



2011 Solar Thermal Water Heating Solutions



Product Catalog
V1 - Effective January 1, 2011



BOSCH
Invented for life

About the Bosch Group



The Bosch Group has been a leading global supplier of technology and services in the areas of Automotive, Industrial Technology, Consumer Goods and Building Technology for over 100 years. The company was founded in Stuttgart, Germany, in 1886 and today has more than 300 subsidiaries in over 150 countries. Every Bosch product is built with one goal in mind; to enhance quality of life by providing innovative technological solutions. Bosch is highly regarded for its development of automotive braking and steering safety systems (ABS) which have been improving automotive performance for over 30 years, helping reduce the number of accidents on North America's roads and highways. Environmental stewardship inspires and drives Bosch product development. Bosch is a leader in the development of next-generation technologies that deliver improved performance and efficiency while conserving natural resources. In the area of sustainable mobility, we're helping reduce the fuel consumption and CO₂ emissions of new vehicles. Energy efficiency and environmental protection are also shaping our

Industrial Technology, Consumer Goods and Building Technology products. Green technologies, such as gas tankless water heaters, heat pump electric water heaters, solar thermal systems, photovoltaics, wind power and geothermal heat pumps are perhaps the best examples of smart technologies growing in demand and shaping the future of Bosch.

Bosch Thermotechnology in North America

Bosch Thermotechnology is a leading source of high quality water heating and comfort heating systems. In particular, the company offers Bosch tankless, point-of-use water heaters, Bosch solar thermal systems, Buderus floor-standing and wall-hung boilers, FHP geothermal heat pumps as well as controls and accessories for every product line. As illustrated in this catalog and at www.bosch-climate.us, Bosch Thermotechnology is committed to reinventing energy efficiency by offering smart products that work together as integrated systems which enhance quality of life in an ultra-efficient and environmentally friendly manner.





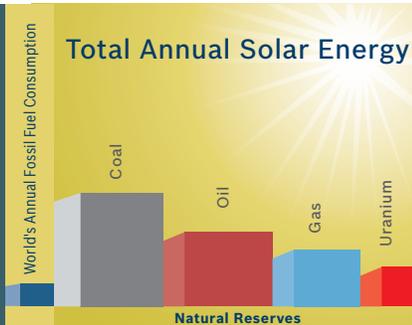
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Benefits of going solar

“I’d put my money on the sun and solar energy. What a source of power! I hope we don’t have to wait ‘til oil and coal run out before we tackle that.”

- Thomas Edison (1847-1931)



Now is the time to start utilizing renewable resources:

- ▶ Every 20 minutes, enough energy is transmitted to the earth’s surface to supply the annual global energy demand
- ▶ The sun generates more energy in one day than all our fossil fuels combined
- ▶ Electricity generated by the U.S. by burning fossil fuels: 75%
- ▶ The estimated time to consume our remaining fossil fuels: 45 years
- ▶ Currently, solar energy accounts for < 1% of the U.S. energy supply

Why should you go solar?

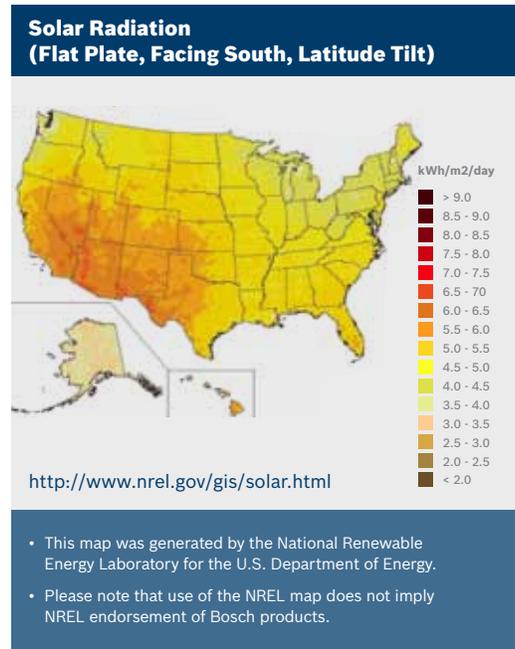
- ▶ Solar water heating systems can make a substantial reduction in utility bills, saving you as much as 75% of the cost for water heating
- ▶ Increase property values with an aesthetic design and a more efficient water heating system
- ▶ Attractive federal, state and local financial incentives support consumer transition to green energy efficient options (visit www.dsireusa.org / www.cansia.ca)

Choosing the right Bosch solar thermal system for you:

Proper sizing of a solar thermal system for water heating is crucial for performance, comfort, fuel savings, and a long service life. The conventional heat source must be able to provide 100% of the hot water in a building independently of the solar system.

A system putting too much emphasis on fuel savings may not meet the customer’s approval if it does not provide hot water comfort during periods of bad weather.

Did you know that a properly sized solar thermal system may provide as much as 75% of your annual hot water requirements? The energy that is provided by the sun can be used effectively in almost any part of North America. Coverage of 50% - 60% over the course of a whole year is ideal for water heating systems for single family homes and two-family homes.



For larger residential & commercial systems, proper sizing takes into account the following parameters:

- ▶ Daily hot water demand
- ▶ Daily & weekly profile, hot water demand
- ▶ Seasonal influence on the hot water demand (i.e. camp site)
- ▶ Set point temperature
- ▶ Existing water heating equipment (if an existing system is being extended)
- ▶ Recirculation losses
- ▶ Location & regional conditions
- ▶ Orientation
- ▶ Slope

How a solar thermal system works

Solar thermal systems from Bosch are fully integrated solutions with modular design allowing you to add more capacity to meet most hot water needs. Solar thermal systems utilize free energy from the sun to produce hot water which can also be used for space and/or pool heating for residential or commercial applications:



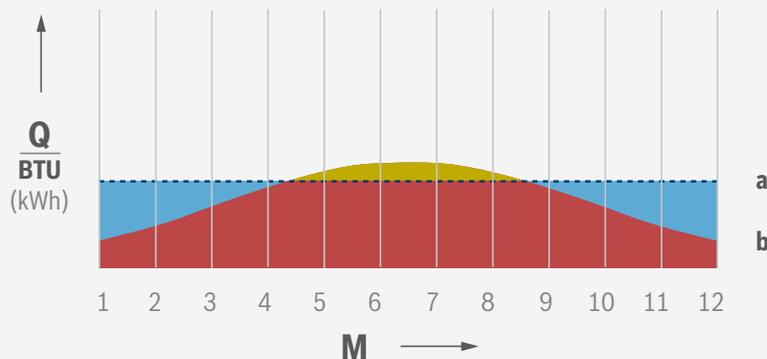
Here is how a Bosch solar thermal system works:

- ▶ Solar collectors contain an absorber that heats up when exposed to both diffused & direct sunlight
- ▶ The absorber contains pipes to transfer heat fluid. The absorber collects the heat and transports the solar heat to the tank where it can be stored for later use
- ▶ When the heat transfer fluid in the collectors is warmer than the bottom of the storage tank, the solar controller will turn on the solar loop pump to transport the hot fluid from the collectors through the solar tank coil where the solar energy is transferred to the stored water
- ▶ The collectors, the pump station, and the storage tank are connected with supply and return piping that is insulated to minimize heat loss
- ▶ As the system heats up or cools down, an expansion tank accounts for expansion and contraction of the heat transfer fluid

What happens if hot water demand fluctuates from the norm?

On days when more hot water is used than could be provided by the solar thermal system, i.e. during a series of cloudy days with limited insolation, Bosch tankless water heaters, boilers or heat pumps can serve as your back-up system.

Energy provided by a solar thermal system in relation to the annual energy demand for water heating



Legend

- a Energy demand
- b Energy provided by the solar system
- M Month
- Q Heating energy
- Solar energy (available for a swimming pool for example)
- Utilized solar energy (solar coverage)
- Energy demand that needs to be provided by the back-up system (reheating)

Why Bosch is your best choice



Since 1886, the Bosch brand has stood for first class technology, innovation, reliability and quality. Understanding the need to utilize renewable resources, Bosch has created an extensive solar thermal product line to save energy, reduce CO₂ emissions and contribute to energy independence while lowering monthly water heating bills through customizable solutions for any hot water need.

Whether remodeling, building a new home, updating plumbing or water heating systems, there is no better time to enjoy the benefits of a Bosch solar thermal system:

- ▶ More than 25 years of solar thermal expertise
- ▶ Systems designed to facilitate system upgrades
- ▶ Confidence in being able to purchase all solar, tankless, boilers and heat pump needs through one source
- ▶ Reduce installation cost through "plug and play" components
- ▶ Reliable customer support with spare parts availability throughout North America
- ▶ Savings up to 75% off your water heating bills*
- ▶ Reduced CO₂ footprint
- ▶ Ideal for residential or commercial hot water, space heating and pool heating applications

*Results may vary depending on installation

Bosch products meet or exceed industry certification standards

Bosch products are also renowned for their reliability and longevity. All products are built using top-grade materials and tested to meet the highest standards for performance, sustainability and safety:

- ▶ SRCC OG300 certified systems
- ▶ FSEC & CSA certified collectors
- ▶ ETL certified controls
- ▶ UL certified pump station & module components



Bosch system integration reinventing energy efficiency



Bosch Solar Thermal Systems

Bosch solar hot water solutions bring the first-class technology, innovation, reliability, quality and environmental sustainability that Bosch is known for world-wide, to the next level. These systems are designed for superior energy efficiency.



Bosch Tankless Water Heaters

If you are building or simply remodeling your current home or business, there's a Bosch tankless water heater designed for your every need. Every unit delivers the highest efficiency in the market and is built to stringent Bosch quality standards. With a Bosch tankless water heater you will get an endless supply of hot water to help reduce heating bills.



Bosch Controls

We supply a wide selection of advanced controls to ensure that your heating and hot water system delivers high efficiency and reliability. Bosch controls give the heating engineer quick and easy access to all functions of the heating system and also allows the integration of multiple heating products.



Buderus Boilers

Our extensive boiler line includes energy efficient cast iron boilers as well as the very latest aluminum condensing boilers and multiple boiler cascade systems for maximum energy efficiency.



FHP Geothermal Heat Pumps

Our high efficiency water source heat pump systems provide the most flexible and lowest installation costs of virtually any HVAC system. These systems are the most energy and cost efficient on the market-making them the greenest technology and the smartest investment for residential heating and cooling applications.



Solar, tankless, boiler and geothermal solutions from Bosch

Bosch is committed to reinventing energy efficiency by offering smart solar, tankless, boiler and geothermal products that produce hot water and indoor comfort solutions. Bosch products work alone or together as an integrated system to provide contractors, mechanical engineers and architects the opportunity to customize unique energy efficient systems.

To learn more about these products and Bosch systems visit the Energy Efficiency Home at www.bosch-climate.us

Glossary of Bosch components & applications



COLLECTORS

Device used to absorb energy from the sun, converting it into heat for producing hot water, space heating and / or pool heating. Also known as solar panels.



PORTRAIT

Refers to the vertically positioned version of the solar collector.



LANDSCAPE

Refers to the horizontally positioned version of the solar collector.



HEAT TRANSFER FLUID

This high-quality, non-toxic / food grade mixture is pumped through the pipes inside the collectors and transfers solar heat to the water in the storage tank.



PUMP STATION

Device that circulates heat transfer fluid within a solar thermal heating system from the collectors to the solar storage tank.



CONTROLS

An electronic controller that manages the operation of a solar thermal heating system.



SOLAR STORAGE TANK

Specially designed storage tank that stores accumulated solar energy for use in applications such as solar hot water and/or space heating.



SLOPED ROOF CONNECTION

Flexible hydraulic connections used when mounting solar collectors on a pitched roof.



FLAT ROOF CONNECTION

Hydraulic connections specially designed for mounting solar collectors on a flat or tilted roof.



SERIES CONNECTION

Hydraulic connections used primarily when plumbing two collector rows in a series.



AIR VENT

Optional device used to remove air from a solar thermal heating system during start-up.



LINE SET

Thermally pre-insulated double-pipe used for fast and flexible connection of the solar array and pump station.



EXPANSION TANK

Safety device used for absorption of excess pressure caused by thermal expansion of the heat transfer fluid under high temperatures.



COOLING VESSEL

Used to pre-cool the heat transfer fluid to minimize high temperature exposure of the expansion tank.



SLOPED ROOF MOUNTING

Bosch engineered collector mounting hardware specifically for flush attachment to a pitched roof.



FLAT ROOF MOUNTING

Bosch engineered collector mounting hardware specifically for attachment to a flat roof.



TILT MOUNTING

Bosch engineered collector mounting hardware for increasing the angle of a collector on a shallow pitched or flat roof.



WALL MOUNTING

Bosch engineered collector mounting hardware for installation of landscape oriented collectors on the wall of a building.



ACCESSORIES

Additional Bosch solar thermal system components.



RESIDENTIAL

Small to medium sized solar thermal system for homes, apartments, domestic dwellings, etc.



COMMERCIAL

Larger solar thermal systems for office buildings, multi-family dwellings, hotels, motels, restaurants, etc.



PRODUCT SAFETY FEATURE

Identifies a Bosch special “safety” feature.



10-YEAR WARRANTY

Bosch solar thermal collector warranty (subject to terms & conditions).



BOSCH SOLAR BACK-UP

Auxiliary heating system to ensure hot water is available when solar heated water is not, and includes Bosch tankless water heaters, boilers and heat pumps.



1-2 PERSON HOUSEHOLD

A residential solar thermal system designed to produce hot water for a one-to-two person household.



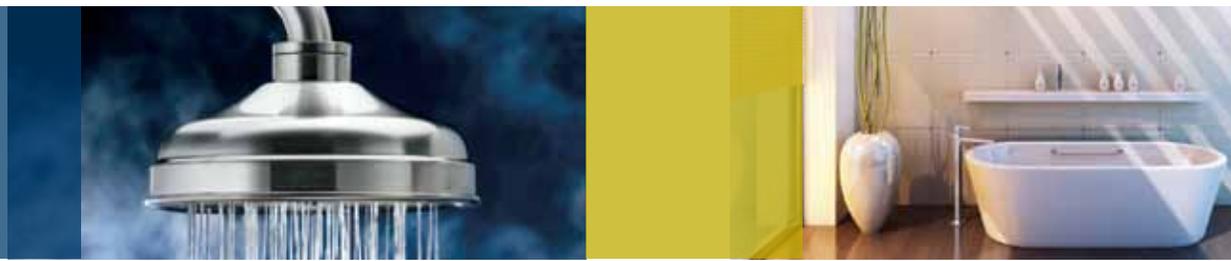
2-4 PERSON HOUSEHOLD

A residential solar thermal system designed to produce hot water for a two-to-four person household.



3-5 PERSON HOUSEHOLD

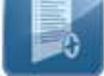
A residential solar thermal system designed to produce hot water for a three-to-five person household.

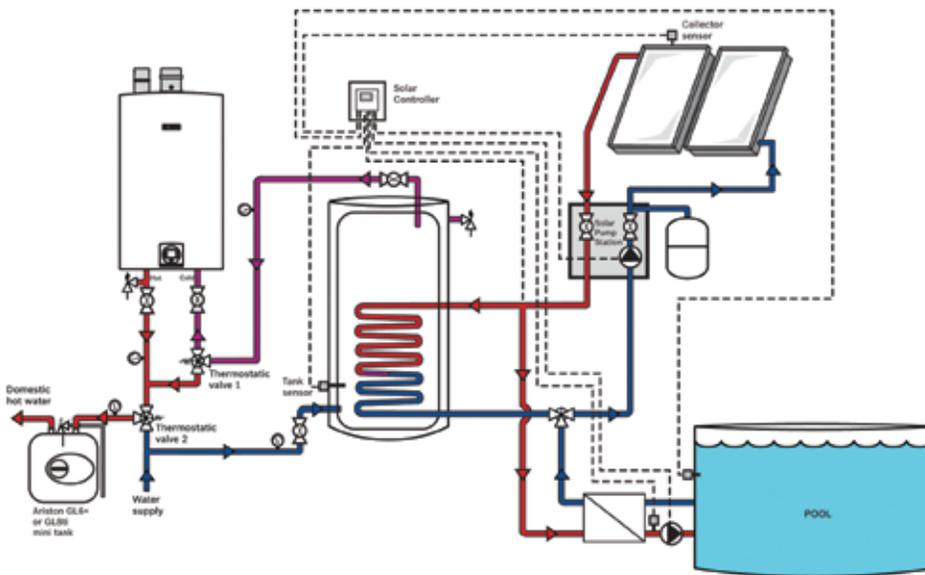


Residential domestic hot water + space heating + pool heating systems

Producing domestic hot water (DHW), space heating, and pool heating from a solar thermal system is a combination that makes sense in many cases. DHW typically takes first priority, and once at capacity, space heating takes second priority. If there are no space heating needs, the solar heat is diverted to the pool. If properly designed, this type of a system can provide the majority of DHW, resulting in significant fuel savings on the space heating side while extending the swim season of a pool. Four to ten panels and 200 to 500 gallon (750 to 2000 L) tanks are typically used in this type of application.

Residential system components include:

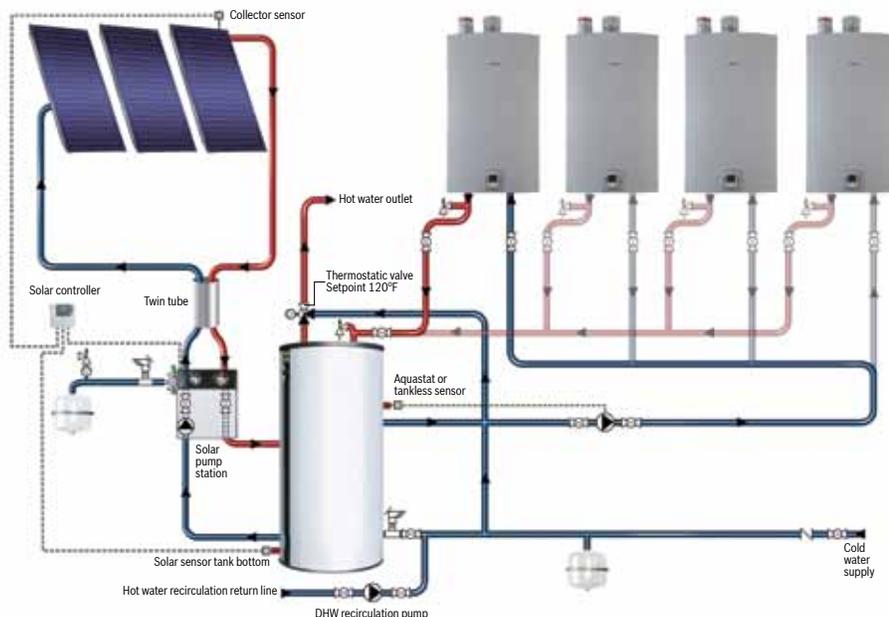
-  **COLLECTORS**
-  **PUMP STATION**
-  **LINE SET**
-  **CONNECTION SET**
-  **EXPANSION TANK**
-  **FLAT ROOF MOUNTING**
-  **CONTROLS**
-  **HEAT TRANSFER FLUID**
-  **ACCESSORIES**



Note: This schematic shows one of the many solar thermal Bosch back-up solutions.

Commercial hot water + space heating + pool heating systems

Volatile energy costs and tighter budgets make solar thermal heating a practical solution to offset future energy costs and reduce operating expenses. Hot water, space heating and pool heating for commercial buildings are ideal applications for a solar thermal system. In commercial systems with uniform consumption, solar pre-heating systems can be a financially viable solution. Integrating a solar thermal system with an existing system can greatly improve the overall energy efficiency. A solar pool heating system can also extend the swim season by providing a comfortably heated pool year round.



Note: This schematic shows one of the many solar thermal Bosch back-up solutions.

Can't figure out which application to utilize? Have a unique application you don't see listed?

Contact your local representative for more information regarding system sizing and design services for large residential and commercial customers. Or, use our GetSolar professional sizing tool at www.bosch-climate.us/GetSolar

Commercial system components include:



COLLECTORS



SOLAR STORAGE TANK



PUMP STATION



LINE SET



CONNECTION SET



EXPANSION TANK



FLAT ROOF MOUNTING



CONTROLS



HEAT TRANSFER FLUID



BACK-UP HEATER



ACCESSORIES



Solar thermal flat plate collectors

FKT-1, FKC-1



Bosch collectors use the energy from the sun to heat water for domestic, space and pool heating applications and are combined with a storage tank and auxiliary back-up to provide comfort and reliability. The collectors are available in portrait (vertical) and landscape (horizontal) formats.

- ▶ Excellent value & optimal performance using high selective absorber coating
- ▶ Fiberglass frame and solar safety glass for robust & durable construction
- ▶ Fastest hydraulic collector connection on market
- ▶ Universal mounting systems



COLLECTORS



RESIDENTIAL



COMMERCIAL



PRODUCT SAFETY



10-YEAR WARRANTY

FKT-1

Top Line collectors



Part Numbers & Pricing		
Part Number	8718530424	8718530425
Description	FKT-1s portrait Top Line collector	FKT-1w landscape Top Line collector
List Price	\$936	\$972

Collector Internal Construction View

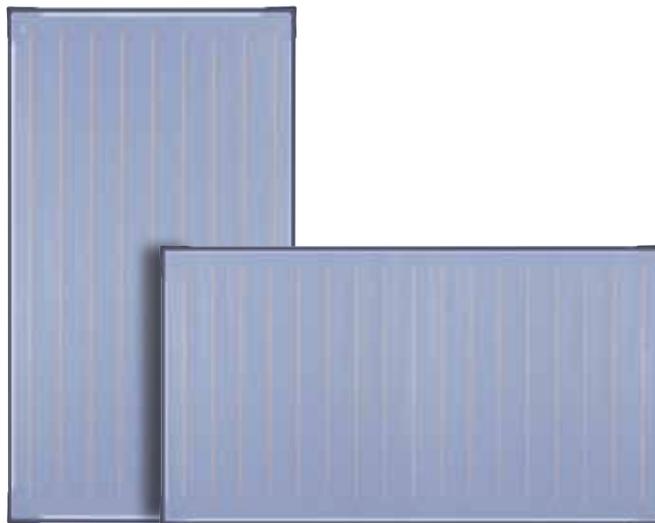
- Item 1: Solar safety glass
- Item 2: Absorber plate
- Item 3: Double meander piping
- Item 4: Mineral wool insulation
- Item 5: Galvanized steel rear panel
- Item 6: Fiberglass frame
- Item 7: Extruded plastic end cap
- Item R: Return
- Item V: Supply
- Item M: Collector sensor well

Technical Specifications		
	FKT-1s Portrait	FKT-1w Landscape
Gross Collector Area (m ²)	25.95 Ft ² (2.41)	25.95 Ft ² (2.41)
Net Aperture Area (m ²)	24.3 Ft ² (2.25)	24.3 Ft ² (2.25)
Dry Weight (kg)	97 lbs. (44)	99 lbs. (45)
Fluid Content (L)	0.37 gal (1.43)	0.46 gal (1.76)
Max. Operating Temperature (°C)	248°F (120)	248°F (120)
Stagnation Temperature (°C)	370°F (188)	370°F (188)
Solar Glass Thickness (mm)	1/8" (3.2)	1/8" (3.2)
Solar Glass Transmissivity	91.5%	91.5%
Coating	Highly selective PVD	Highly selective PVD
Absorptivity	95% ± 2%	95% ± 2%
Emissivity	5% ± 2%	5% ± 2%
Absorber Material / Type	Copper with ultrasonic welding / double meander	
Collector Type / Construction	Plug and socket connector / open vented	
Thermal Insulation (mm)	2 1/8" mineral wool, high temperature resistant and outgassing free	
Max. Operation Pressure (bar)	145 psi (10)	145 psi (10)
Nominal Flow Rate (L/hr)	0.22 gpm (50)	0.22 gpm (50)
Efficiency η ₀ (%)	85.1	85.1
Effective Heat Transfer Coefficient		
k ₁ W/(m ² ≥ K ¹)	4.0360	4.0360
k ₂ W/(m ² ≥ K ²)	0.0108	0.0108
Collector Yield (Minimum Yield Verification [†])	> 525	> 525
Max. # Col/Tow Opposite Side Connection	10	10
Max. # Col/Row Same Side Connection	5	5
Y-intercept	0.746	0.746

Performance Rating SRCC (OG100 Certified)	Category (Ti-Ta) Ti= inlet fluid temp Ta= ambient air temp	BTU Per Ft ² Per Day			Thousands of BTU Per Panel Per Day		
		Clear Day 2,000 BTU/ Ft ² .Day	Mildly Cloudy 1,500 BTU/ Ft ² .Day	Cloudy Day 1,000 BTU/ Ft ² .Day	Clear Day 2,000 BTU/ Ft ² .Day	Mildly Cloudy 1,500 BTU/ Ft ² .Day	Cloudy Day 1,000 BTU/ Ft ² .Day
FKT-1s / FKT-1w	A (-9 °)	1,486	1,119	757	36.1	27.2	18.4
	B (9 °)	1,358	992	630	33.0	24.1	15.3
	C (36 °)	1,156	798	444	28.1	19.4	10.8
	D (90 °)	757	432	128	18.4	10.5	3.1
	E (144 °)	391	128	0.0	9.5	3.1	0.0

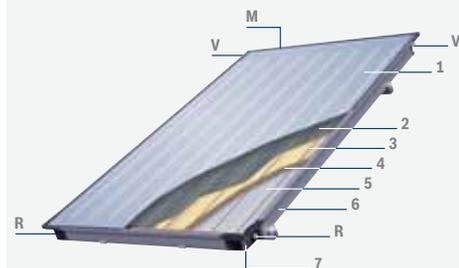
FKC-1

Comfort Line collectors



Part Numbers & Pricing		
Part Number	7747025774	7747025775
Description	FKC-1s portrait Comfort Line collector	FKC-1w landscape Comfort Line collector
List Price	\$794	\$837

Collector Internal Construction View



- Item 1: Solar safety glass
- Item 2: Absorber plate
- Item 3: Harp piping
- Item 4: Mineral wool insulation
- Item 5: Galvanized steel rear panel
- Item 6: Fiberglass frame
- Item 7: Extruded plastic end cap
- Item R: Return
- Item V: Supply
- Item M: Collector sensor well

Technical Specifications		
	FKC-1s Portrait	FKC-1w Landscape
Gross Collector Area (m ²)	25.95 Ft ² (2.41)	25.95 Ft ² (2.41)
Net Aperture Area (m ²)	24.3 Ft ² (2.25)	24.3 Ft ² (2.25)
Dry Weight (kg)	90 lbs. (41)	92 lbs. (42)
Fluid Content (L)	0.23 gal (.86)	0.33 gal (1.25)
Max. Operating Temperature (°C)	248°F (120)	248°F (120)
Stagnation Temperature (°C)	370°F (188)	370°F (188)
Solar Glass Thickness (mm)	1/8" (3.2)	1/8" (3.2)
Solar Glass Transmissivity	91.5%	91.5%
Coating	Highly selective black chrome	Highly selective black chrome
Absorptivity	96% ± 2%	96% ± 2%
Emissivity	12% ± 2%	12% ± 2%
Absorber Material / Type	Copper with ultrasonic welding / harp	
Collector Type / Construction	Plug and socket connector / open vented	
Thermal Insulation (mm)	2 1/2" mineral wool, high temperature resistant and outgassing free	
Max. Operation Pressure (bar)	87 psi (6)	87 psi (6)
Nominal Flow Rate (L/hr)	0.22 gpm (50)	0.22 gpm (50)
Efficiency η ₀ (%)	85.1	85.1
Effective Heat Transfer Coefficient k ₁ W/(m ² ≥ K ²) k ₂ W/(m ² ≥ K ²)	3.6810 0.0173	3.6810 0.0173
Collector Yield (Minimum Yield Verification ¹)	> 525	> 525
Max. # Col/Row Opposite Side Connection	10	10
Max. # Col/Row Same Side Connection	Not permitted	Not permitted
Y-intercept	0.723	0.723

Performance Rating SRCC (OG100 Certified)	Category (Ti-Ta) Ti= inlet fluid temp Ta= ambient air temp	BTU Per Ft ² Per Day			Thousands of BTU Per Panel Per Day		
		Clear Day 2,000 BTU/ Ft ² .Day	Mildly Cloudy 1,500 BTU/ Ft ² .Day	Cloudy Day 1,000 BTU/ Ft ² .Day	Clear Day 2,000 BTU/ Ft ² .Day	Mildly Cloudy 1,500 BTU/ Ft ² .Day	Cloudy Day 1,000 BTU/ Ft ² .Day
FKC-1s / FKC-1w	A (-9 °)	1,481	1,111	782	36	27	19
	B (9 °)	1,317	988	617	32	24	15
	C (36 °)	1,111	741	412	27	18	10
	D (90 °)	700	412	82	17	10	2
	E (144 °)	370	82	0.0	9	2	0.0



Solar storage tanks SOL-RET



Indirect storage tanks for closed loop pressurized solar water heating systems. 80 and 120 gallon (300 and 450 L) glass lined storage tanks with a single wrap-around heat exchanger that qualify for both single wall and double wall code jurisdictions. Tanks come equipped with a 4.5kW immersion element for supplemental water heating.



SOLAR STORAGE TANK



RESIDENTIAL



COMMERCIAL

SOL-RET

indirect solar storage tanks

Part Numbers & Pricing		
Part Number	SOL-RET80	SOL-RET120
Description	Indirect solar storage DHW tank, 80 gallon (300 L), single coil, 4.5kW heating element	Indirect solar storage DHW tank, 120 gallon (450 L), single coil, 4.5kW heating element
List Price	\$2,025	\$2,308



Use 3/16" one hole strap (not supplied) to secure temperature sensor against tank using threaded post and nut



Copper Coil Data (Type L Copper)

Maximum Pressure= 150 psi
 Maximum Temperature= 185°F
 Tube I.D.= 5/8"

Pressure Drop Through Coil (Feet of H ₂ O)		
Flow Rate	Head Loss (Feet)	
	80 Gallon (300 L)	120 Gallon (450 L)
1 gpm	1.3	1.6
2 gpm	4.8	5.6
3 gpm	10.0	12.0

Technical Specifications			Roughing in Dimensions			Energy Information
Tank Capacity (L)	Coil Capacity (L)	Length of Tubing Around Tank (m)	Height A (mm)	Diameter B (mm)	Approx. Shipping Weight (kg)	Approx. R-Factor
80 gals (300)	2.2 gals (8.3)	120' (36.6)	58 3/4" (1492)	24 1/2" (622)	220 lbs. (100)	R-17.3
120 gals (450)	2.6 gals (9.8)	143' (43.6)	62" (1575)	28 1/4" (718)	380 lbs. (172)	R-17.3

* Heater furnished with standard 240 volt AC, single phase non-simultaneous wiring and 4500 watt element. To prevent corrosion, proper pH levels in heat transfer fluid must be maintained. SOL-RET models meet all current state requirements for storage tank.



Features & benefits:

- ▶ Collector feed & return fittings located at front of tank for convenient installation
- ▶ Cold water inlet, hot water outlet, relief valve and anode rod at top of tank for easy access and fast, economical installation
- ▶ Isolated tank design for better heat retention
- ▶ High efficiency heating element
- ▶ Tank lining resists corrosion and prolongs tank life
- ▶ Heat exchanger: copper tubing wrapped around and secured to the tank
- ▶ Double wall, vented design for positive leak detection
- ▶ Cold water inlet brings cold water to tank bottom to prevent mixing with heated water
- ▶ Anode rod equalizes aggressive water action for prolonged tank life
- ▶ Automatic temperature control
- ▶ Temperature and pressure relief valve included
- ▶ Brass drain valve
- ▶ Warranty: 6-year limited tank and parts



Hydraulics

lifelines of the solar thermal system

Hydraulics are the lifelines of the solar thermal system. These units control extraction of the heat collected from direct sunlight and diffused rays via the collectors and then transferring this to heat the water in the storage tank. Bosch provides nearly all hydraulics components required for your solar needs, which are engineered and designed to work with each other to provide reliable performance.



PUMP STATION



CONNECTION SET



LINE SET



EXPANSION TANK



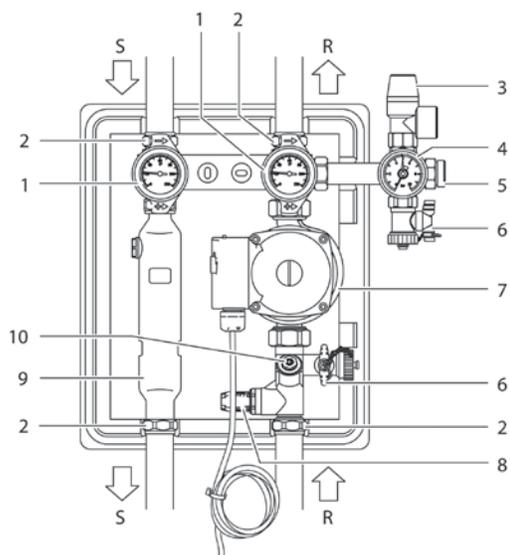
COOLING VESSEL



HEAT TRANSFER FLUID

Pump stations

Solar pump stations serve as the circulation system for transferring the heat drawn from the collectors via heat transfer fluid to the storage tank, working in conjunction with the control to maintain consistent high-efficiency. These compact units are completely integrated packages and come with all the operational and safety devices required for a reliable solar thermal system.



List of components

- S** Supply from collector to tank
- R** Return from tank to collector
- 1** Ball valve with thermometer and integrated flow check
 - Position 0°** = flow check engaged, ball valve open
 - Position 45°** = flow check manually open
 - Position 90°** = ball valve closed
- 2** Compression fitting (all supply & return connections)
- 3** Safety relief valve
- 4** Pressure gauge
- 5** Connection for expansion tank
- 6** Fill & drain valve
- 7** Solar circulator
- 8** Flow volume indicator
- 9** Air separator
- 10** Flow setter

Features & benefits:

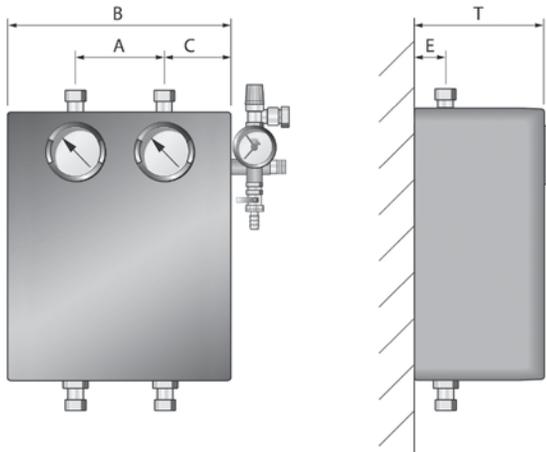
- ▶ Easy to install, with pre-assembled, fully integrated two-line pump kit
- ▶ Quiet, variable flow circulation solar system pump
- ▶ Line connections with compression fittings
- ▶ Integrated fill and drain valves for ease-of-service and maintenance
- ▶ Diverse performance levels depending on the size of the collector field

Part Numbers & Pricing				
Part Number	7747021981	7747021982	7747021983	8718530311
Description	KS-105 pump station with tempering valve, 120 V AC	KS-110 pump station with tempering valve, 120 V AC	KS-120 pump station with tempering valve, 120 V AC	KS-150 pump station with tempering valve, 120 V AC
List Price	\$1,001	\$1,056	\$1,138	\$1,800

Recommended item to purchase:

- ▶ Controls (not included) (Please see pages 34 -36 for Bosch controls)

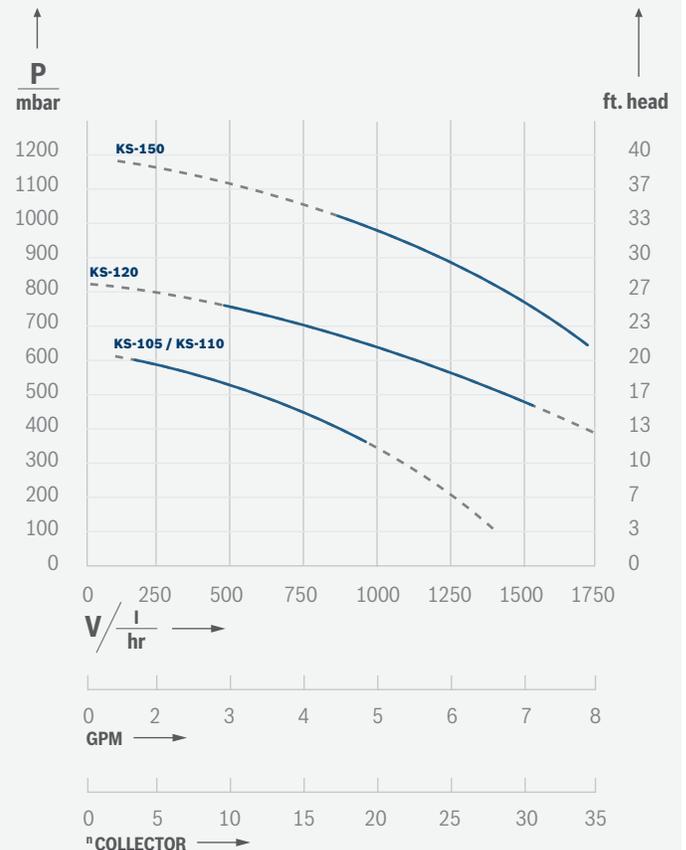
Pump stations



Dimensions

Dimensions (mm)	KS-105	KS-110	KS-120	KS-150
Height	14" (355)	14" (355)	14" (355)	14" (355)
Width (B)	11½" (290)	11½" (290)	11½" (290)	11½" (290)
Depth (T)	9 ¼" (235)	9 ¼" (235)	9 ¼" (235)	9 ¼" (235)
(A)	5 ⅞" (130)	5 ⅞" (130)	5 ⅞" (130)	5 ⅞" (130)
(C)	3 ⅞" (80)	3 ⅞" (80)	3 ⅞" (80)	3 ⅞" (80)
(E)	2" (50)	2" (50)	2" (50)	2" (50)

Pressure Drop Curve for n-Collectors



Technical Specifications

	KS-105	KS-110	KS-120	KS-150
Max. Recommended # of Collectors	5	10	20	50
Copper Pipe Connection Size (Compression Fitting) Supply/Return	½"	¾"	1"	1"
Expansion Tank Connection	¾"	¾"	¾"	1"
Safety Relief Valve (bar)	87 psi (6)	87 psi (6)	87 psi (6)	87 psi (6)
Circulation Pump Type	Bosch Solar 15-58	Bosch Solar 15-58	Bosch UPS 25-99	Bosch UPS 26-120
Circulation Pump Finished Length (mm)	5 ⅞" (130)	5 ⅞" (130)	7 ⅞" (180)	7 ⅞" (180)
Electrical Power Supply	120 V AC	120 V AC	120 V AC	120 V AC
Frequency	60 Hz	60 Hz	60 Hz	60 Hz
Max. Power Consumption	60 W	125 W	195 W	215 W
Max. Current Load	0.25 A	0.54 A	0.85 A	2.15 A
Throughput Limiter Adjusting Range (L/min)	½ - 1½ gpm (0.5-6)	½ - 4¼ gpm (2-16)	2 - 7 gpm (8-26)	5 - 11 gpm (20-42.5)
Weight (kg)	16 lbs. (7.1)	16 lbs. (7.1)	21 lbs. (9.3)	22 lbs. (10.0)

System modules for pump stations

Pump station modules are our building-blocks with pre-integrated components which plug into our solar pump station to provide common hydraulic options for solar applications.



Part Numbers & Pricing			
Part Number	8718572675	8718572677	8718572704
Description	SBU – change over module	SBH – heating support module	SBT – system division module
List Price	\$470.00	\$370.00	\$990.00



SBU change over module

Used with solar thermal systems with two storage tanks and one solar pump station. Priority / first tank connects on the left side; second tank is on the bottom. Overlap of the rear panel is needed for cooling of the pump station. Connects directly below the pump station.



Features & benefits:

- ▶ Easy planning with reduced component complexity
- ▶ Fast & easy installation with pre-integrated, “plug & play” parts, reducing labor costs
- ▶ Prevention of failure with clearly defined combinations & piping structure designs to lower likelihood of malfunction



SBH heating support module

For solar space heating with return temperature increase. Portrait / landscape mounting.



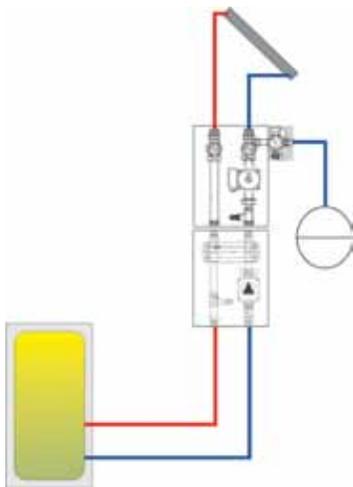
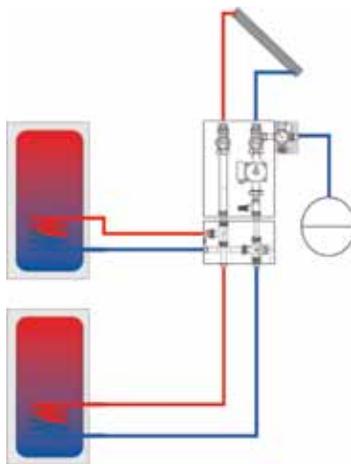
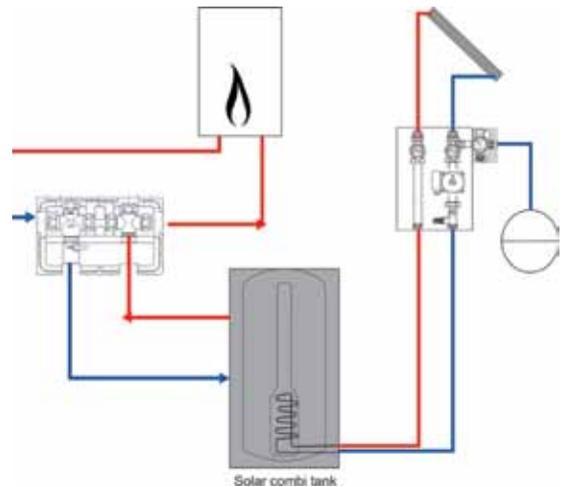
SBT system division module

Includes heat exchanger for heat transfer fluid. Overlap of the rear panel is needed for cooling of the pump station.



System modules for pump stations

System options:

SBT MODULE

SBU MODULE

SBH MODULE


Technical Specifications				
Type		SBU	SBH	SBT
Part Number		8718572675	8718572677	8718572704
Width x Height x Depth (mm)		290" / 203" / 217" (11.4 / 8 / 8.5)	290" / 174" / 135" (11.4 / 6.9 / 5.3)	290" / 374" / 217" (11.4 / 14.7 / 8.5)
Connection	Solar Loop Secondary Loop	Compression ring ½" Compression ring ¾"	- Compression ring ¾"	Compression ring ½" Compression ring ¾"
Max. Pressure (bar)		87 psi (6)	87 psi (6)	87 psi (6)
Flow Meter (L/min)		-	-	0.5 - 4.2 gal/min (2 - 16)
Delivery Height Pump (m)		-	-	18' (4) (UPS 15 - 58)
Socket Temperature Sensor (mm)		-	-	6" (9,7)
Actuator		120 V (2.5 W normally open)	120 V (2.5 W normally closed)	-
Flow Coefficient Value for Valves		Kvs 4,5	Kvs 4,5	-
Pressure Drop		-	-	SBT 10 mbar / 4 inch H ₂ O
Max # Collectors		10	-	8
Performance Heat Exchanger		-	-	10 kW/34,000 BTU/h (solar 1.8 gpm Δ 45° F (solar 131° F/86° F heating 77° F/122° F))

Connection sets

These flexible line sets allow easily fitting in tight corners and penetrations under the roof with no tools required. The connection sets also offer flexibility whether or not an air vent is being installed. There is a separate connection set for the FKT-1 and FKC-1; FKT-1 uses corrugated metal pipe, FKC-1 uses rubber hose.



Sloped roof connection sets

The sloped roof connection set is designed to connect the supply and return manifolds on the collector array with the solar line sets using a flexible connector that adapts to copper piping.



Part Number 8718530495
Description FKT-1 collector connection set, sloped roof
List Price \$220.00



Part Number 7747021988
Description FKC-1 collector connection set, sloped roof
List Price \$96.00



Flat roof connection sets

The flat roof connection set is designed to connect the supply and return manifolds on the collector array with the solar line sets using a 90° elbow fitting that adapts to copper piping.



Part Number 8718530496
Description FKT-1 collector connection set, flat roof
List Price \$93.00



Part Number 7747021989
Description FKC-1 collector connection set, flat roof
List Price \$96.00



Series connection sets

The series connection set allows piping two rows of collectors together with flexible lines that allow fitting in tight corners using the same quick connects as the collectors.



Part Number 7747025431
Description FKT-1 series connection set
List Price \$120.00



Part Number 83077300
Description FKC-1 series connection set
List Price \$91.00



Air vent sets

Solar heating systems consisting of more than 20 collectors should be vented via responsive air vent valves at the highest point of the system. For systems consisting of less than 20 collectors, an air vent is optional when operating the system using a high volume and high pressure filling station with air separator.



Part Number 83077210
Description FKT-1 solar air vent set
List Price \$120.00



Part Number 83077200
Description FKC-1 solar air vent set
List Price \$96.00

Line sets

Designed to minimize heat loss and protect against freezing, the twin tubing assembly has an embedded collector temperature sensor and is surrounded by a pre-insulated, robust weather/UV resistant jacket to simplify the installation of tube connections between Bosch collectors and the solar storage tanks.



Twin tube copper line set

Flexible copper line set can be bent in shape to easily fit the most challenging installations.



Part Number 7747208380
Description Twin tube set copper 1/2" 50' incl. adapters
List Price \$711.00



Twin tube stainless steel line sets

Flexible stainless steel line sets can be bent in shape to easily fit the most challenging installations.



Part Number 8718530798
Description Twin tube set stainless steel 1/2" 50' incl. adapters
List Price \$870.00



Part Number 8718530799
Description Twin tube set stainless steel 3/4" 50' incl. adapters
List Price \$980.00



Wall mounting bracket set

Accessory for twin tube line set.



Part Number 83007300
Description Wall mounting bracket set, accessory for twin tube 1/2"
List Price \$30.00



Part Number 8718530800
Description Adapter for twin tube stainless steel 1/2" x 1/2" pipe 2pcs.
List Price \$35.00



Part Number 8718530803
Description Adapter for twin tube stainless steel 3/4" x 3/4" pipe 2pcs.
List Price \$45.00



Part Number 8718530801
Description Adapter for twin tube stainless steel 1/2" x 3/4" pipe 2pcs.
List Price \$40.00



Part Number 8718530814
Description Coupling for twin tube stainless steel 1/2" 2pcs.
List Price \$45.00



Part Number 8718530802
Description Adapter for twin tube stainless steel 3/4" x 1/2" pipe 2pcs.
List Price \$75.00



Part Number 8718530815
Description Coupling for twin tube stainless steel 3/4" 2pcs.
List Price \$55.00

Expansion tanks



Bosch expansion tanks are safety devices that capture the expansion and condensation of the heat transfer fluid during stagnation. Each system's expansion tank capacity depends on system pressure, collector area, system volume and static height of the system.



Part Numbers & Pricing							
Part Number	7747202342	7747202343	7747202344	80432046	80432048	80657080	80657082
Description	Expansion tank 5 gal (18 L), 6 bar white	Expansion tank 7 gal (25 L), 6 bar white	Expansion tank 9 gal (35 L), 6 bar white	Expansion tank 13 gal (50 L), 6 bar white	Expansion tank 21 gal (80 L), 6 bar white	Expansion tank 26 gal (100 L), 6 bar blue	Expansion tank 36 gal (140 L), 6 bar blue
List Price	\$ 111	\$ 133	\$ 162	\$ 170	\$ 186	\$ 350	\$ 440

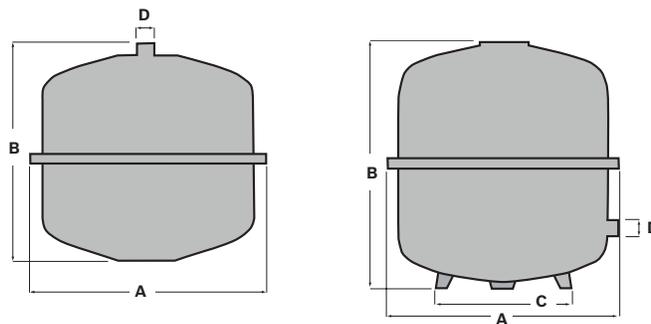


AAS / solar expansion tank connection set

Part Number 63003891
Description Only required for 5-13 gallon (18-50 L) tanks. Includes 24" of 3/4" corrugated stainless steel line, wall mounting bracket with flexfast connection fitting and mounting hardware.
List Price \$68.00

Features & benefits:

- ▶ Designed to meet solar thermal system requirements
- ▶ Resistant to high temperatures and degradation from heat transfer fluid
- ▶ A properly designed system will compensate volume changes in the solar thermal system and diminish the need to have a safety valve open



Technical Specifications							
Tank (L)	A (mm)	B (mm)	C (mm)	D Connection (male)	Pre-Pressure (bar)	Weight (kg)	Max. Operating Pressure (bar)
5 gal (18)	12.91" (328)	12.05" (306)	-	3/4"	21.76 psi (1.5)	16.53 lbs (7.5)	87.02 psi (6)
7 gal (25)	14.09" (358)	14.13" (359)	-	3/4"	21.76 psi (1.5)	21.16 lbs (9.6)	87.02 psi (6)
9 gal (35)	15.59" (396)	16.38" (416)	10.35" (263)	3/4"	21.76 psi (1.5)	26.01 lbs (11.8)	87.02 psi (6)
13 gal (50)	17.20" (437)	18.62" (473)	10.35" (263)	3/4"	21.76 psi (1.5)	33.29 lbs (15.1)	87.02 psi (6)
21 gal (80)	20.43" (519)	21.26" (540)	14.17" (360)	1"	21.76 psi (1.5)	48.72 lbs (22.1)	87.02 psi (6)
26 gal (100)	20.16" (512)	26.77" (680)	14.17" (360)	1"	21.76 psi (1.5)	45.2 lbs (20.5)	87.02 psi (6)
36 gal (140)	20.16" (512)	35.04" (890)	14.17" (360)	1"	21.76 psi (1.5)	63.05 lbs (28.6)	87.02 psi (6)

Cooling vessel

The cooling vessel is for larger volume closed loop solar hot water systems used to pre-cool the heat transfer fluid, minimizing high temperature exposure of the expansion tank. It is connected up-stream from the expansion tank and is typically installed in commercial systems with larger volumes of heat transfer fluid.



Part Number 83001626
Description Cooling vessel, 4 gallon (12 L)
List Price \$162



Heat transfer fluid

Bosch collectors contain an absorber that heats up when exposed to sunlight. The absorber contains pipes that are filled with heat transfer fluid that is transported to the tank where it can be stored for later use. The heat transfer fluid is specifically designed to protect the system components from frost and corrosion.



Part Number 8718660945
Description Pre-mixed solar fluid Tyfocor® L, 5.2 gallon (20 L)
List Price \$109



Part Number 8718571374
Description Pre-mixed solar fluid Tyfocor® L "G" OG300, 5.2 gallon (20 L)
List Price \$159

Features & benefits:

- ▶ Specifically engineered for use in Bosch solar thermal systems
- ▶ High quality, pre-mixed solar fluid mixture consisting of polypropylene glycol and water
- ▶ Non-toxic / food grade and biologically degradable
- ▶ Broad operational range from -35°F to 338°F (-37°C to 170°C)



Mounting hardware

versatile mounting solutions for quick, easy installation

Offering the perfect collector mounting solution for sloped roofs and flat roofs including shingle, tile and corrugated metal, as well as wall mounting installation.

Features & benefits:

- ▶ Designed to ensure the most aesthetic installations
- ▶ Use of high quality aluminum hardware that can withstand the most challenging environments, such as those exposed to high wind and snow loads
- ▶ Allow for flexible collector angles to optimize system performance based on application requirements
- ▶ Adjustable roof-jacks and pre-drilled rails require only an Allen wrench to install Bosch collectors
- ▶ Wind load calculations are PE stamped according to building codes throughout North America



SLOPED ROOF MOUNTING



FLAT ROOF MOUNTING



TILT MOUNTING



WALL MOUNTING

Sloped roof mounting hardware

Three different roof attachments are available from Bosch, providing optimal and secure fastening for collectors on sloped roofs quickly and easily.

Roof-jack sets

	Part Number 7739300281 Description Roof-jack set for asphalt shingle (set of 4) List Price \$82
	Part Number 7739300436 Description Roof-jack set, adjustable for interlocking tile (set of 4) List Price \$75
	Part Number 7739300439 Description Roof-jack set, hanger bolts for corrugated sheet, flat shingle (set of 4) List Price \$90



Basic roof mounting sets

	Part Number 7739300440 Description Basic roof mounting set, portrait List Price \$82
	Part Number 7739300442 Description Basic roof mounting set, landscape List Price \$120

Extension roof mounting sets

	Part Number 7739300441 Description Extension roof mounting set, portrait List Price \$82
	Part Number 7739300443 Description Extension roof mounting set, landscape List Price \$120

Auxiliary mounting sets

	Part Number 7739300444 Description Auxiliary rail, basic roof mounting set, portrait List Price \$41
	Part Number 7739300445 Description Auxiliary rail, extension roof mounting set, portrait List Price \$41

Wind, snow & ice loads*

			
Part Number 7739300448	Part Number 7739300449	Part Number 7739300450	
Description Snow load rail, interlocking tile, portrait	Description Snow load rail, flat shingle, portrait	Description Snow load rail, corrugated sheet, portrait	
List Price \$130	List Price \$130	List Price \$150	

Features & benefits:

- ▶ Adjustable roof-jacks were specifically designed to offer the necessary flexibility and adaptation for S-tile, barrel tile and similar interlocking tile roofs
- ▶ Hanger bolts are suitable for corrugated metal roofs, flat shingle roofs, mission and similar tile roofs, as well as other roofing materials, offering flexibility with attachment to the substructure while being height adjustable and easy to install

*Please reference Bosch engineering & sizing documents for wind, snow & ice load conditions.

Flat roof mounting hardware

Intended for installation of Bosch collectors on flat surfaces, surfaces with a shallow pitch of 6/12 (25°) or less and landscape positioned collectors mounted on-wall. Collector tilt angle can be adjusted from 30° - 60°. For situations where the flat roof mounting system cannot be attached to the substructure of the building, or where additional support is needed, ballast trays are available in sets of four per collector to be loaded with concrete blocks or similar ballast for added weight.



Basic roof mounting sets



Part Number 7739300454
Description Basic roof mounting set, 1 collector, portrait
List Price \$328



Part Number 7739300456
Description Basic roof mounting set, 1 collector, landscape
List Price \$328

Extension roof mounting sets



Part Number 7739300455
Description Extension roof mounting set, 1 collector, portrait
List Price \$260



Part Number 7739300457
Description Extension roof mounting set, 1 collector, landscape
List Price \$260

Auxiliary mounting sets

	Part Number 7739300444 Description Auxiliary, basic roof mounting set, portrait List Price \$41
	Part Number 7739300445 Description Auxiliary, extension roof mounting set, portrait List Price \$41
	Part Number 7739300459 Description Auxiliary mounting bracket, portrait List Price \$135
	Part Number 7739300446 Description Auxiliary, basic roof mounting set, landscape List Price \$65
	Part Number 7739300447 Description Auxiliary, extension roof mounting set, landscape List Price \$65
	Part Number 7739300460 Description Auxiliary mounting bracket, landscape List Price \$95

Ballast tray set



Part Number 7739300458
Description Ballast tray set, 1 collector, 4 trays, portrait & landscape
List Price \$85

A system consists of:

- ▶ Adjustable tilt angle
- ▶ Anti-slip protection for ease of installation
- ▶ Integrated collector clamps

Installers select:

- ▶ One basic system for the first collector in each row
- ▶ One extension system for each additional collector in that row
- ▶ In addition to these, choose the correct roof hooks depending on the type of roof surface

Tilt mounting hardware

Tilt mounting hardware offers rack mounting for flat and shallow tilted roofs at a competitive price, approximately 30% - 40% lower than standard flat roof racks. Collector tilt angle can be adjusted from 15° - 35°. There is a basic set that covers the first collector of each row, and each additional collector requires an extension set.

Basic roof mounting sets



Part Number 7747025400
Description Tilt mount basic set, portrait
List Price \$185



Part Number 7747025405
Description Tilt mount basic set, landscape
List Price \$185

Extension roof mounting sets



Part Number 7747025401
Description Tilt mount extension, portrait
List Price \$145



Part Number 7747025406
Description Tilt mount extension, landscape
List Price \$145

Auxiliary mounting sets



Part Number 7747025403
Description Tilt mount auxiliary rail, portrait
List Price \$40



Part Number 7739300444
Description Auxiliary, basic roof mounting set, portrait
List Price \$41



Part Number 7739300445
Description Auxiliary, extension roof mounting set, portrait
List Price \$41



Part Number 7739300446
Description Auxiliary, basic roof mounting set, landscape
List Price \$65



Part Number 7739300447
Description Auxiliary, extension roof mounting set, landscape
List Price \$65

Roof-jack sets & support



Part Number 7747025402
Description Tilt mount support, portrait
List Price \$80



Part Number 7747025408
Description Tilt mount support, landscape
List Price \$70



Part Number 7747025413
Description Roof-jack slate / shingle, twin set, portrait & landscape
List Price \$50



Part Number 7747029184
Description Roof-jack corrugated roof, twin set, portrait & landscape
List Price \$80



Features & benefits:

- ▶ Simplified mounting system for tilt angles up to 35°
- ▶ Made of light weight, anodized aluminum for corrosion resistance

A system consists of:

- ▶ Adjustable tilt angles
- ▶ Rails
- ▶ Integrated collector clamps

Wall mounting hardware

Bosch offers basic and extension roof mounting sets suitable for wall mounting. Suitable for buildings where a roof installation is not possible. Wall must have adequate load bearing capacity.



Basic roof mounting set



Part Number 7739300456
Description Basic roof mounting set, 1 collector, landscape
List Price \$328

Extension roof mounting set



Part Number 7739300457
Description Extension roof mounting set, 1 collector, landscape
List Price \$260

Auxiliary mounting set



Part Number 7739300446
Description Auxiliary, basic roof mounting set, landscape
List Price \$65



Part Number 7739300447
Description Auxiliary, extension roof mounting set, landscape
List Price \$65



Part Number 7739300460
Description Auxiliary mounting bracket, landscape
List Price \$95

Features & benefits:

- ▶ Collectors can be mounted to provide shade to keep windows and rooms cool
- ▶ In winter, when the sun's path is lower, solar gain can provide an additional source of energy

Advisory:

- ▶ Snow and ice accumulating on the collectors may give way and slide off suddenly. Take provisions that the installation does not pose a risk to property or cause personal injury.

Mounting hardware kits

Applicable for sloped roof & flat roof mounting

Bosch offers complete mounting kits pre-configured to the number of collectors and type of roof installation.

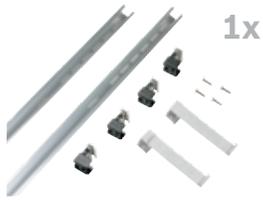
Sloped roof shingle mounting kits

Components included in two collector kit:

- 2 x Roof-jack connection sets, flat shingle
- 1 x Sloped roof basic mounting set, portrait
- 1 x Sloped roof extension mounting set, portrait



2x



1x



1x



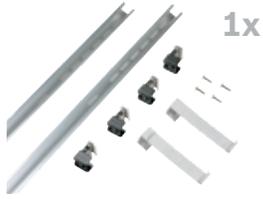
Part Number ORMK2CS
Description Sloped roof mounting kit, 2 collectors, shingle
List Price \$328

Components included in three collector kit:

- 3 x Roof-jack connection sets, flat shingle
- 1 x Sloped roof basic mounting set, portrait
- 2 x Sloped roof extension mounting set, portrait



3x



1x



2x



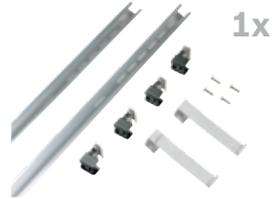
Part Number ORMK3CS
Description Sloped roof mounting kit, 3 collectors, shingle
List Price \$492

Mounting hardware kits

Sloped roof tile mounting kits

Components included in two collector kit:

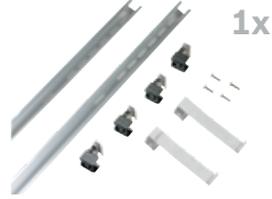
- 2 x Roof-jack connection sets, tile
- 1 x Sloped roof basic mounting set, portrait
- 1 x Sloped roof extension mounting set, portrait



Part Number ORMK2CT
Description Sloped roof mounting kit, 2 collectors, tile
List Price \$314

Components included in three collector kit:

- 3 x Roof-jack connection sets, tile
- 1 x Sloped roof basic mounting set, portrait
- 2 x Sloped roof extension mounting set, portrait



Part Number ORMK3CT
Description Sloped roof mounting kit, 3 collectors, tile
List Price \$471

Mounting hardware kits

Flat roof ballast mounting kits

Components included in two collector kit:

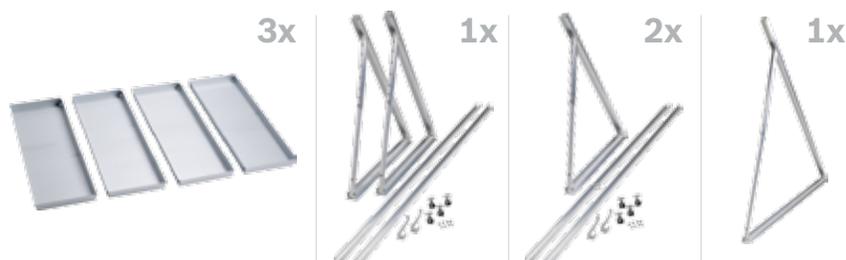
- 2 x flat roof ballast tray set, 1 collector
- 1 x flat roof basic mounting set, 1 collector, portrait
- 1 x flat roof extension mounting set, 1 collector, portrait
- 1 x flat roof auxiliary rail, portrait



Part Number	FRMK2CB
Description	Flat roof mounting kit, 2 collectors, ballast
List Price	\$758

Components included in three collector kit:

- 3 x flat roof ballast tray set, 1 collector
- 1 x flat roof basic mounting set, 1 collector, portrait
- 2 x flat roof extension mounting set, 1 collector, portrait
- 1 x flat roof auxiliary rail, portrait



Part Number	FRMK3CB
Description	Flat roof mounting kit, 3 collectors, ballast
List Price	\$1,103



Solar controls

TR0301 U, TR0603mc U



The solar controls ensure the circulation pump is running and automatically decide when to run the pump station to deliver heat from the collectors to the storage tank when the benefit of free solar energy is available.



CONTROLS



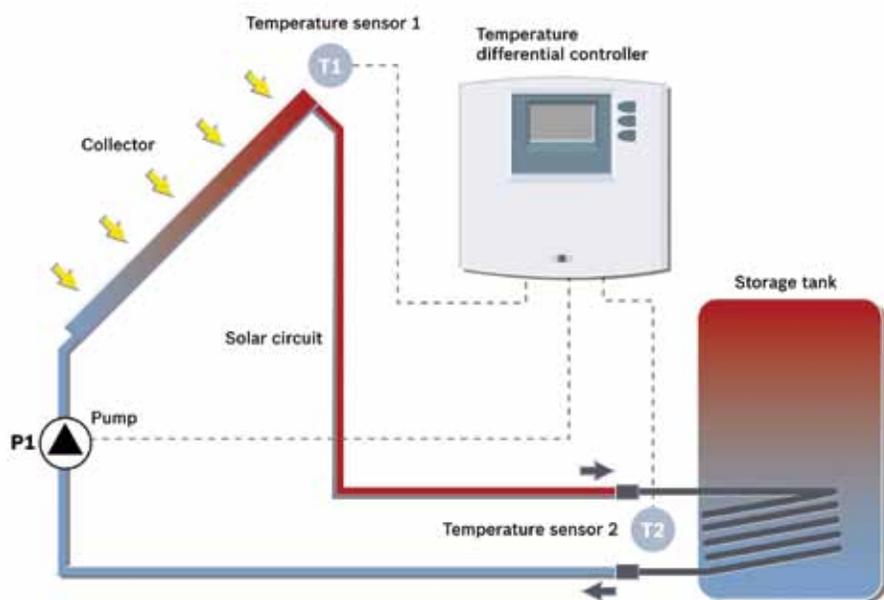
ACCESSORY

TR0301 U solar controller

The TR0301 U is a controller for basic solar thermal hot water systems. It features three temperature sensor inputs and an output for a solar circulator. The basic unit includes two temperature sensors (PT 1000 sensor).



Part Number 7747208381
Description TR0301 U solar controller
List Price \$240



Features & benefits:

- ▶ Backlight LCD display
- ▶ Animated representation of solar system functions
- ▶ Anti-freeze function
- ▶ Tank discharge function for heat dissipation
- ▶ Storage tank max. temperature set-point
- ▶ Temperature display for storage tank and collector
- ▶ Pump operation status display
- ▶ Temperature sensor and system monitoring
- ▶ Temperature display in °C/°F

TR0603mc U solar controller

The TR0603mc U is an intelligent controller that manages solar systems from simple hot water systems to systems with multiple tanks, hot water, space heating and pool heating demands. It has six PT-1000 sensor inputs and three programmable outputs. The controller's animated display simplifies programming and provides important diagnostic information in real time. The TR0603mc U has data logging capability and can measure energy collected when a flow meter is connected. Data tracked can be displayed and analyzed using the TS analyzer software (see page 40). The unit includes three temperature sensors (PT 1000 sensor).

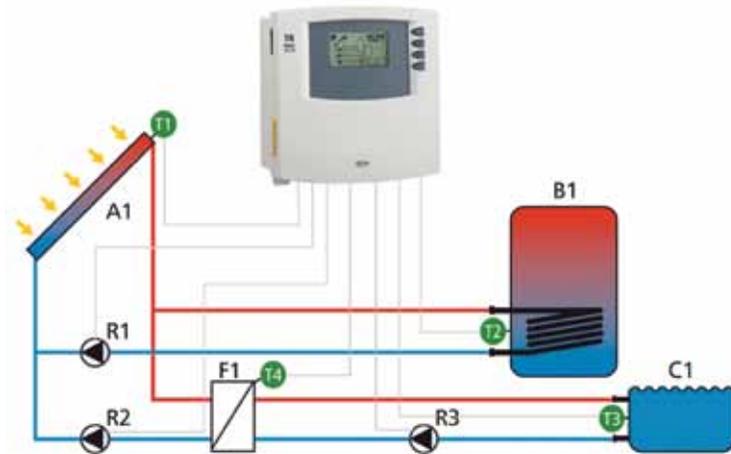


Part Number 8718572810
Description TR0603mc U solar controller
List Price \$1,075



Features & benefits:

- ▶ Microprocessor controlled with date and time, data logging capability with data stored on an SD media card
- ▶ Electronic pump speed control on two outputs
- ▶ One relay output and animated multifunction LCD display
- ▶ Forty pre-programmed systems and numerous additional functions for meeting customer specific applications
- ▶ Onboard monitor that indicates error messages in full text for easy servicing and maintenance
- ▶ Warranty: 2-years



Solar PT1000 sensor

The PT1000 sensors are 1000 ohm temperature sensors for additional temperature control using the TR0301 U and TR0603mc U solar controllers.



Part Number 7739300062
Description Solar PT1000 sensor
List Price \$57



Solar accessories

Lightning protection

The collector temperature sensor in the lead collector can be subject to overvoltage and potential damage during a thunderstorm because of its exposed location on the roof. The overvoltage protection junction box is designed for buffering lightning strikes in the vicinity of the solar collectors. Safety diodes limit this overvoltage to a level that will not damage the controller. The junction box must be located within 10 ft. (3.5 m) of the collector temperature sensor.



Part Number 83006120
Description Lightning protection
List Price \$41

Solar filling station

The solar filling station is a powerful tool for flushing, filling, bleeding, and pressurizing solar thermal systems. This dedicated station with its cleanable filter prevents contaminated heat transfer fluid from entering solar thermal systems. The solar filling station has large wheels for easy transport to the job site and a large fluid reservoir with cleanout opening. A ten-foot long, high-temperature rubber hose is also included.



Part Number 8718530474
Description Solar filling station
List Price \$1,250

Manual filling pump

Used for servicing pressurized solar thermal systems with antifreeze/water mixture. This low-cost filling system works quickly, by manually connecting direct to the pump station. The manual pump includes a check valve, and hose bib fitting. Please note the manual pump is recommended for topping off the system or increasing pressure - not filling or charging the system.



Part Number 83007262
Description Manual filling pump
List Price \$172

Honeywell diverter valves



Part Number V404A1191/U
Description Honeywell AM-1 diverter / mixing valve
(2 needed for tankless with solar)
List Price \$122

Watts / ESBE tempering valves



Part Number 83013079
Description ESBE tempering valve 3/4" MNPT; 95 - 140°F (35 - 60°C)
List Price \$100



Residential solar packages selection tool

Pre-configured systems designed to meet a variety of hot water needs. Bosch residential package components include collectors, pump station, line set, connection set, expansion tank, controls and heat transfer fluid. Bosch OG300 certified solar thermal system packages are Energy Star® rated.



COLLECTORS



PUMP STATION



LINE SET



CONNECTION SET



EXPANSION TANK



CONTROLS



HEAT TRANSFER FLUID

Residential solar system selection

Part Numbers & Pricing



Part Number	FKT 1-1OG300	FKT 1-1	FKC 1-1OG300	FKC 1-1
Description	OG300 Top Line 1-2 person package	Top Line 1-2 person package	OG300 Comfort Line 1-2 person package	Comfort Line 1-2 person package
List Price	\$3,566	\$3,516	\$3,276	\$3,226



Part Number	FKT 1-2OG300	FKT 1-2	FKC 1-2OG300	FKC 1-2
Description	OG300 Top Line 2-4 person package	Top Line 2-4 person package	OG300 Comfort Line 2-4 person package	Comfort Line 2-4 person package
List Price	\$4,502	\$4,452	\$4,070	\$4,020



Part Number	FKT 1-3OG300	FKT 1-3	FKC 1-3OG300	FKC 1-3
Description	OG300 Top Line 3-5 person package	Top Line 3-5 person package	OG300 Comfort Line 3-5 person package	Comfort Line 3-5 person package
List Price	\$5,438	\$5,388	\$4,864	\$4,814

Bosch DHW Solar Package Specifications

Components Included	Item	1-2 Person				2-4 Person				3-5 Person			
		Top Line		Comfort Line		Top Line		Comfort Line		Top Line		Comfort Line	
Part Number		FKT 1-1OG300	FKT 1-1	FKC 1-1OG300	FKC 1-1	FKT 1-2OG300	FKT 1-2	FKC 1-2OG300	FKC 1-2	FKT 1-3OG300	FKT 1-3	FKC 1-3OG300	FKC 1-3
SRCC Number		2009121L	-	2009121K	-	2009121M	-	2009121C	-	2009121N	-	2009121E	-
Collectors	Portrait	1	1	1	1	2	2	2	2	3	3	3	3
Controller	TR0301 U	x	x	x	x	x	x	x	x	x	x	x	x
Pump Stations	KS-105	x	x	x	x	x	x	x	x	x	x	x	x
Expansion Tank	7 gal (25L)	x	x	x	x	x	x	x	x	x	x	x	x
Expansion Tank Connection Set	AAS	x	x	x	x	x	x	x	x	x	x	x	x
Air Vent	FKT-1	x	x	-	-	x	x	-	-	x	x	-	-
	FKC-1	-	-	x	x	-	-	x	x	-	-	x	x
Connection Set	Sloped Roof	x	x	x	x	x	x	x	x	x	x	x	x
Line Set	50' Roll	x	x	x	x	x	x	x	x	x	x	x	x
Pre-Mixed Heat Transfer Fluid	Tyfocor® L "G"	x	-	x	-	x	-	x	-	x	-	x	-
	Tyfocor® L	-	x	-	x	-	x	-	x	-	x	-	x

Optional Components Not Included in Package

Mounting Hardware	Sloped Roof Flat Roof On-Wall	o	o	o	o	o	o	o	o	o	o	o	o
Storage Tank	SOL-RET	SOL-RET 80	SOL-RET 120	SOL-RET 120	SOL-RET 120	SOL-RET 120							
Advanced Controller	TR0603mc U	o	o	o	o	o	o	o	o	o	o	o	o

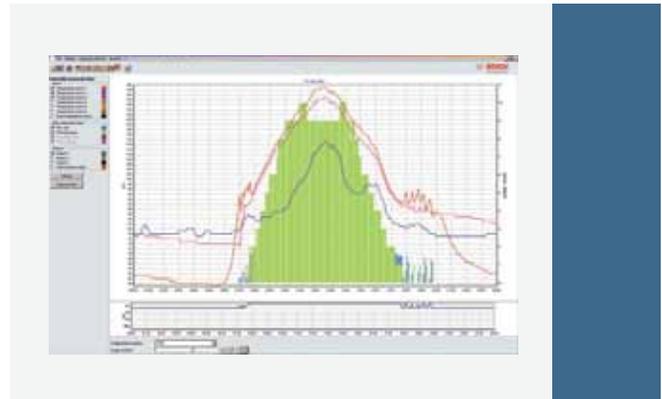
x = included | o = optional | - = N/A

Solar design tools & software

TS analyzer software

Analysis software used in conjunction with the data logging capability of the TR0603mc U controller. Provides visualization of the solar systems performance over time.

Visit www.bosch-climate.us/TSAnalyzer to download this software.



GetSolar professional sizing tool

GetSolar is a professional planning tool to help design and size solar thermal systems. The step-by-step wizard tool makes it easy to use for the novice. Experts can modify system parameters in order to fine tune the design of domestic hot water, space and pool heating systems.

Visit www.bosch-climate.us/GetSolar to access this tool.



Marketing & sales tools



Tax credits, savings & rebates

- ▶ Customers can save as much as 42% today on an installed solar thermal system purchase
- ▶ Installed systems can deliver up to 75% savings on monthly utility bills
- ▶ Solar thermal installations are eligible for a Federal Tax Credit of up to 30% of the installed cost*
- ▶ State and local utility company rebates can mean even more savings and incentives for your customers



<h2>Solar Thermal Net Cost Calculator</h2> <p>Example Average Calculation*</p> <p><small>*DISCLAIMER: This is a conservative percentage specific to U.S. rebates. As tax credits & rebates vary by state, contact your local tax consultant to learn the current status of the tax credits and rebates available, and how these may apply to your solar thermal system.</small></p>	Installed Cost.....\$9,000.00 *State Rebate.....\$1,000.00 *Utility Rebate.....\$ 500.00	MINIMUM SAVINGS AFTER ALL REBATES (IN THIS EXAMPLE) <h1 style="font-size: 48px; margin: 0;">42%</h1>
	<hr/> Net Cost After Rebates.....\$7,500.00 30% Federal Tax Credit\$2,250.00 <hr/> Net Cost.....\$5,250.00	

*Visit www.dsireusa.org for U.S. residents, or www.cansia.ca for Canadian residents to access the latest rebate opportunities for your state & region.

Bosch is compliant with the Buy America provision



Sales samples

Solar thermal collector cut-away samples



Part Number 7747000692
Description FKT-1 collector cutaway (20"x20"x9")
List Price \$432.00



Part Number 7747000691
Description FKC-1 collector cutaway (20"x20"x9")
List Price \$432.00

Bosch solar training



Bosch Solutions Centers, offering the best training programs nationwide

Bosch has always placed great emphasis on technical support and training for installers and service engineers. Today this need is greater than ever as technology continues to advance at a rapid pace. With the increased push for renewable technologies in the U.S., the need for training has never been greater. To ensure the highest levels of competence and expertise in the installation of all Bosch products, the company hosts intensive training courses for installers and commissioning engineers involved with servicing and finding the perfect “Bosch” solutions for every job.

Our training solutions centers offer a number of courses suitable for the installer and commissioning engineers, and a more comprehensive course for the servicing and solutions-focused engineers. These courses cover basic solar education/installation in addition to other Bosch product integration with solar thermal systems; tankless and point-of-use water heaters, geothermal heat pumps, boilers, etc.

Bosch’s network of national training solutions centers are strategically located throughout the U.S. and includes a newly opened training solutions center at our Irvine, CA office location. This Bosch facility offers solar and tankless training centers in addition to impressive training classrooms to showcase the Bosch range of products for renewable energy.

Each course is run by specialized trainers and is organized to deliver a combination of classroom theory and practical, hands-on experience that is second-to-none. We are proud to offer customized trainings upon request and are excited to announce that our two-day solar basic training course is now a registered NABCEP course for 16 continuing education credits.

For more information regarding our training courses, web based training, locations and registration, please visit www.bosch-climate.us



Terms and conditions of sale

1. GENERAL

1.1 Your purchase order(s), when accepted, will be subject to the following terms and conditions. The terms and conditions contained herein constitute the entire agreement between you ("Buyer") and Bosch Thermotechnology Corp ("BTC") with respect to the transaction(s) covered by your purchase order(s) as confirmed by BTC.

1.2 No modification or waiver of any of the terms and conditions contained herein and no additional or different terms or conditions shall be effective unless (i) modified by BTC's quotation or sales acknowledgement, or (ii) agreed to in a single writing signed by both parties. No oral agreement, course of performance or other means other than such written agreement signed by both parties expressly providing for such waiver shall be deemed to waive the terms of this document.

1.3 The terms and conditions set forth below shall become binding on the parties by:

- 1.3.1 BTC's written acknowledgment of Buyer's purchase order,
- 1.3.2 Signature of Buyer and BTC on an agreement for the purchase and sale of goods, or
- 1.3.3 BTC's delivery of the Goods, in whole or part.

2. PRICES AND TAXES

2.1 All prices are based upon BTC's pricing in effect on the date of the quotation, unless otherwise indicated on the face of the quotation. The delivery date will be established on the order acknowledgement form prepared and sent by BTC.. BTC reserves the right to adjust the prices due to increases in material, labor, manufacturing or shipping costs if the increases occur before the delivery date. If the amount of the cost increases exceed ten (10) percent, BTC has the right to cancel the contract on four (4) weeks notice in writing, and the delivery will not be made unless a new price agreement is reached.

2.2 The Prices do not include any applicable Federal, State or local sales, use, excise, value-added or similar-type tax or assessments applicable to the price, sale, use or delivery of the Goods ordered by Buyer. Such taxes and assessments will be included in BTC's invoice and paid by Buyer unless Buyer's purchase order plainly states on its face the existence of an exemption from any such tax or assessment and Buyer provides BTC with evidence of such exemption from the applicable taxing authority.

3. DELIVERY, TITLE & RISK OF LOSS

3.1 Delivery dates are approximate and are based upon prompt receipt of all necessary information from Buyer. Delivery shall be made and title and risk of loss shall pass to Buyer upon BTC placing the Goods with a carrier FCA point of shipment or Buyer's designated consignee. Receipt of the Goods by Buyer FCA point of shipment shall constitute Buyer's acceptance for delivery and waiver of any and all claims against BTC for loss or damage incurred due to delay. Shipments will only be insured at Buyer's request and expense. Title to the Goods is subject to Buyer's compliance with these Terms and Conditions. If Buyer fails to do so, BTC may, at its option, retake possession and title pursuant to Section 7.

3.2 In the event Buyer requests changes in specifications after these Terms and Conditions have become binding, such changes shall become part of the purchase order only upon acceptance by BTC in its sole discretion, whereupon delivery dates will be reasonably extended, BTC shall be compensated for all costs incurred in connection with such change and the price shall be adjusted to maintain BTC's anticipated profit margin.

3.3 No claims for errors in shipment will be considered unless made within 10 days after receipt of materials nor unless accompanied by necessary papers or documents to substantiate the claim. Claims for loss or damage in transit must be entered and prosecuted by Buyer.

4. INSTALLATION

4.1 The Goods shall be installed by and at the expense of the Buyer unless otherwise expressly stipulated in writing by Buyer and BTC.

4.2 BTC shall not be liable for material and equipment or the acts of Buyer's employees, agents or contractors, nor has it any responsibility for the performance of Goods not installed in compliance with the Installation Manual under the supervision of its superintendent unless deficient performance is caused by defects independent of the installation and within the scope of the warranty set forth in section 5.

4.3 BTC assumes no responsibility for damages due to deterioration during periods of storage by the Buyer prior to installation and operation.

4.4 BTC reserves the right to make changes in design or additions to or improvements in its products without liability to install such changes, additions or improvements in any product manufactured prior thereto.

5. WARRANTY POLICY

5.1 Unless a different limited written warranty is provided by BTC with the Goods, the terms and conditions of the warranty for the Goods shall be subject to the following limited written warranty. BTC warrants all Goods manufactured by it to be free from defects in material and workmanship for one year from the following:

- 5.1.1 The date of installation if a warranty card has been received by BTC that sets forth the correct date of installation;
- 5.1.2 The date of purchase if the date can be established by an invoice; or
- 5.1.3 The date of manufacture if the information required in 5.1.1 or 5.1.2 is not available.

Buyer's sole and exclusive remedy under this warranty shall be limited to either the repair or exchange of warranted products, at BTC's option FCA BTC's factory. No attempt to repair or improve the Goods or parts by any of BTC's representatives shall change or extend this warranty.

5.2 Limitations on Warranty

THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

The above warranty does not apply to specialty items or modifications to Goods, which as detailed in section 12.2, are purchased "AS IS."

5.3 If the Buyer (as that term is hereafter defined) or Agent grants to an end user any warranty which is greater in scope or time period than the warranty stated herein, BTC shall not be liable beyond this stated warranty. Except as otherwise provided under the Warranty Processing Procedures section of this warranty, equipment and accessories not manufactured by BTC shall not be the responsibility of BTC. The term "Buyer" as used herein means the person or firm that purchased the product directly from BTC and the end customer.

5.4 Warranty Processing Procedures

No products shall be returned without prior authorization from BTC. Buyer shall prepay all transportation charges for the return of such products to BTC's factory or authorized factory service center. BTC will not accept any charges for labor and/or parts incidental to the removal and remounting of products repaired or replaced under this warranty. All repair and replacement parts provided under this warranty will assume the identity, for warranty purposes, of the part replaced and the warranty on such replacement parts will expire when the warranty on the original part would have expired. Claims must be submitted within 30 days of failure or be subject to rejection. This warranty is not transferable beyond the first using purchaser.

5.5 The foregoing warranty does not cover conditions over which BTC has no control, including, without limitation, contamination, products damaged or subjected to voltage, or temperature outside of specified range, accident, abuse or misuse after shipment from BTC's factory, electricity or fuel costs or any unrealized savings (anticipated or projected) on energy costs, products altered, disassembled or repaired by anyone other than BTC personnel, BTC authorized factory service center personnel or persons so designated in writing by BTC's Customer Service Department prior to commencement of said work.

5.6 Types of failures which are not attributable to defects in materials and/or workmanship and which are not considered by BTC as part of its warranty include, but are not limited to the following:

- Damages due to deterioration during periods of storage by the Buyer prior to installation and operation.
- Damage due to unsuitable fuels, power, selection to the wrong product settings.
- Damage attributable to accident, abuse, neglect and improper maintenance.
- Operating outside the specified temperatures, venting requirements or flow rates.
- Repairs by unauthorized service personnel.
- Use of the product in a manner or purpose for which it was not designed or intended by BTC.
- Improper installation.
- Damage due to corrosion (including due to water quality, liquids utilized and air), mineral deposits, mold, fungus, abrasion or bacteria.
- Ordinary wear and tear.
- Any portion or component of any system that is not supplied by BTC, regardless of the cause of the failure of such portion or component.

- Products on which the unit identification tags or labels have been removed or defaced.
- Products on which payment to BTC, or to the owner's seller or installing contractor, is in default.

5.7 Whenever possible, each provision of the foregoing warranty shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this warranty shall be prohibited by or invalid under applicable law, such provision shall be ineffective only to the extent of such prohibition or invalidity without invalidating the remainder of such provision or the remaining provisions of this warranty.

6. FORCE MAJEURE

6.1 BTC shall not be liable for delays or failures in delivery, damage to Goods, or performance due to acts of God, governmental authority or public enemy, fire, flood, strike, labor disturbance, epidemic, war, riot, civil disturbance, power failure, embargoes, shortages in materials, components or service, boycotts, transportation delays or any other cause beyond BTC's control.

6.2 In the event of such delay or failure, Buyer's order shall not terminate, but the date of delivery or performance shall be extended for a period equal to the time lost by reason of the delay.

7. CANCELLATION AT DEFAULT OF BUYER

7.1 BTC may cancel Buyer's order without liability effective upon written notice to Buyer, upon occurrence of any of the following Events of Default:

- 7.1.1 Buyer's failure to make timely payment of any sum owing to BTC for the orders accepted and shipped by BTC or otherwise;
- 7.1.2 Buyer's failure to conduct its operation in the normal course of business (including the inability to meet obligations as they accrue);
- 7.1.3 Institution of any proceedings by or against Buyer under any bankruptcy, insolvency or similar law;
- 7.1.4 Appointment or application for a receiver for Buyer;
- 7.1.5 An assignment by Buyer for the benefit of creditors;
- 7.1.6 Failure of Buyer to furnish BTC with a written representation reaffirming Buyer's solvency (it being understood that Buyer's order hereunder constitute a representation by Buyer that it is solvent);
- 7.1.7 Failure of Buyer to maintain any insurance required as herein provided; or
- 7.1.8 Failure of Buyer to maintain the Goods free and clear of any and all Liens of third parties prior to Buyer's payment of the full purchase price.

7.2 Upon cancellation, at BTC's option:

- 7.2.1 Buyer shall pay for all Goods delivered and for all Goods completed or in process pursuant to purchase orders accepted by BTC;
- 7.2.2 With respect to all Goods for which BTC has not received full payment, BTC may stop delivery, retake (Buyer shall surrender the Goods without dispute) or retain possession of the Goods wherever located (all without notice, demand or legal process) and retain, lease or resell (at public or private auction or otherwise) without accounting to Buyer, and any payments received by BTC from Buyer or otherwise may be retained as liquidated damages;
- 7.2.3 BTC may declare any outstanding balance immediately due and owing and collect same from Buyer without further notice or demand, together with interest at the maximum rate permitted by law;
- 7.2.4 Refuse to deliver except for cash payment for all Goods.

7.3 The rights of cancellation and remedies provided in this Section are cumulative and are in addition to any other rights and remedies of BTC in law or equity.

8. PAYMENTS TERMS

8.1 Except as otherwise specified by BTC in writing, terms of payment are net thirty (30) days from date of invoice, with no discount allowed for earlier payment and no right of set-off for amounts due or allegedly due from BTC to Buyer. BTC reserves the right to alter or suspend credit terms, require C.O.D. or advance payment, whenever BTC has reasonable doubt as to Buyer's credit worthiness. If Buyer becomes delinquent in payment or refuses to accept C.O.D. shipments, BTC shall have the right, in addition to any other right it may have, to cancel any order of Buyer's, withhold further deliveries, and declare all unpaid amounts for products or goods previously delivered immediately due and payable. Each shipment shall be considered a separate and independent transaction and payment therefor shall be made accordingly. Amounts past due may, at BTC's discretion, be subject to an interest charge of 1.5% per month. All costs and expenses incurred by BTC as

a result for non-payment or delinquent payment by Buyer, including collection costs, interest, and reasonable attorneys' fees, shall be paid by Buyer. All invoices are due and payable in cash in United States of America funds.

8.2 In the event BTC consents to delay shipments after completion of the Goods or any portion thereof, payment shall become due upon notice to Buyer that such Goods are ready for shipment and such Goods shall thereafter be held at Buyer's risk and expense.

8.3 Buyer grants to BTC a purchase money security interest in the goods, products and/or equipment supplied hereunder. Failure of Buyer to make any payment when due shall entitle BTC, in its sole discretion, to declare all obligations of Buyer immediately due and payable; in such event BTC shall have all the rights and remedies of a secured party under applicable law. Buyer agrees to execute upon request such documents which may be deemed necessary or appropriate by BTC to create, perfect and maintain the perfection of its security interest under applicable law. Buyer hereby appoints BTC as its attorney-in-fact to sign and file a financing statement and such other documents as BTC deems necessary to create, file, perfect and maintain the perfection of its security interest.

8.4 In the event Buyer fails to fulfill the terms of payment of any invoice, or if the financial responsibility of the Buyer shall become impaired or unsatisfactory to the BTC, or if necessitated by any acts of any governmental authority, including financial disclosures mandated by Section 409 of Sarbanes Oxley Act, BTC reserves the right to change terms of payment and/or defer or discontinue further shipments without prejudice to any other lawful remedy, until past due payments are made and satisfactory assurances of Buyer's credit standing are received by BTC or until such acts or requirements of such governmental authority shall have been complied with.

8.5 BTC also reserves the right to cancel the contract in the case of any of the events described in Section 8.4, in which event Buyer shall compensate BTC for any commitments, obligations, expenditures, expenses, and costs including attorney fees, BTC may have incurred in connection with the contract. Each shipment by BTC shall be considered a separate transaction and if payment is not received therefore within the periods specified herein, BTC at its option may bring a separate suit to recover the contract price of each such shipment.

8.6 If any of the following events occur, BTC shall have the right to demand assurance from Buyer that payment in full will be made:

- 8.6.1 Buyer is delinquent in making payment hereunder for a period of 45 days after payment was due.
- 8.6.2 Buyer fails to meet his obligations with one or more other suppliers as the obligations occur.
- 8.6.3 A Writ of Attachment or Judgment is entered in any court of competent jurisdiction.

On written demand for assurance by BTC, Buyer shall, within five (5) days after receipt thereof, furnish, in amount sufficient to secure the full payment of the balance of any monies due hereunder on account of the purchase price, either a penalty bond issued by a competent surety company, or financial security, bank irrevocable letter of credit, or other liquid collateral to be held in escrow by an attorney at law as designated by BTC, to secure the payment of the purchase price aforesaid.

8.7 Buyer agrees that BTC retains its mechanic's lien, payment bond or other legal rights for unpaid deliveries, regardless of what other documents have been presented to BTC for signature that may imply otherwise. Buyer further agrees that BTC has the right to determine, in its sole discretion, how to apply payments, and which invoices to pay with all payments, received on account, despite any advice to the contrary.

9. LIMITATION OF LIABILITIES

9.1 BTC shall not be liable for any indirect, consequential, exemplary, special, incidental or punitive damages, including, without limitation, loss of use, loss of business, revenue, profit or goodwill, downtime costs, damage to associated equipment, cost of substitute goods, facilities or services, or claims of Buyer's customers for such damages, or other commercial or economic damages or costs, that may arise out of, in conjunction with or relate to, the failure of any Goods sold by BTC to Buyer, under any legal theory or cause of action, including, without limitation, tort, contract, warranty, strict liability or federal, state or local statute, ordinance or regulation. In no event shall BTC's liability exceed the price of the Goods which give rise to the claim.

9.2 Buyer agrees that if it transfers title to or leases the Goods to any third party Buyer shall obtain such party's agreement to the limitations of section 9.1.

10. FEDERAL CONTRACT REQUIREMENTS

If the Goods are purchased under a government contract or subcontract, Buyer

shall promptly notify BTC of the provisions of any government procurement laws and regulations which are required to be included in the contract covering the Goods. If compliance with such provisions increases BTC's costs or liability, BTC shall be entitled, at its option, to adjust the prices accordingly, request separate payment of the additional costs, or terminate this agreement with Buyer being responsible for all costs incurred by BTC.

11. EXPORT CONTROLS

BTC and Buyer acknowledge and agree that the Goods covered by Buyer's order are subject to export controls imposed by the United States Government under various federal laws. Buyer shall comply with all applicable recommendations or requirements of the United States Bureau of Customs and Border Protection's ("U.S. Customs") Customs-Trade Partnership Against Terrorism ("C-TPAT") initiative (for information go to <http://www.cbp.gov/> and find the link to the C-TPAT section). Buyer further certifies that the Goods: (a) are not intended to be used for any purpose prohibited by the applicable law or regulations including, without limitation, nuclear related activities or chemical/biological weapons or missiles; (b) are not intended to be released, shipped or re-exported to any destination to which the United States has prohibited shipment; and (c) are not intended to be released, shipped or re-exported, either directly or indirectly, to any persons identified on the Denied Persons List published by the U.S. Department of Commerce Bureau of Industry and Security. This Section shall survive any termination or expiration of Buyer's order.

12. CANCELLATION, CHANGES AND SPECIAL ORDERS

12.1 Buyer's orders may NOT be canceled or changed by Buyer without the prior written consent of BTC, which consent may be granted or withheld in BTC's sole discretion. In the event of such cancellation, Buyer shall be liable for BTC's anticipated profit and for all costs incurred prior to cancellation.

12.2 Buyer's may request specialty items or modifications. Any such specialty items or modifications will not be UL approved unless otherwise agreed by BTC in writing by an authorized representative of BTC. BTC does not warrant that the specialty items or modifications will perform to any level or standard and such specialty items or modifications are "AS IS" and the warranty provided in section 5 above does not apply.

13. RELEASE AND INDEMNIFICATION

Buyer acknowledges that it will use the Goods only in accordance with the Installation Manual applicable to the Goods. As such, Buyer agrees to release BTC from, and to hold harmless and, upon request, defend BTC for, from and against, any and all claims, suits, actions or legal proceedings brought against BTC, their affiliates and their officers, directors, employees and representatives, seeking injunctive relief or damages to recover any loss, damage or injury to person or property, including reputation and goodwill, whether brought by a federal, state or local governmental agency, or any other person, caused by or arising out of Buyer's purchase or use of the Goods. This release, hold harmless and indemnification shall apply, regardless of whether such claims, lawsuits, judgments, demands, actions or causes of action allege or are based on negligence, breach of implied warranty, strict liability, reckless or intentional conduct, or any other nature or manner of legal theory or cause of action. The sole exception to this agreement is if such claims, suits, actions or legal proceedings arise exclusively from failure of the Goods to meet the warranty set forth in Paragraph 5 above.

14. MISCELLANEOUS

14.1 NOTICE. All notices in connection with Buyer's order shall be in writing and shall be given by Federal Express or other reputable next day courier service or U.S. mail, postage prepaid, certified or registered, return receipt requested. Each notice shall be addressed to BTC at 50 Wentworth Avenue, Londonderry, NH 03053., Attn: President and to Buyer at the address contained in the Purchase Order, or at such other address as a party shall provide by notice to the other party. Notice shall be deemed effective upon delivery.

14.2 WAIVERS. No waiver shall be effective unless it is in writing. The failure of either party to require performance under any provision of this Agreement shall in no way affect the right of such party to require full performance at any subsequent time, nor shall the waiver by either party of a breach of any provision of this Agreement constitute a waiver of any succeeding breach of the same or any other provision.

14.3 SEVERABILITY. These Terms and Conditions shall be deemed severable and if any portion hereof shall be held to be invalid for any reason, the remainder shall not be deemed invalid but shall remain in full force and effect.

14.4 GOVERNING LAW/ARBITRATION. These Terms and Conditions shall be governed and construed in accordance with the laws of the State of Michigan except for its choice of law provisions. The United Nations Convention of the International Sale of Goods shall not apply. The Buyer and BTC agree to submit all disputes, except for requests for equitable relief by way of an injunction or restraining order (including BTC's right to relief under Section 7 above), between them to binding arbitration, which shall be held in or near Farmington Hills, Michigan, in accordance with the rules of the American Arbitration Association ("AAA") pertaining to commercial arbitration. All of Buyer's disputes and claims shall be brought within two (2) years of the date of delivery by BTC. Within 30 days after either party has notified the other in writing that it is submitting a dispute to arbitration, one arbitrator shall be appointed in accordance with said rules. The arbitrators shall have no authority to award punitive damages or any other damages excluded herein. A hearing of no more than five (5) consecutive business days shall be completed within 180 days from the Statement of Claim. The arbitration award shall be by a written decision containing findings of fact and conclusions of law and shall be final and binding. It may be entered in and enforced by any court of competent jurisdiction. The party prevailing in the arbitration or any other legal proceedings shall be entitled to recover its costs including reasonable attorney's fees incurred due to the arbitration or other legal proceedings.

14.5 MODIFICATION. These Terms and Conditions may not be amended, modified or supplemented at any time except by a written document signed by the parties.

14.6 ENTIRE AGREEMENT. This is the complete and final agreement between the parties related to the subject matter of these Terms and Conditions and supersedes all prior writings, conversations, understandings or agreements.

14.7 CREDIT. BTC reserves the right to grant, deny or stop advancing credit at any time in its sole discretion. BTC's credit policies are subject to change at any time without notice.

a. CREDIT INFORMATION. Buyer hereby consents to BTC giving or obtaining credit information to or from third parties regarding Buyer.

b. CREDIT CHECK AUTHORIZATION. Buyer authorizes BTC to conduct a credit investigation for the purpose of extending credit to Buyer. Buyer agrees to supply such information as may be required by BTC to: (i) warrant the future extension of credit; (ii) enable BTC to perfect liens; or (iii) recover upon any bond issued for its protection.

c. Buyer further agrees to inform BTC of any material change in the condition of its business or of any changes in its legal structure.

14.8 PARTIES IN INTEREST. These Terms and Conditions shall be binding upon and inure to the benefit of the parties and their respective successors and assigns.

14.9 ASSIGNMENT. Buyer shall not assign Buyer's order without the prior written consent of BTC, which consent may be granted or withheld in the sole discretion of BTC.

14.10 CLASS I OR II SUBSTANCES. Buyer warrants and agrees that pursuant to 40 C.F.R. 82.154(m), any class I or II substances included as a part of this sale are sold only for eventual resale to certified technicians or that Buyer is a certified technician under 40 C.F.R. 82, subpart B.

14.11 ENFORCEMENT. Buyer shall indemnify BTC against all costs and expenses (including attorney fees) reasonably incurred in the enforcement of Buyer's order and these Terms and Conditions.

14.12 DISPOSAL. **Buyer is responsible for the proper disposal of the Goods and must comply with all Federal, State and applicable local laws and regulations related to disposal, including the disposal of refrigerants. BTC is not responsible or liable for the disposal of the Goods.**

14.13 CONFIDENTIALITY. Prints or drawings attached to Buyer's order or otherwise furnished by BTC to Buyer in connection with BTC's performance under Buyer's order are the sole property of BTC. BTC retains all patent and other rights, including exclusive rights of use and/or manufacture and/or sale. BTC prints and drawings that are provided to Buyer for use with the Goods are to be reviewed only by necessary and authorized personnel of the Buyer and with the understanding that the information contained in the prints and drawings is confidential and proprietary to BTC and owned by BTC. BTC does not convey any permission to show, reproduce, or manufacture the article or articles shown in the prints or drawings, such permission to be granted only by specific authorization in writing signed by an officer or other authorized agent of BTC.

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