



Daikin Altherma Selection Report

Produced on 6/4/2010 with Daikin Altherma Simulator V3.3.2 - beta 1 - database Central USA 7.1

Project name Lee
Reference Lee
Client name Lee

Only the data published in the data book are correct. This program uses close approximations of these data.

1. Low temp - Outdoor/indoor ERLQ030BAVJU

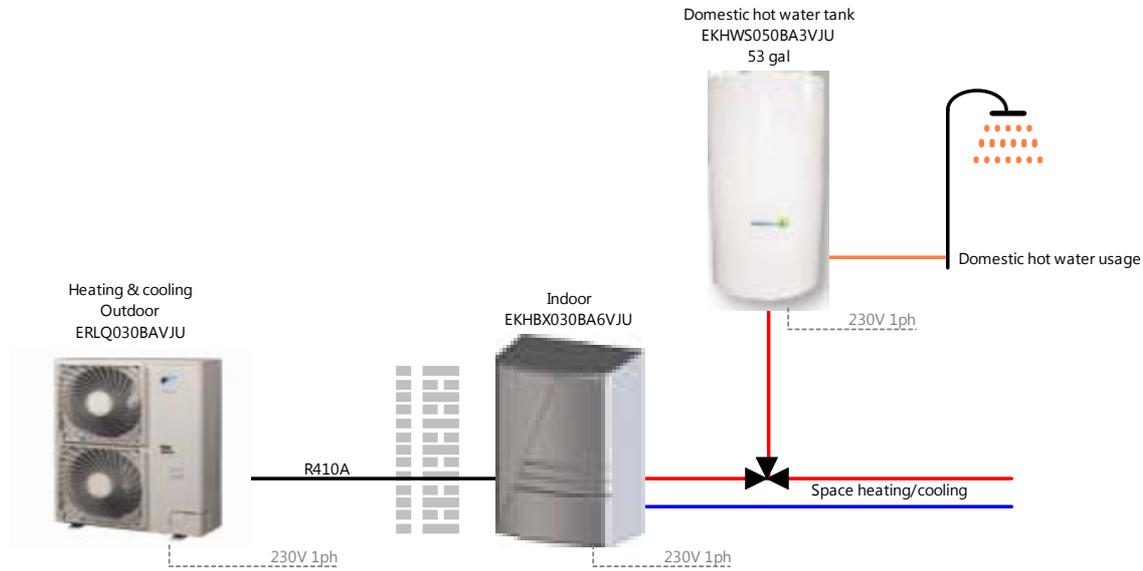
1.1. Material List

	Model
Outdoor	ERLQ030BAVJU
Bottom plate heater	Yes
Indoor	EKHBX030BA6VJU
Domestic hot water tank	EKHWS050BA3VJU
Solar kit connection	EKSOLHWBAVJU

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Carrollton, TX, 75006

1.2. System Diagram



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1.3. Technical Details

Indoor	EKHBX030BA6VJU
Application	
Function	Reversible
Application	Low temperature
Leaving water range heating	77.0 - 122.0°F
Leaving water range cooling	41.0 - 68.0°F
Technical data	
Dimensions (WxHxD)	19.8x36.3x14.2 inch
Weight	143lbs
Drain connection	0.7inch
Material	Epoxy polyester painted galvanized steel
Electrical data	
Power supply	230V 1ph
Fuse size	30A
Capacity electric backup heater	6.0 kW
Capacity steps	2

Domestic hot water tank	EKHWS050BA3VJU
Technical data	
Water volume	53 gal
Max. water temperature	185.0°F
Material inside tank	Stainless Steel
Material outside tank	Epoxy-Coated Mild Steel
Dimensions (WxHxD)	22.8x45.3x22.8 inch
Weight	99lbs
Electrical data	
Electric heater	10236 BTU/h
Power supply	230V 1ph
Fuse size	20A

Outdoor	ERLQ030BAVJU
Performance	
Nominal heating capacity	28764 BTU/h
COP	4
Operation range heating	-4.0 - 77.0°F
Operation range cooling	50.0 - 109.4°F
Rated cooling capacity @ ambient temp.	100.9°F
LWE with delta temp. 41.0°F	44.6°F
Cooling capacity	21029 BTU/h
EER	2.8
Technical data	
Dimensions (WxHxD)	32.5x28.9x11.8 inch
Weight	123lbs
Refrigerant	R410A
Base charge	3.7lbs
Sound data	
Sound pressure	49dBA
Sound power	
Electrical data	
Power supply	230V 1ph
Fuse size	20A

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1.4. Energy Consumption of the Domestic Hot Water Tank

Type of usage	Hot water consumption	Occurrences (per week)
Small	3 gl	20
Floor	3 gl	0
Clean	2 gl	10
Dish wash small	6 gl	3
Dish wash medium	8 gl	5
Dish wash large	14 gl	5
Large	15 gl	0
Shower	40 gl	20
Total for year	52416 gl	

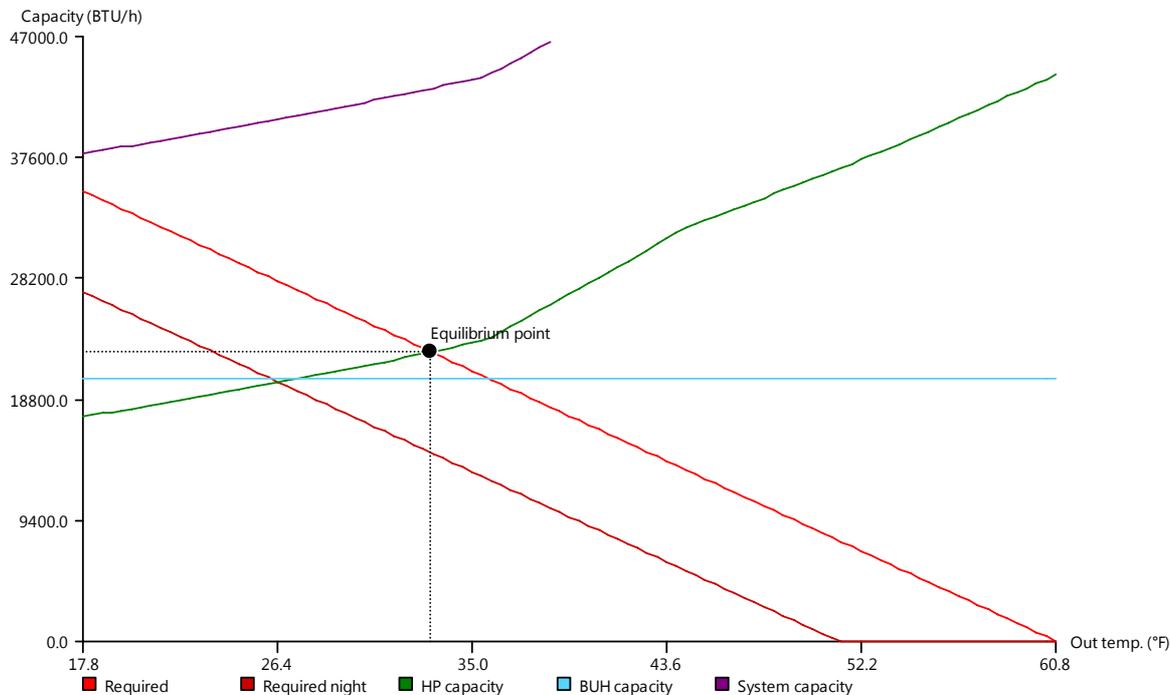
Actual total energy consumption = 1270 kWh.

The COP used in the energy calculation is based on the prEN255-3 large tapping pattern at a standard temp set of 118.4°F for preparation of DHW and avoiding the use of booster heater. The cold water temperature is assumed to be 50.0°F.

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1.5. Graphs

Required and available capacities



Equilibrium point 33.2°F / 22490 BTU/h Seasonal COP 3.4
 Total thermal energy 6838 kWh

HP capacity (Heatpump capacity):

The integrated heat generation capacity of the heatpump. This value takes into account the energy used for the defrost cycle.

Heat pump capacity depends on the outside temperature and the leaving water temperature. The simulator calculates the heatpump capacity at the minimum night temperature in the winter as described in the meteorological data, and at the selected maximum leaving water temperature.

BUH capacity (Backup heater capacity):

The nominal heat generation capacity of the electrical backup heater.

System capacity:

Total heat generation capacity of the system, i.e. the sum of heat pump capacity and backup heater capacity.

Spare capacity:

The surplus in heat generation capacity when compared to the required heating capacity, i.e. the difference between system capacity and required capacity.

Equilibrium point or equilibrium temperature:

The outside ambient temperature at which the heat pump capacity matches the heating demand. It is therefore the lowest outside temperature at which no additional heat source is needed. The heat pump can cover the entire

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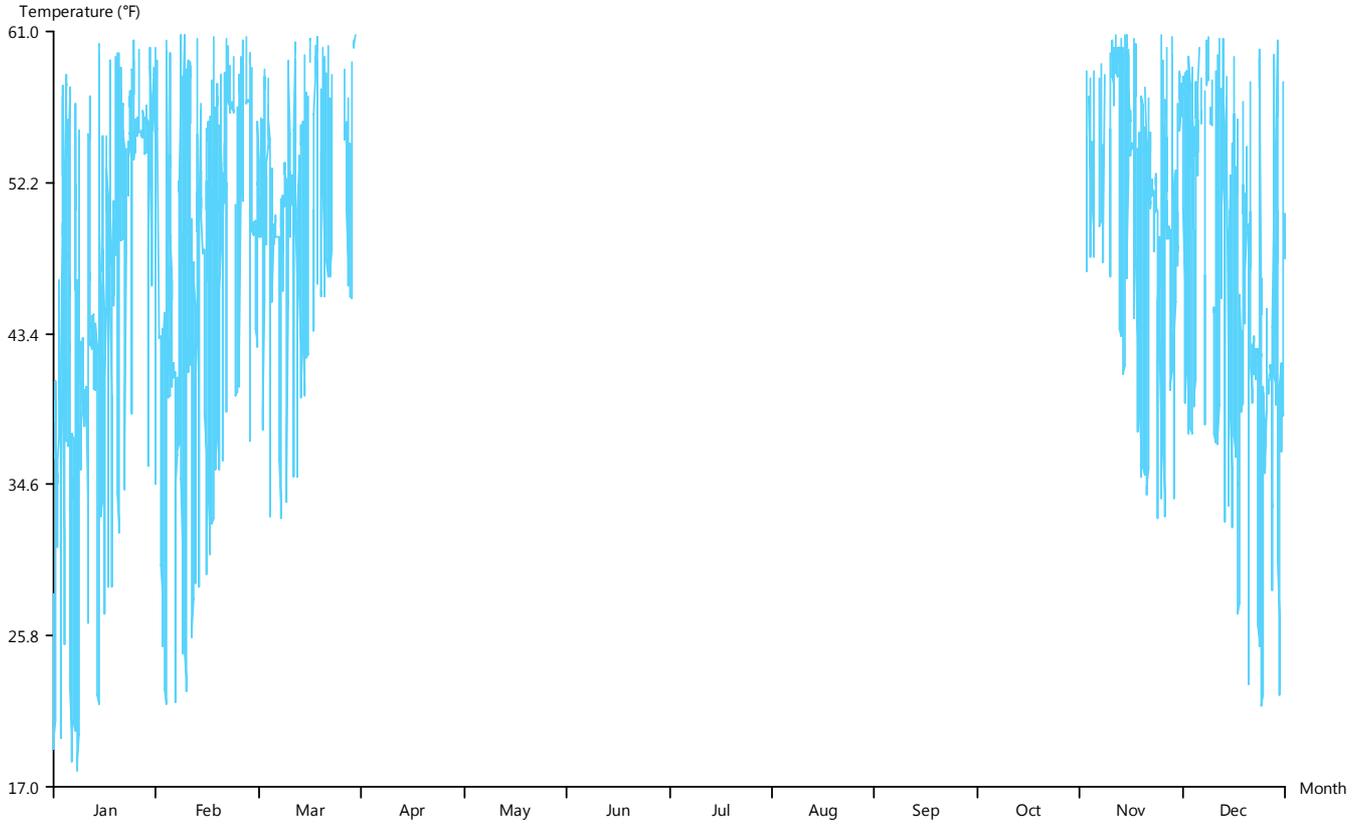


heating demand down to this outside temperature. For outside temperatures below this equilibrium temperature, additional heat from the backup heater is required to fulfill the heating demand. During transient conditions at system heat-up, the equilibrium point can shift to a higher temperature than the one it would be at during normal operations.

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Heating period

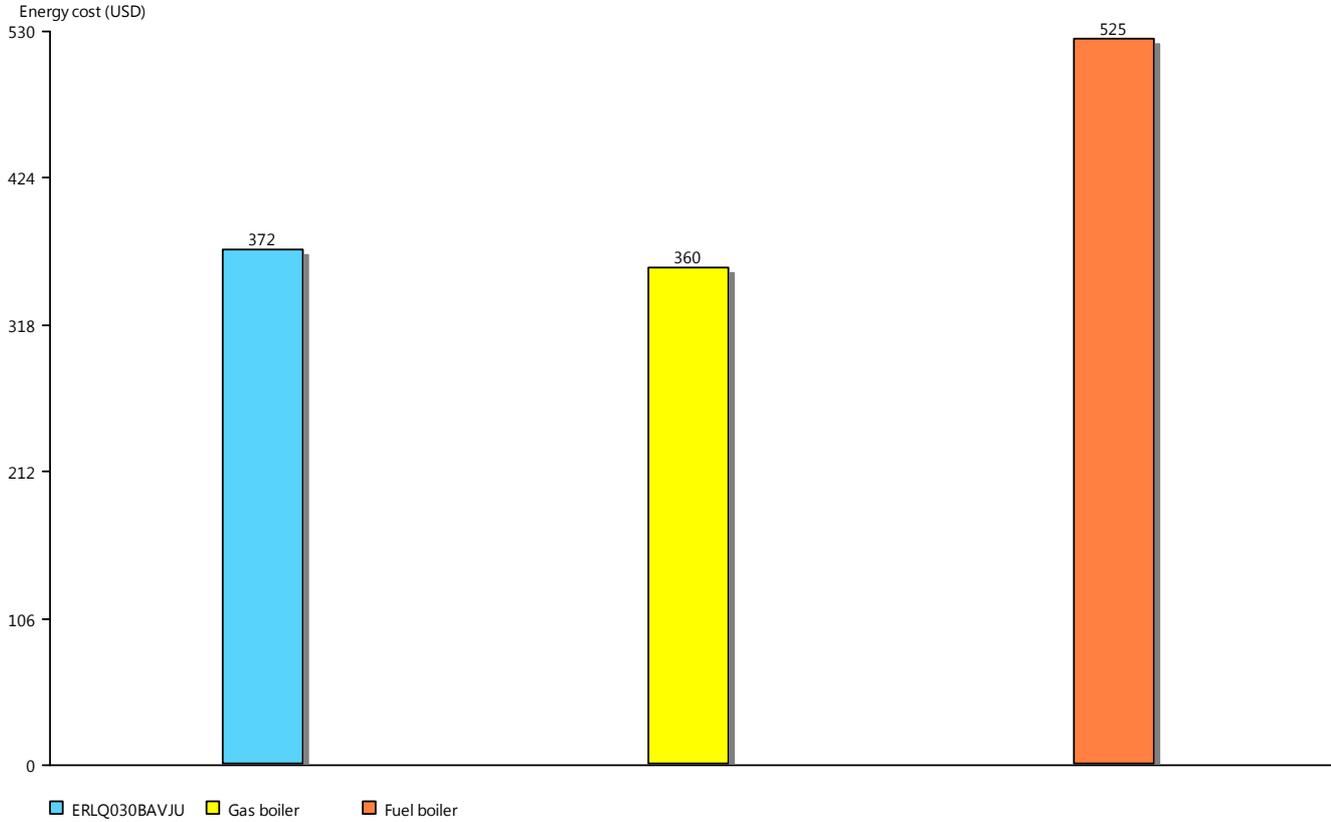


Location	Country	USA Texas
	City	Dallas/Fort Worth Int Ap
Temperatures (min / max)	Summer Day	93.0 / 100.9°F
	Summer Night	77.2 / 85.1°F
	Winter Day	56.1 / 75.2°F
	Winter Night	17.8 / 36.9°F

The graph shows the simulated outdoor temperature variations within the defined heating months.

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Energy cost

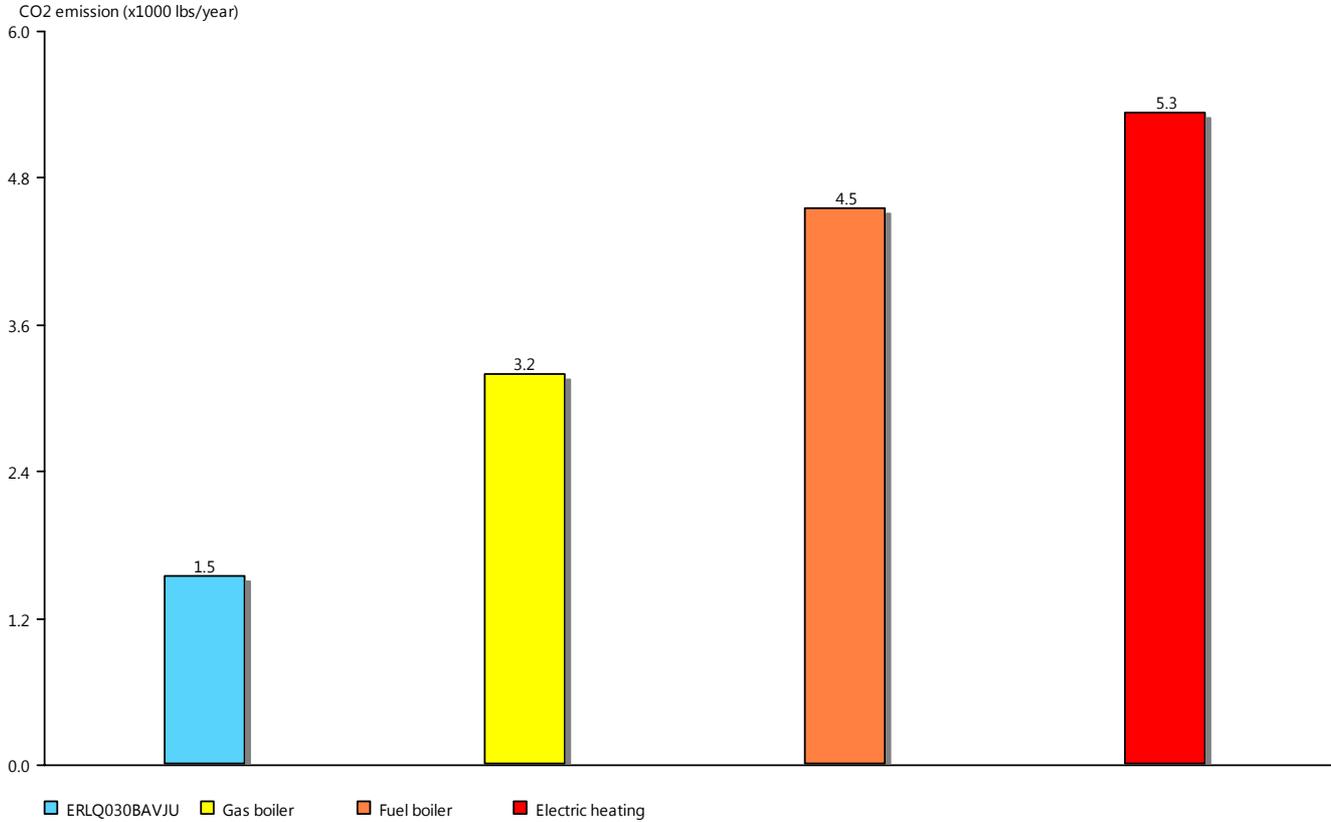


Electricity normal tariff	High price period	0.17 USD/kWh
	Low price period	0.17 USD/kWh
Electricity heat pump tariff	High price period	0.17 USD/kWh
	Low price period	0.17 USD/kWh
Electricity	Direct heater efficiency	100%
Gas	Tariff	1.4654 USD/thm
	Efficiency	95%
Fuel	Tariff	2.6498 USD/gal
	Efficiency	89%
Design conditions	Required capacity	35000 BTU/h
	Surface to be heated	2000 sqft
	Zero capacity at outside temperature	60.8°F

The graph shows a comparison of the simulated annual running costs for Daikin Altherma, a gas boiler and an oil boiler. The calculation is based upon the selected buildings yearly required thermal input, each systems coefficient of performance (without pump) and the inputted energy prices.

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CO2 emission

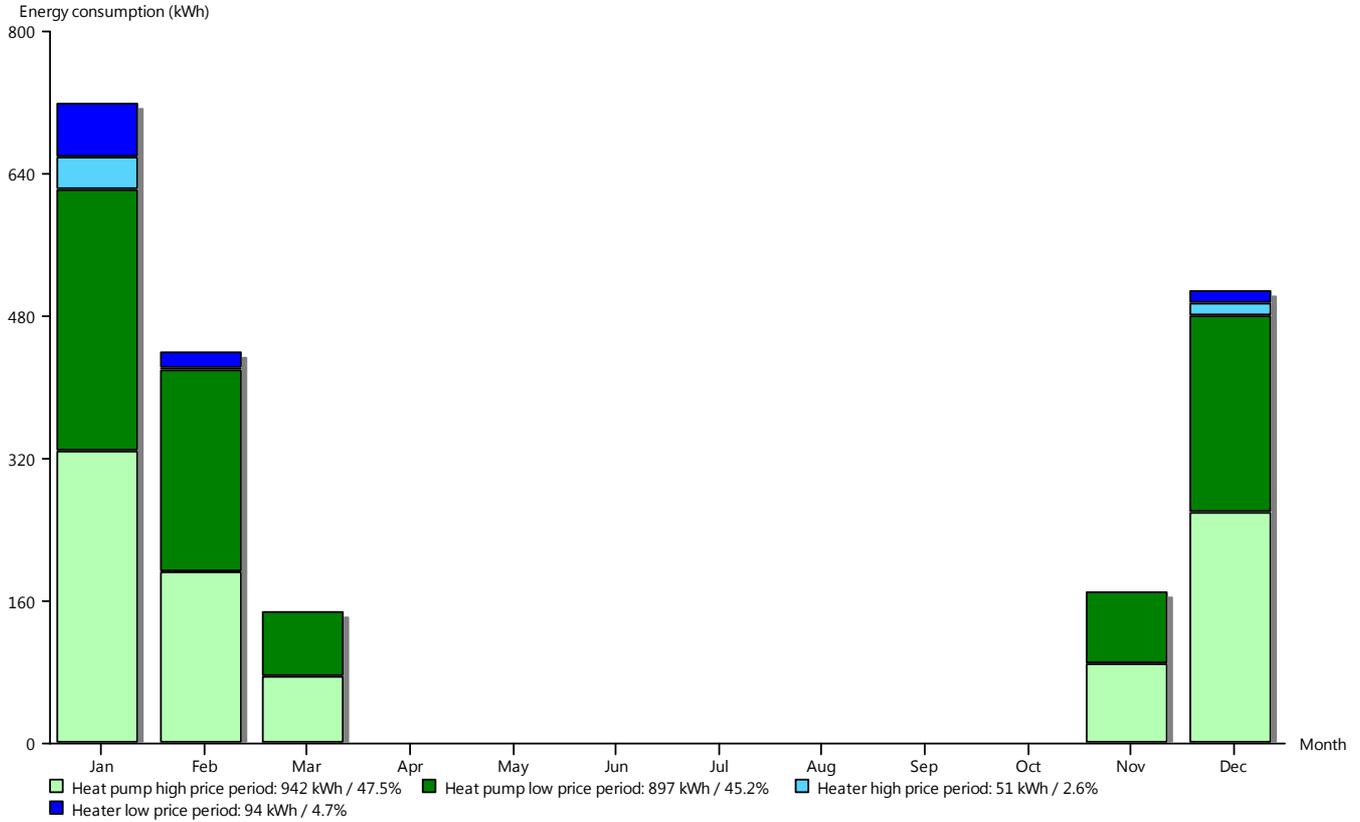


Location	Country	USA Texas
Electricity	CO2 emission	0.1606 lbs/kWh
	Direct heater efficiency	100%
Gas	CO2 emission	0.0916 lbs/kWh
	Efficiency	95%
Fuel	CO2 emission	0.1218 lbs/kWh
	Efficiency	89%
Design conditions	Required capacity	35000 BTU/h
	Surface to be heated	2000 sqft
	Zero capacity at outside temperature	60.8°F

The graph shows a comparison of the annual CO2 emissions for Daikin Altherma an electric heating system, a gas boiler and an oil boiler sized to cover the yearly heat load for the simulated building. Neither Daikin Altherma nor the electric heater will have any direct emissions. The emission from these systems is based on calculations according to the average CO2 emission from the selected country's electricity production.

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Energy consumption per month



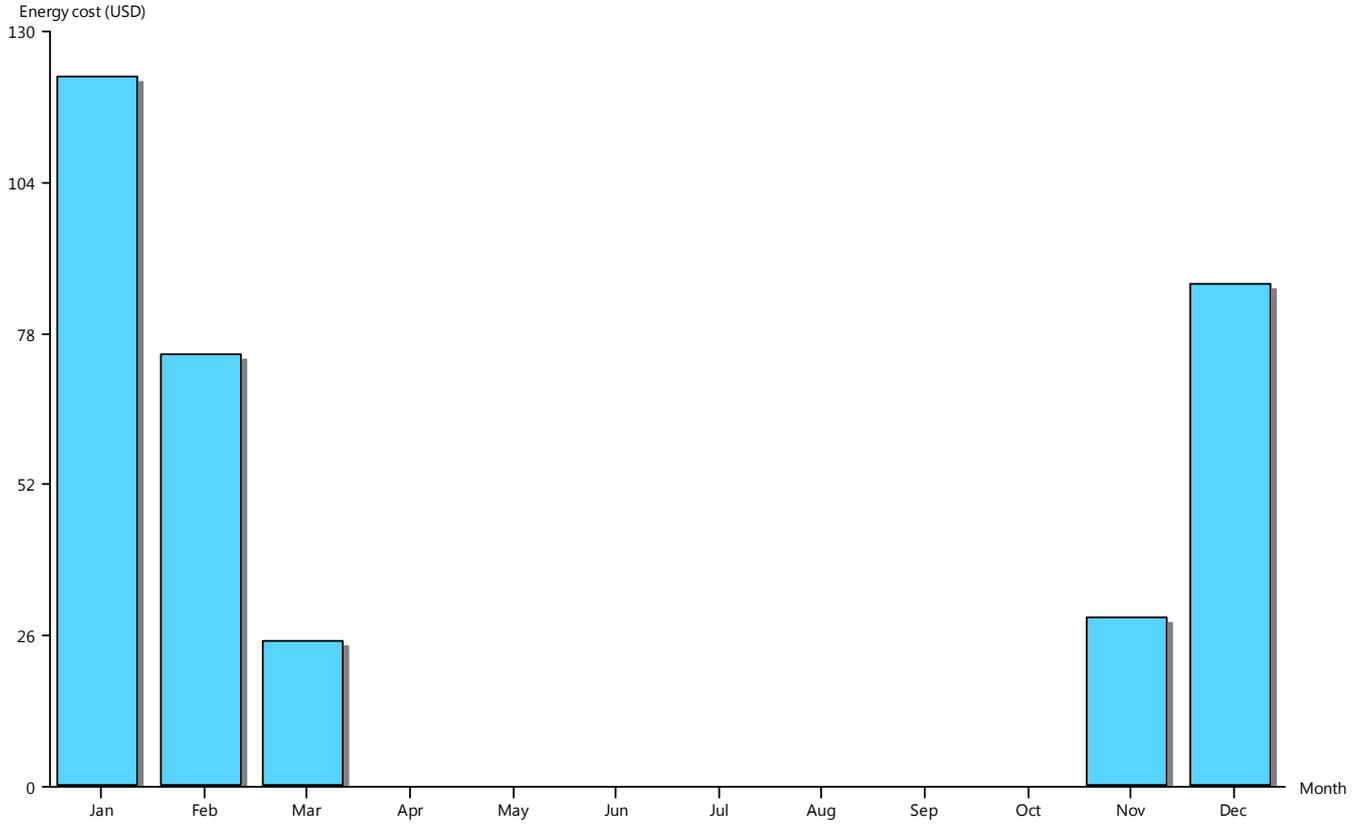
Yearly energy consumption

Yearly energy consumption		1985 kWh
Primary energy use		4963 kWh
Electricity normal tariff	High price period	0.17 USD/kWh
	Low price period	0.17 USD/kWh
Electricity heat pump tariff	High price period	0.17 USD/kWh
	Low price period	0.17 USD/kWh
Design conditions	Required capacity	35000 BTU/h
	Surface to be heated	2000 sqft
	Zero capacity at outside temperature	60.8°F

The graph shows the energy consumption (input) per month for the heat pump and back up heater. There is made a separation between day and night operation to show the amount of energy consumption that falls under day and night tariff.

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Energy cost per month

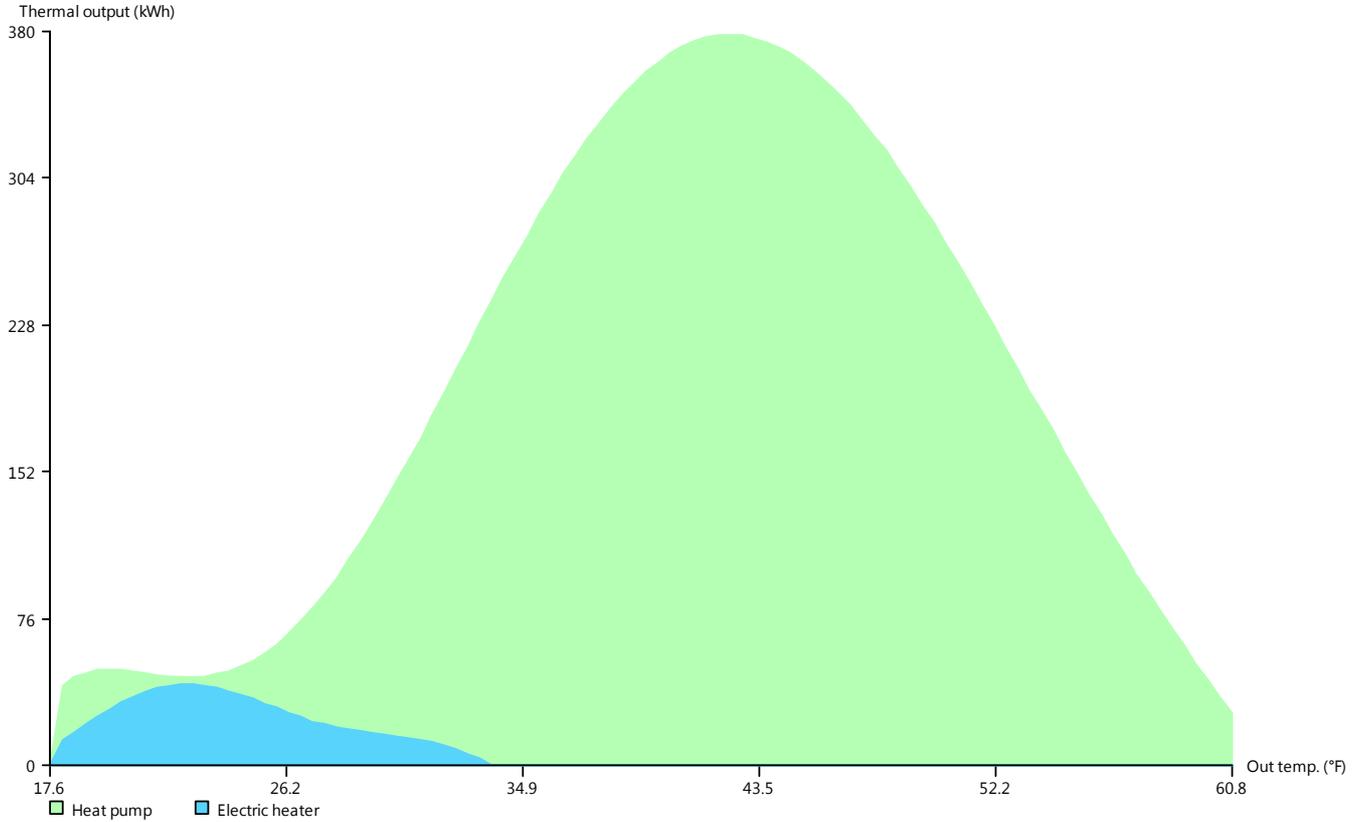


Total for year		372 USD
Electricity normal tariff	High price period	0.17 USD/kWh
	Low price period	0.17 USD/kWh
Electricity heat pump tariff	High price period	0.17 USD/kWh
	Low price period	0.17 USD/kWh
Design conditions	Required capacity	35000 BTU/h
	Surface to be heated	2000 sqft
	Zero capacity at outside temperature	60.8°F

The graph shows the running cost per month for Daikin Altherma according to the inputted electricity prices and the power input as given in the graph "energy consumption per month".

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Thermal output by source



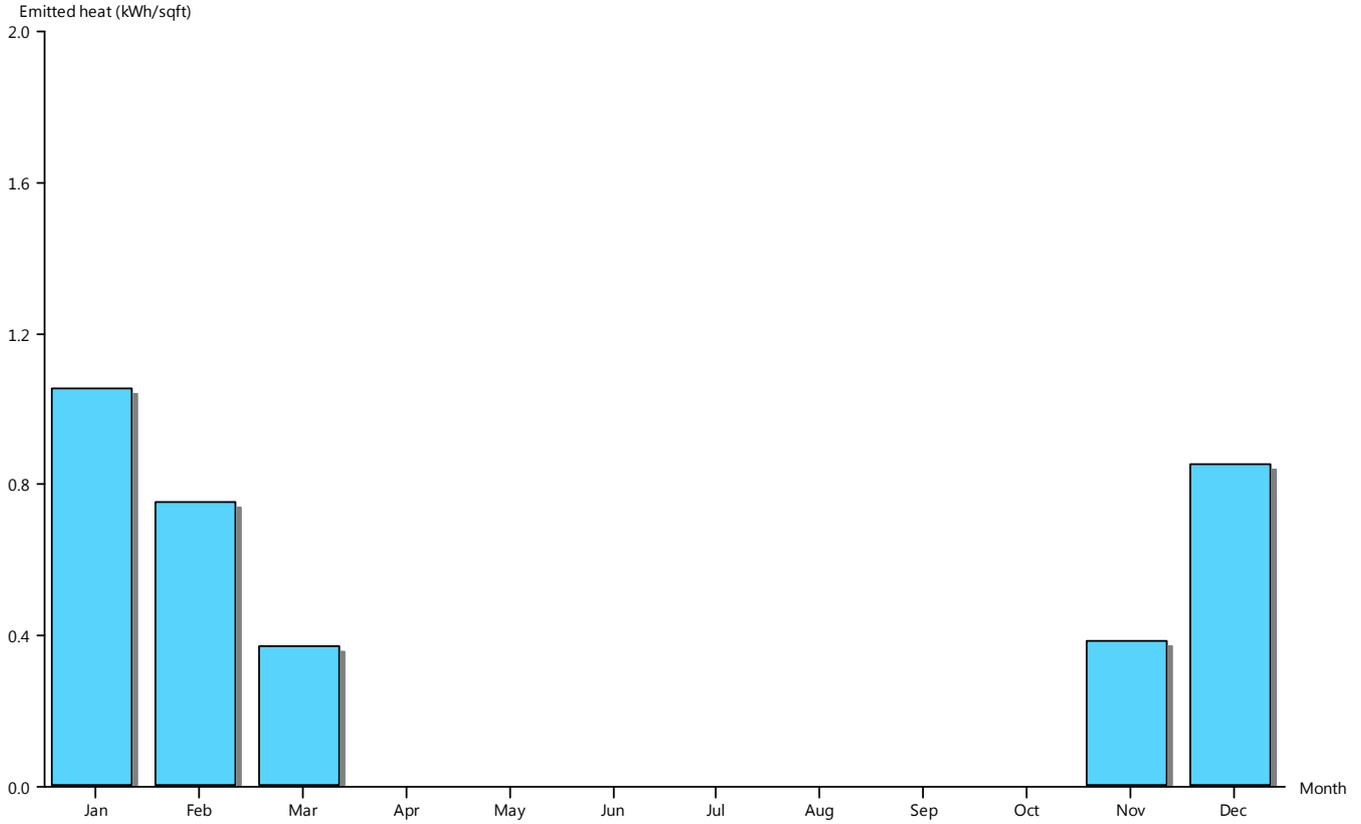
Thermal output (kWh) is given in intervals of 1°F

Temperature range	Heat pump	17.8 / 60.8°F
	Electric heater	17.8 / 33.2°F
Percentages for year	Heat pump	97.9%
	Electric heater	2.1%
Design conditions	Required capacity	35000 BTU/h
	Surface to be heated	2000 sqft
	Zero capacity at outside temperature	60.8°F

The graph shows the simulated thermal output in kWh for the heat pump and back up heater through one year. The back up heater is only operational at low temperatures. The main portion of the output is at moderate temperatures where the heat pump can cover the entire heating requirement.

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Emitted heat per surface



Total for year	3 kWh/sqft
Seasonal COP	3.4
Total thermal energy	6838 kWh
Design conditions	Required capacity 35000 BTU/h
	Surface to be heated 2000 sqft
	Zero capacity at outside temperature 60.8°F

The graph shows the total emitted heat per living surface per month. The required heat emission varies with the buildings insulation standard and the weather conditions at the location.

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1.6. Supplementary Explanations

Design conditions:

The Daikin Altherma simulation software is a static calculation tool, which can be used as an indication for dimensioning Daikin Altherma heat pump systems. The software works with following assumptions.

- A detailed study to calculate the heat load should be made. The heat load of the house is a crucial input in the software. Miscalculating the heat load will lead to badly dimensioned heat pump systems with a reduced efficiency. Calculating the heat load cannot be done with the simulation software.

- The software uses climatological data, which has been measured and averaged over a number of years. Real conditions will differ from these averaged values.

- The simulation is based on the assumption that heating is required 24h/24h. The daytime capacity is calculated in function of ambient temperature and design heat load. The nighttime capacity (night setback) is calculated in function of ambient temperature and fraction of design heat load, for which this fraction is defined as required indoor night temperature divided by 71.6°F.

- Eurelectric provides the CO₂ emissions per kWh electricity for every country. If Eurelectric does not give a value, the software uses an average value of 0.1606 lbs/kWh instead.

Personalising the input data:

Under 'Preferences', following input data should be reviewed for every new simulation.

- Minimum ambient temperature at which the heating capacity is 0 BTU/h.
- Prices for gas, fuel and electricity (including day and night price period) used for comparison.
- Day and night period for design room temperature, including night setback temperature.

Efficiencies of gas and oil boilers:

The efficiency values for gas and oil boilers used for comparative calculations are adjustable under 'Preferences'. The default efficiencies are chosen to reflect the minimum requirements of the European Boiler Efficiency Directive 92/42/EC for low temperature boilers.

Domestic warm water production:

The Daikin Altherma system can optionally be combined with a sanitary warm water tank for the preparation of domestic warm water. The type of tank and its capacity can be selected in the simulation for the investment cost calculation.

Cooling mode:

The reversible version (EKHBX) of the Low Temperature Daikin Altherma system can provide cooling. The energy consumption for cooling is not included in the energy and cost calculations.

1.7. Field Settings Report

1st code	2nd code	Setting name	Date (*)	Value (*)	Date (*)	Value (*)	Default value	Range	Step	Unit
0		User permission level								
	00	User permission level					3	2~3	1	-
1		Weather dependent set point								
	00	Low ambient temperature (Lo_A)		17.8			14	-4~41	1.8	°F
	01	High ambient temperature (Hi_A)		60.8			59	50~68	1.8	°F
	02	Set point at low ambient temperature (Lo_TI)		115			104	77~131	1.8	°F
	03	Set point at high ambient temperature (Hi_TI)		86			77	77~131	1.8	°F
2		Disinfection function								
	00	Operation interval					Fri	Mon-Sun, All	-	-
	01	Status		1 (ON)			1 (ON)	0/1	-	-
	02	Start time					23:00	0:00-23:00	1:00	hour
	03	Set point					158	104~176	9	°F
	04	Interval					10	5~60	5	min
3		Auto restart								
	00	Status		0 (ON)			0 (ON)	0/1	-	-
4		Backup/booster heater operation and space heating off temperature								
	00	Status		1 (ON)			1 (ON)	0/1	-	-
	01	Priority		0 (OFF)			0 (OFF)	0/1/2	-	-
	02	Space heating off temperature					95	57.2~95	1.8	°F
	03	Booster heater operation					3	0/1/2/3	-	-
	04	Not applicable					2	Read only	-	-
5		Equilibrium temperature and space heating priority temperature								
	00	Equilibrium temperature status		1 (ON)			1 (ON)	0/1	-	-
	01	Equilibrium temperature		33.2			32	5~95	1.8	°F
	02	Space heating priority status		1 (ON)			0 (OFF)	0/1	-	-
	03	Space heating priority temperatures		35.6			32	5~68	1.8	°F
	04	Set point correction for domestic hot water temperature		50			50	32~68	1.8	°F
6		DT for heat pump domestic water heating mode								
	00	Start		3.6			3.6	3.6~36	1.8	°F
	01	Stop		3.6			3.6	0~18	1.8	°F
	02	Not applicable					0	Read only	-	-
7		DT for booster heater and dual set point control								
	00	Domestic hot water step length		5.4			0	0~7.2	1.8	°F
		Hysteresis value booster heater					3.6	3.6~72	1.8	°F
		Dual set point control status					0	0/1	-	-
		Second set point heating					18	1.8~43.2 / 45~99	1.8	°F
		Second set point cooling					12.6	9~39.6	1.8	°F
8		Domestic hot water heating mode timer								
	00	Minimum running time		5			5	0~20	1	min
	01	Maximum running time		30			30	5~60	5	min
	02	Anti-recycling time		3			3	0~10	0.5	hour
	03	Booster heating delay time		50			50	20~95	5	min
	03	Additional running time at [4-02]/[F-01]					95	0~95	5	min
9		Heating and cooling set point ranges								
	00	Heating set point upper limit		115			131	98.6~131	1.8	°F
	01	Heating set point lower limit		86			77	59~98.6	1.8	°F
	02	Cooling set point upper limit					71.6	64.4~71.6	1.8	°F
	03	Cooling set point lower limit					41	41~64.4	1.8	°F
	04	Overshoot setting					33.8	33.8~39.2	1.8	°F
A		Quiet mode								
	00	Quiet mode type					0	0/2	-	-

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1st code	2nd code	Setting name	Date (*)	Value (*)	Date (*)	Value (*)	Default value	Range	Step	Unit
	01	Parameter 01					3	-	-	-
	02	Not applicable					1	Read only	-	-
	03	Not applicable					0	Read only	-	-
	04	Not applicable					0	Read only	-	-
B		Not applicable								
	00	Not applicable					0	Read only	-	-
	01	Not applicable					0	Read only	-	-
	02	Not applicable					0	Read only	-	-
	03	Not applicable					0	Read only	-	-
	04	Not applicable					0	Read only	-	-
C		Setup on EKR1HB digital I/O PCB								
	00	Solar priority mode settings					0	0/1	1	-
	01	Alarm output logic					0	0/1	-	-
	02	Bivalent operation status					0	0/1	-	-
	03	Bivalent ON temperature					32	-13~77	1.8	°F
	04	Bivalent hysteresis					37.4	35.6~50	1.8	°F
D		Benefit kWh rate power supply/local shift value weather dependent								
	00	Switching off heaters					0	0/1/2/3	-	-
	01	Unit connection to benefit kWh rate power supply					0 (OFF)	0/1/2	-	-
	02	Not applicable. Do not change the default value					0	-	-	-
	03	Local shift value weather dependent					0	0/1/2/3/4	-	-
E		Unit information readout								
	00	Software version					Read only	-	-	-
	01	EEPROM version					Read only	-	-	-
	02	Unit model identification					Read only	-	-	-
	03	Liquid refrigerant temperature					Read only	-	-	°F
	04	Inlet water temperature					Read only	-	-	°F
F		Option setup								
	00	Pump operation					0	0/1	-	-
	01	Space cooling permission temperature					68	50~95	1.8	°F
	02	Bottom plate heater ON temperature					37.4	37.4~50	1.8	°F
	03	Bottom plate heater hysteresis					41	35.6~41	1.8	°F
	04	Functionality of X14A					1	0/1	-	-

(*) Installer setting at variance with default value.

Note: The preferred settings of your Daikin Altherma system are mentioned in field settings report. For more details see installation manual.