

C A N A D A

PROVINCE DE QUÉBEC
DISTRICT DE MONTRÉAL

DOSSIER R-4169-2021
Phase 1 – Le secteur résidentiel

RÉGIE DE L'ÉNERGIE

MESURES D'HQD-ÉNERGIR
DE SOUTIEN À LA DÉCARBONATION
DU CHAUFFAGE DES BÂTIMENTS

HYDRO-QUÉBEC
En sa qualité de distributeur
-et-
ÉNERGIR

Demanderesse

-et-

REGROUPEMENT POUR LA TRANSITION,
L'INNOVATION ET L'EFFICACITÉ ÉNERGÉTIQUES
(RTIEÉ), un Regroupement comprenant les
organismes suivants : l'Association québécoise de
lutte contre la pollution atmosphérique (AQLPA),
Stratégies Énergétiques (S.É.), le Groupe d'Initiatives
et de Recherches Appliquées au Milieu (GIRAM) et
Énergie solaire Québec (ÉSQ)

Intervenant

EXTRAITS SUR LES RADIATEURS À ACCUMULATION

Déposé par le Regroupement pour la transition, l'innovation et l'efficacité énergétiques (RTIEÉ)

Le 25 février 2022

EXTRAITS SUR LES RADIATEURS À ACCUMULATION

WEKIWI, *Tout savoir sur le radiateur à accumulation*, 5 octobre 2021, <https://www.wekiwi.fr/post/radiateur-a-accumulation>, Extrait :

Avantages et inconvénients du radiateur à accumulation

Le radiateur à accumulation présente trois grands avantages :

- **confort thermique supérieur** à celui offert par un convecteur électrique grâce à la diffusion de chaleur par rayonnement
- diffusion de chaleur très rapide lorsque le radiateur est chargé
- économies d'énergie : il diffuse la chaleur emmagasinée même lorsqu'il est éteint

Mais il présente également certains inconvénients, qu'il est intéressant de prendre en compte au moment de faire votre choix :

- **design lourd et massif** (nécessaire pour emmagasiner la chaleur) qui ne convient pas à une installation dans toutes les pièces
- une fois la chaleur entièrement diffusée dans la pièce, l'appareil doit se recharger avant de pouvoir à nouveau la chauffer
- **prix assez élevé**
- système qui ne peut fonctionner qu'en tarification heures pleines/heures creuses.

Différence entre un radiateur à inertie électrique et un radiateur à accumulation électrique

Le radiateur à accumulation et le radiateur à inertie sont deux radiateurs électriques reposant sur le principe du stockage de la chaleur. La différence réside dans la capacité de stockage, largement supérieure dans le cas du radiateur à accumulation. **Revers de la médaille, le radiateur à accumulation est bien plus imposant que le radiateur à inertie, et il lui faut donc plus de temps pour chauffer.**


HYDRO-QUÉBEC – INSTITUT DE RECHERCHE (IREQ, Alain Moreau ing M Sc A., Chercheur, chargé de projet) et **VILLE DE QUÉBEC** (Jean Lemay, ing., Gestionnaire de l'énergie), https://www.agpi.org/documents/file/colloques/2010/p5_agpi_rdv-hydro_2007.pdf, Extraits :



Hydro Québec
Institut de recherche

VILLE DE QUÉBEC

4. Exemples d'application (version hydronique)



THERM-ELECT

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Hydro Québec
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4. Exemples d'application (version hydronique)



THERM-ELECT

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STEFFES, *ThermElect Hydronic Brochure*, May 2020, <https://www.steffes.com/wp-content/uploads/2020/05/Steffes-ThermElect-Brochure.pdf> (2 pages) :



ThermElect Hydronic


DEMAND-FREE, OFF-PEAK HEATING

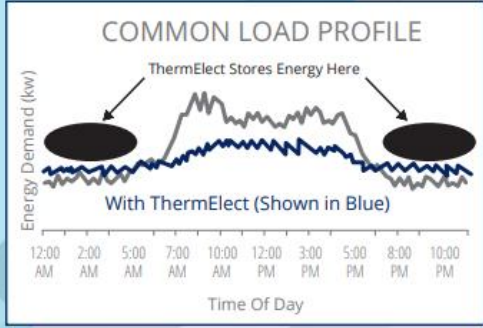
The Steffes ThermElect Hydronic is a commercial, institutional, and industrial heating system that blends hydronic heating with Electric Thermal Storage (ETS) technology. Schools, hospitals, and churches are just a few examples of facilities that have been successful in reducing their peak demand, better managing their energy consumption, and saving money with off-peak ETS heating systems.

OPERATION:

The low cost electricity is utilized to store electricity as heat in specially designed high-density ceramic brick. Brick core temperature is regulated by outdoor temperature and heat need. The stored heat is transferred from the bricks to a water solution which is circulated to where heat is needed.

The control system allows for easy customization and building load management integration. The ThermElect Hydronic is an environmentally friendly heating system offering great safety and reliability with minimal maintenance.





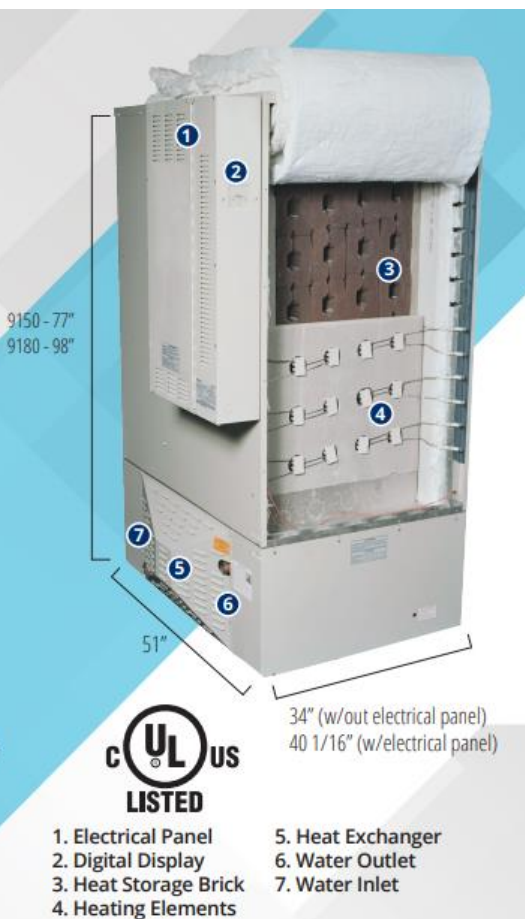
APPLICATIONS:

The Steffes ThermElect Hydronic off-peak electric heating system is extremely flexible and can handle multiple zones. Its versatility allows it to be used in, but not limited to, any of the following applications: primary space heating, supplement to heat pumps or boiler systems, pre-heating of fresh air, and domestic water heating.

Find Out More at: www.steffes.com/ets

FEATURES:

- Selectable outlet water temperature (can automatically adjust based on outdoor weather temperature)
- Built-in energy and demand management control center can be used as a stand-alone system or can receive a 4-20mA or 1-5 Volt DC signal from an external energy management system
- Heat storage is regulated automatically or by local control based on heating need and/or power capacity of facility
- Programmable microprocessor-based control system allows for application customization and self-diagnostics
- Digital display provides operating and diagnostic information
- Super insulation package ensures low surface temperatures and minimal static heat dissipation
- BACnet communication and control interface available
- Integrated SSR control to provide variable input power regulation



SPECIFICATIONS:

	Model 9150		Model 9180	
Voltages (3 Phase)	277/480V	347/600V	277/480V	347/600V
Charging Input	50.4kW	53kW	75.6kW	80kW
Storage Capacity (see Note)	290kWh (989,480 BTU)		440kWh (1,501,280 BTU)	
Approximate Installed Weight	4,670 lbs		6,530 lbs	
Pipe Size - Water Inlet & Outlet	1.5"			
Output Water Temp Selection Range	50° F to 185° F (10° C to 85° C)			
Maximum Working Pressure	60 PSIG (standard); 125 PSIG (optional)			
Minimum Flow Rate (Primary Loop)	1 GPM per 10,000 BTU of required output at 20° F (-6.7° C) temperature rise (30 GPM maximum)			
Internal Pressure Drop (assuming 50% glycol mix)	.7 ft @ 15 GPM	1.8 ft @ 25 GPM	1.2 ft @ 20 GPM	2.5 ft @ 30 GPM

NOTE: The size and heating capability of the system required for an installation is dependent on the thermal load and the demand profile of the facility. The daily rate structure of the utility can also affect size of furnace needed in the application.

Manufacturer reserves the right to discontinue or change at any time, specifications or designs, without notice or incurring obligations.

3050 HWY 22 N | Dickinson, ND 58601 | 701-483-5400 | www.steffes.com | offpeak@steffes.com

Remarquez le voltage et la puissance requis et le poids, aux lignes 2,3 et 5 du tableau (indiquées par des flèches).

Note : 4670 lbs = 2118 kg - 6530 lbs = 3416 kg.

STEFFES, 4100 Comfort Plus Forced Air, Technical Data Sheet, <https://www.steffes.com/wp-content/uploads/2016/09/4100Series-Tech-Data-Sheet-Rev-3.pdf> (4 pages), consulté en fév. 2022 :

Technical Data Sheet

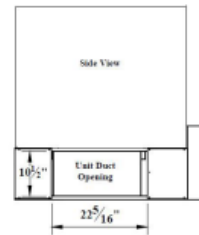
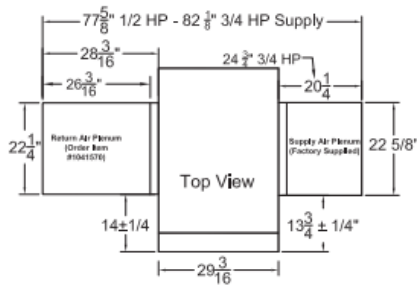
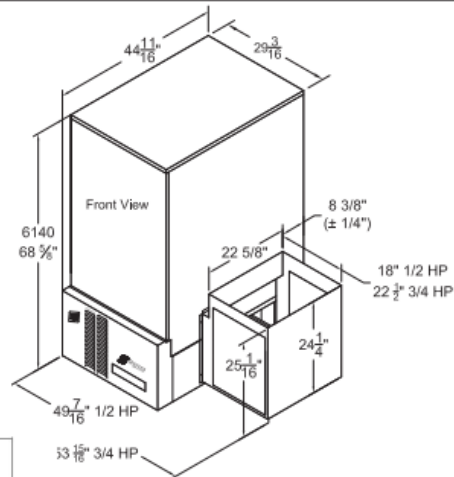
4100 Comfort Plus Forced Air

5-Year Limited Manufacturer's Warranty



Unit and Duct Opening Dimensions

- Unit is factory configured for left-to-right or right-to-left air-flow.
- Down flow configuration is available with the addition of the optional down flow kit accessory. In down flow configuration, the furnace must be installed in a fashion that allows access to the supply blower's plenum cover. It is recommended to elevate the furnace a minimum of 10" to achieve this access.
- Return air plenum can be ordered as an optional accessory from the factory.
- Unit will fit through a 30" doorway without disassembling. For smaller openings or for ease in moving, the unit can be disassembled.



Placement and Clearances

- The area in which the Comfort Plus unit is installed must remain free of debris and adequate ventilation is required to maintain room temperature of less than 85°F.
- Adhere to all national and local electrical and building code placement requirements for electric heating appliances.
- An 18" high stand is available from the factory to elevate the system if necessary.

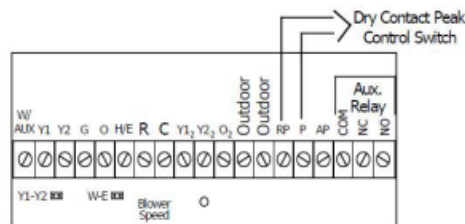


- A Back and sides = 3 inches (from combustible material)
- B Front = 36 inches (for ease in servicing)
- C Top = 6 inches (from combustible material)
- D Between Duct and Left side of system = 2 inches
- E Outer Sides of Return and Supply Ducts = zero clearance
- F Between Duct and Right side of system = zero clearance
- G Bottom = zero clearance

Low Voltage Peak Control Connections

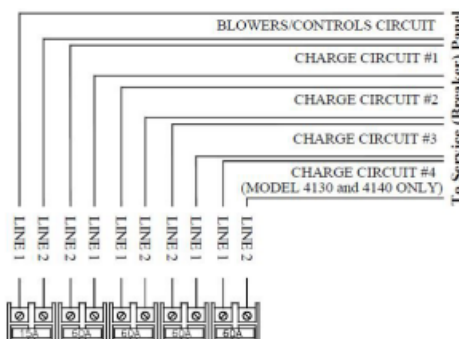
- If using the optional Steffes Power Line Carrier Transceiver or Steffes Time Clock Module for peak control, the direct wiring shown here is not necessary.

Variable Speed Blower



Line Voltage Field Connections and Circuit Phasing

- The breakers on the Comfort Plus are intended for service disconnect only. The 15 amp breaker powers the blowers and system controls circuit. The 60 amp-breakers power the element circuits.
- Units are factory configured with multiple circuit, single phase connections. If single feed is desired, a single feed kit is available from the factory. Phase-balancing is recommended when making connections in 3-phase applications.



Supply Air Delivery Matrix

- External static pressure should not exceed .75 inches water column.
- A supply blower must be specified with each furnace. Available options include a 1/2 HP or 3/4 HP variable speed blower.
- 1/2 HP configuration can accommodate most 1.5 to 4 ton heating/cooling coils.
- 3/4 HP configuration can accommodate most 3 to 5 ton heating/cooling coils.
- Interfaces to multi-speed air conditioners or heat-pumps. When interfaced to a 2-stage air conditioner or heat pump, the variable speed motor will operate at 70% of the selected air flow in low speed (Stage 1) compressor mode. If 50% air flow is required in low speed, a Stage 1 speed adjusting relay must be installed. Steffes recommends the Allen Bradley Relay #700-HA32A24 with Relay Base #700- HN125 or equivalent.

Variable Speed Blower Option:

Configuration	Field Selectable Air Flows (CFM)
1/2 HP	1000, 1200, 1400, 1600
3/4 HP	1200, 1400, 1600, 2000

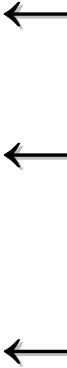
Specifications for Standard 240VAC Systems							
Model	4120			4130		4140	
Charging Input (See Note 1)	14.0 kW	19.2 kW	24.8 kW	28.8 kW	37.2 kW	38.4 kW	45.6 kW
Single Feed: Minimum Circuit Ampacity (240V Systems) (Includes 25% Derate for Continuous Load)	81	109	138	159	203	209	247
Element Current Draw	59 AMPS	80 AMPS	104 AMPS	120 AMPS	155 AMPS	160 AMPS	190 AMPS
Element Circuits Required (See Note 2)	1-20 AMP 2-30 AMP	1-30 AMP 2-40 AMP	1-40 AMP 2-50 AMP	4-40 AMP	4-50 AMP	4-50 AMP	4-60 AMP
Blowers/Controls Circuit Required (See Note 2)	One - 15 AMP (7 AMPS maximum load)						
Storage Capacity (See Note 3)	120 kWh (426,500 BTU)			180 kWh (614,160 BTU)		240 kWh (818,880 BTU)	
Approximate Installed Weight	2,183 lbs			3,031lbs		3,859 lbs	
Maximum Coil Dimensions (See Note 4) W x D x H	26' x 22" x 31"						
Maximum Maintainable Heat Loss (See Note 3)							
8 Consecutive Hours (BTU/hr)	20,414	28,013	34,188	42,002	49,201	55,991	65,613
12 Consecutive Hours (BTU/hr)	30,612	42,002	45,550	62,986	65,613	84,003	87,484
18 Consecutive Hours (BTU)	45,931	62,986	81,376	94,478	122,047	125,971	131,225

Note 1: Standard configuration (240V) systems can be connected to 208V; however, the charging input of the system will derate by 25%. If 208V specific charging voltage is required, it is available as a special factory order. For 277V systems, refer to the 6100 series.

Note 2: Unit is factory configured to be field connected to multiple line voltage circuits. If single feed to the element and blowers/system controls circuits is desired, an optional single feed kit is available to order.

Note 3: The size and heating ability of the system required for an installation is dependent on the heat loss of the area and the power company's off-peak hours. In addition, if the unit is not installed within the heated area, heat lost statically must be taken into account when sizing a system. Contact Steffes for assistance in selecting an appropriately sized system.

Note 4: The indoor coil and outdoor compressor of an air conditioner or heat pump are not included with the ETS system. A return air plenum, configured for housing an indoor coil, can be ordered from the factory as an optional accessory. Dimensions listed are that of the inner coil area in this plenum. For larger coils, field provisions to the factory built plenum are necessary or one will need to be custom built by the installer. (In heat pump applications, the indoor coil MUST be placed on the return air side.)



Steffes | 3050 Highway 22 North | Dickinson, North Dakota 58601-9413 | 701-483-5400 **Rev 3**

Remarquez la puissance et l'ampérage requis et le poids aux lignes 2, 4 et 8 du tableau (indiquées par des flèches)

Note: 2183 lbs = 990 kg - 3031 lbs = 1375 kg - 3859 lbs = 1750 kg