shower On			
6	2¼	2.7	49%
Pump On, Shower Off, Bathtub Draining			
5	2½	2	47%
5	5	1	28%

\*DHR-Efficiency = Nominal drop in wastewater temperature divided by temperature difference between drain and coil input temperatures =  $(T_{\text{Drain-In}} - T_{\text{Drain-Out}}) / (T_{\text{Drain-In}} - T_{\text{Cold}})$

\*\* CDR = Coil/Drain Flow Ratio

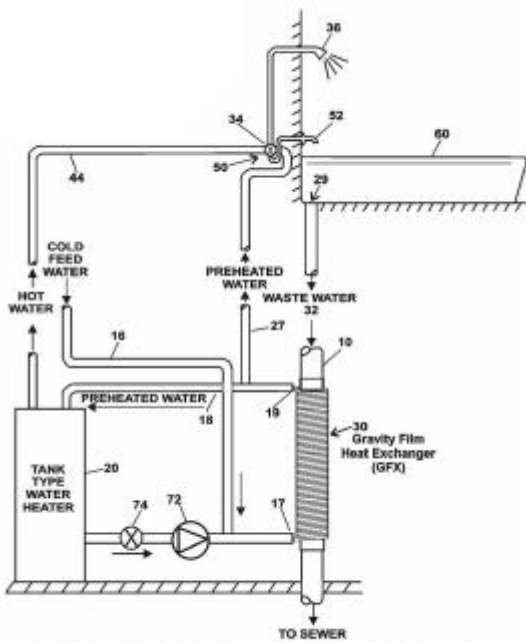


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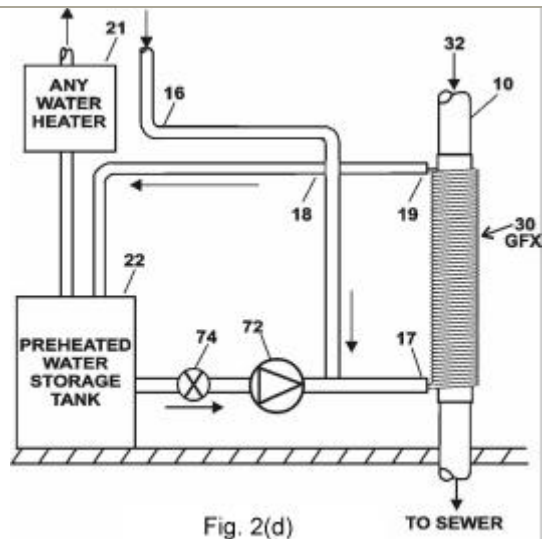


Fig. 2(d)



**GFX-STAR™  
Model  
GS-G3-60-500**

**GFX-STAR™** system for use in homes with a tank type water heater that has too little storage capacity, is located too far from the GFX, or uses a tankless, solar, point-of-use, heat pump, indirect, geothermal, or some other type of water heating system.



**G3-60 GFX & Low Power Diaphragm Pump**  
SHURflo Model 2088-594-500  
Internal Check Valve, 80 Watts @ 2.4 GPM  
(115 VAC, 0.55 to 0.9 AMPS)

**Performance**

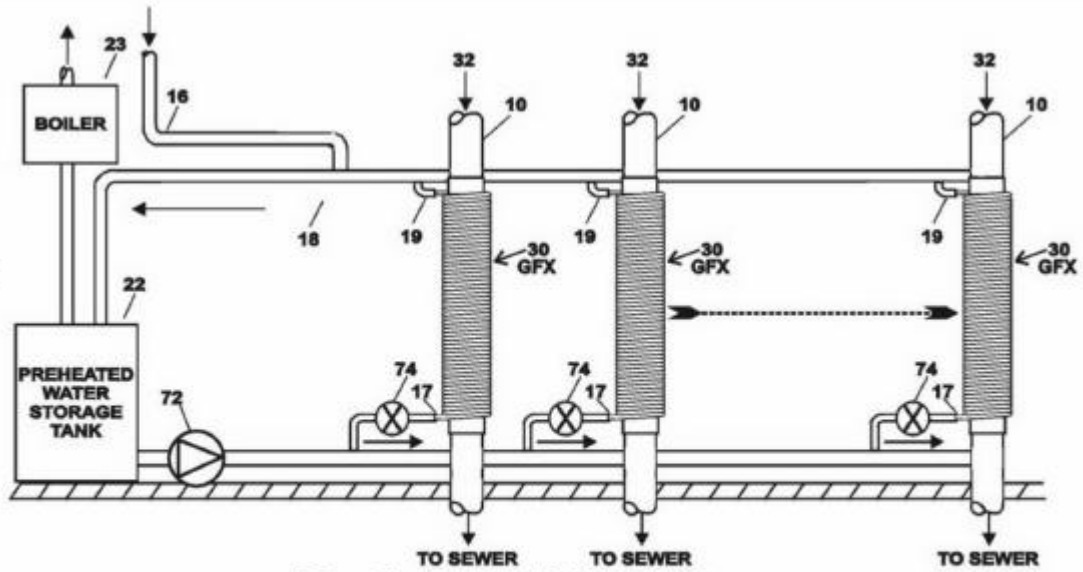
<b>Pump Off &amp; Shower On</b>			
<b>Coil Flow GPM</b>	<b>Drain Flow GPM</b>	<b>CDR** Ratio</b>	<b>Nominal DHR-Efficiency*</b>
1.13	2.25	0.5	38%
1.35	"	0.6	45%
1.58	"	0.7	50%
1.80	"	0.8	54%
2.03	"	0.9	57%
2.25	Equal Flow	1.0	60%
2.70	2.25	1.2	63%
3.15	"	1.4	67%
3.60	"	1.6	70%
4.05	"	1.8	72%
4.50	"	2.0	74%
<b>Pump &amp; Shower On</b>			
3.9	2.25	1.7	71%
<b>Pump On, Shower Off, Bathtub Draining</b>			
2.4	2.25	1.07	62%
"	3.0	.75	50%
"	4.5	.5	36%

\*DHR-Efficiency = Drop in wastewater temperature divided by difference between its entering temperature and cold water entering GFX's coil =  $(T_{\text{Drain-In}} - T_{\text{Drain-Out}}) / (T_{\text{Drain-In}} - T_{\text{Cold}})$

**G3-60 Effectiveness & DHR-Efficiency vs. Coil/Drain Flow Ratio ("CDR")\*\***

**Drain Flow = 2.25 GPM**

<b>CDR</b>	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8	2.0
<b>Effectiveness</b>	0.79	0.75	0.71	0.67	0.63	0.60	0.63	0.67	0.70	0.72	0.74
<b>DHR-Eff.</b>	38%	45%	49.7%	53.6%	56.7%	60%	63%	67%	70%	72%	74%



**Fig 2(e) of GFX-STAR  
Provisional Patent Application**

Proprietary & Trade Secret Property  
of WaterFilm Energy Inc.



Delta-T Controller



Sensors



Delta-T Controller & TACO 008



Delta-T Controller & TACO 008

## **GFX in Octagon Apartment Building**

(Roosevelt Island, NY)

The Octagon was designed to achieve a Silver LEED rating and received an award from the EPA and the DEP for leadership in applying sustainable design principles to residential development



**Fig. 1 Model G4-80-4 GFX**

One of 33 for Octagon Building<sup>1</sup>

[www.octagonnyc.com/about.asp](http://www.octagonnyc.com/about.asp)

Courtesy, Don Johnson, Becker + Becker  
Developer, Architect & Planner [www.beckerandbecker.com](http://www.beckerandbecker.com)



**Fig. 2 GFX-STAR™ Model GS-G3-52-4-006**

[www.gfxtechnology.com/GFX-STAR.pdf](http://www.gfxtechnology.com/GFX-STAR.pdf)<sup>2</sup>

Patent Pending

<sup>1</sup> The 80" long GFX of Fig. 1 will be feeding preheated water to showers and lavatories having drains connected to one of 33 4" drain stacks.

<sup>2</sup> GFX-STAR™ systems like the one shown in Figure 2 will allow increased savings in future projects by also feeding preheated water to a storage tank connected to a central water heater. The unit shown is equipped with a circulating pump controlled by a "Delta-T" controller that energizes the circulator whenever recoverable hot water energy enters a GFX's drain inlet. (GFX: Model G3-52-4, a special 52" long, 4-coil model evaluated by ORNL in a triplex in Duluth, MN (<http://gfxtechnology.com/Duluth.pdf>); Pump: TACO Model 006 Bronze; Controller: Analog temperature differential controller, Thermomax Model USDT 2005 [www.thermomax.com/Differential%20Controller.htm](http://www.thermomax.com/Differential%20Controller.htm))