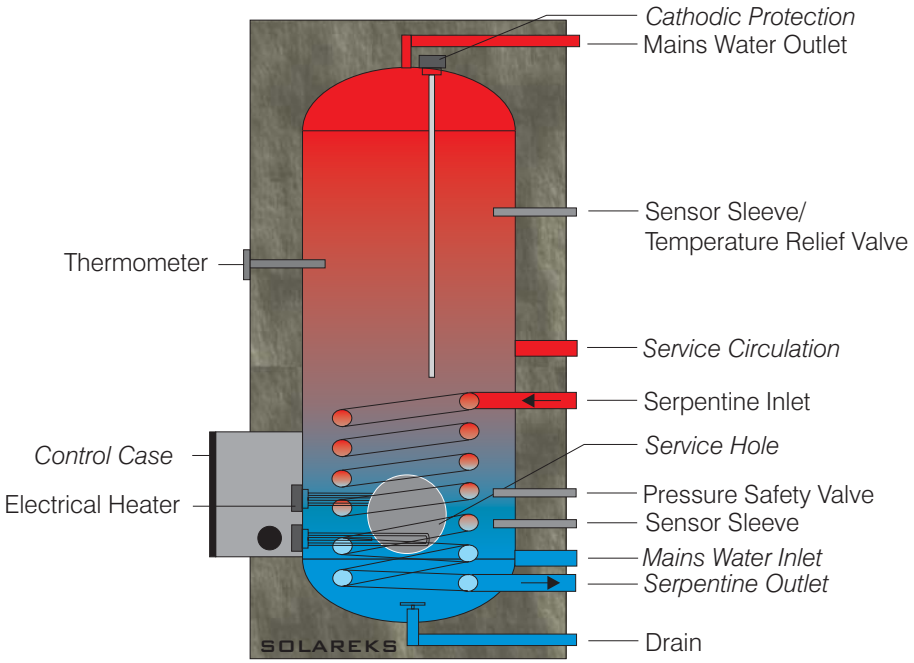
MARINE BOILER

SI UNIT CATALOGUE

BOILER&ELECTRICAL HEATER FOR SHIP

SOLAREKS - MARINE BOILER

Boiler is designed to be used in ships, water can be heated by electrical heaters and engine cooling luquid. While the engine is working engine cooling luquid passes through the serpentine in the boiler and heats the water storaged in the tank where energy is saved. When the engine is not working the water will be heated by the thermostatically controlled electrical heaters.



Technical Details

1- **Boiler and Electrical Heater in one Product**

Serpentine and electrical heaters are situated in the boiler. While the engine is working the water will be heated by the engine cooling liquid to save energy, when the engine is not working water can be heated by the electrical heaters

2- **Corrosion Protection and Hygiene**

Boilers inner tank is produced by high quality stainless steel for a longer useful life. Additional corrosion protection is obtained by magnesium anods. (Cathodic Protection)

3- **Insulation**

Boiler is insulated with rockwool against heat losses.

4- **Digitally Controlled Heaters**

Boilers heaters are controlled by digital thermostat, easy to use and safe by its coding system.

5- **Aesthetic**

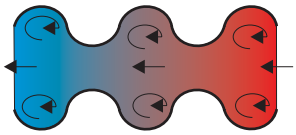
Thus the outer coverage of the boiler is made by brushed stainless steel has an aesthetic view.

6- **Long Useful Life**

The boilers are produced by stainless steel have a useful long life. Serpentine is designed to work as a compensator against heat tensions.

7- **Perfect Heat Transfer**

Pipes where the heat transfer fluid passes works like a turbulator, higher heat convection and heat convection coefficients are obtained to have a perfect heat transfer



8- **Installation**

Boiler can be connected to ground by welding or bolts. Wall hanging equipments lets a secure installation.

9- **Material in a High Quality and Production**

High quality stainless steel is used for production. Products are shipped after conducting pressure, electrical and packing controls.

10- **Safety**

Boiler is equipped with a digital thermostat and additional analog thermostat, If digital thermostat is broken down safety thermostat will switch off the electrical heaters at 80 °C. Non return valve is used not to let the electrical heaters work without water. Pressure safety valve is used to protect the tank against high pressures.

11- **Packing**

Woodbox is used to pack the products

12- **Warranty**

Stainless Steel: 5 years
Hot Deep Galvanized: 2 years
Electrical case&Equipments: 2 years
Electrical Heaters: 2 year warranty against production faults.

Note: Hetaers are not guarantied against crack or explosion of working conditions.

Technical Details

Capacity		100 lt	160 lt	200 lt	300 lt	400 lt	500 lt	600 lt
Corrosion Protection		Stainless Steel / Cathodic Protection						
Outer Coverage		Stainless Steel						
Insulation		Rockwool						
Dimensions (mm)		1000 x Ø 500	1300 x Ø 550	1300 x Ø 600	1560 x Ø 650	1500 x Ø 780	1830 x Ø 780	1700 x Ø 850
Weight (kg)		40	58	73	89	108	127	140
Working Pressure		6 bars						
Test Pressure		9 bars						
Thermostat Heater 440 V- 3 Phase - 60 Hz		2x4,5 kW 9 kW	2x4,5 kW 9 kW	2x4,5 kW 9 kW	3x4,5 kW 13,5 kW	3x6 kW 18 kW	3x7,5 kW 22,5 kW	3x7,5 kW 22,5 kW
Time of the heating by electrical heater (min.) considering heating from 10°C up to 50°C		31	50	62	62	62	62	74
		Serpentine Continous Working Capacity						
Heat Transfer Fluid Temperature ↘		**100 lt**	**160 lt**	**200 lt**	**300 lt**	**400 lt**	**500 lt**	**600 lt**
Heating Capacity (lt/h) considering heating from 10°C up to 50°C	80°C	490 lt/h	845 lt/h	885 lt/h	1270 lt/h	1630 lt/h	2000 lt/h	1760 lt/h
	70°C	385 lt/h	665 lt/h	700 lt/h	1000 lt/h	1280 lt/h	1620 lt/h	1400 lt/h
	60°C	305 lt/h	495 lt/h	525 lt/h	740 lt/h	960 lt/h	1180 lt/h	1030 lt/h

Technical Details

Capacity	750 lt	1000 lt	1250 lt	1500 lt	1750 lt	2000 lt	2500 lt
Corrosion Protection	Stainless Steel / Cathodic Protection						
Outer Coverage	Stainless Steel						
Insulation	Rockwool						
Dimensions (mm)	1850 x Ø 900	2090 x Ø 990	2250 x Ø 1100	2050 x Ø 1300	2100 x Ø 1340	2190 x Ø 1390	2150 x Ø 1600
Weight (kg)	185	253	315	375	462	550	645
Working Pressure	6 bars						
Test Pressure	9 bars						
Thermostat Heater 440 V- 3 Phase - 60 Hz	3x10 kW 30 kW	3x15 kW 45 kW	3x15 kW 45 kW	3x20 kW 60 kW	3x20 kW 60 kW	3x30 kW 90 kW	3x30 kW 90 kW
Time of the heating by electrical heater (min.) considering heating from 10°C up to 50°C	70	62	77	70	81	62	77

Serpentine Continous Working Capacity

Heat Transfer Fluid Temperature ↘		750 lt	1000 lt	1250 lt	1500 lt	1750 lt	2000 lt	2500 lt
Heating Capacity (lt/h) considering heating from 10°C up to 50°C	80°C	2200 lt/h	3540 lt/h	4250 lt/h	4950 lt/h	5850 lt/h	6780 lt/h	8475 lt/h
	70°C	1750 lt/h	2800 lt/h	3350 lt/h	3900 lt/h	4650 lt/h	5400 lt/h	6750 lt/h
	60°C	1280 lt/h	2100 lt/h	2500 lt/h	2930 lt/h	3400 lt/h	3950 lt/h	4920 lt/h

Technical Details

Capacity	3000 lt	4000 lt	5000 lt
Corrosion Protection	Stainless Steel / Cathodic Protection		
Outer Coverage	Stainless Steel		
Insulation	Rockwool		
Dimensions (mm)	2190 x Ø 1640	2200 x Ø 1890	2200 x Ø 2090
Weight (kg)	725	948	1225
Working Pressure	6 bars		
Test Pressure	9 bars		
Thermostat Heater 440 V- 3 Phase - 60 Hz	4x30 kW 120 kW	5x30 kW 150 kW	5x30 kW 150 kW
Time of the heating by electrical heater (min.) considering heating from 10°C up to 50°C	70	74	93

Serpentine Continous Working Capacity

Heat Transfer Fluid Temperature ↘		3000 lt	4000 lt	5000 lt
Heating Capacity (lt/h) considering heating from 10°C up to 50°C	80°C	8070 lt/h	10700 lt/h	13100 lt/h
	70°C	6380 lt/h	8500 lt/h	10850 lt/h
	60°C	4730 lt/h	6300 lt/h	8070 lt/h

Material Specifications

	Material	ASTM (USA)	EN (Europe)	UNS (USA)	BS (Great Britain)	JIS (Japan)	NF (France)	SIS (Sweden)	GOST (Russia)
Inner Tank	Stainless Steel	304 L	1.4306 - X12 CrNi 19-11	S30403	304S11	SUS 304 L	Z 3 CN 18-10	2352	03Ch18N11
Serpentine	Stainless Steel	316 L	1.4432 - X5 CrNiMo 17-12-3	S31603	316S13	SUS 316 L	Z 3 CND 17-12-03	2353	03Ch17N14M3
Electrical Heater	Stainless Steel	316 L	1.4432 - X5 CrNiMo 17-12-3	S31603	316S13	SUS 316 L	Z 3 CND 17-12-03	2353	03Ch17N14M3
Cathodic Protection	Magnesium	**ASTM -** B843AZ63(H-1)							
Insulation	Rockwool	**EN -** 13162							
Outer Coverage	Stainless Steel	304 L	1.4306 - X12 CrNi 19- 11	S30403	304S11	SUS 304 L	Z 3 CN 18-10	2352	03Ch18N11
Mounting Parts	Stainless Steel	304 L	1.4306 - X12 CrNi 19- 11	S30403	304S11	SUS 304 L	Z 3 CN 18-10	2352	03Ch18N11

Control Case Specifications

Boiler is shipped with all working equipments ready to use. Below are the main elements of control case;

- Electrical Heater: To have a long useful life in hard working conditions 316 quality stainless steel is used in production, heaters are designed for low energy output per square meter. Electrical heaters can be operated seperately. When one of the heater is broke down the others can be operated.

- Emergency Stop Button

- Reset Button: If the system is stopped becouse of unsafety conditions it should be reset before operating.

- Digital Controller/Thermostat: Easy to adjust temperature. Becouse of its coding system limit sets can be done only by authorized person.

- Safety Thermostat: Safety thermostat is used as an additional safety when the digital thermostat is out of order. It switches of the heating elements when the water temperature is 80 °C. It is used to prevent boiler producing steam and to prevent users from scalding.

- Dielectric Current Protection Relay: When there is leakage current in system Protection Relay switches off the system.

- Magnetic Contactors are heavy duty resistive load type rated for 100.000 cycles.

- Water proof control case is used.

- Easy&Secure to change heaters: Control case has two gates second is a flat type gate (service gate) which is easy to open and used to change the electrical heaters, open gate cut off switch is used as an additional safety which switches off heaters when the service gate is open.

- 24 Volt AC Control Circuit Voltage.

Safety Specifications

- Adjustable Safety Valve: Protects boiler against high mains water pressure. Can be adjusted between 3 bars to 12 bars.

- Non-Return Valve: Prevents electrical heaters against dry fired.

- Boiler is equipped with a digital thermostat and additional analog thermostat, If digital thermostat is broken down safety thermostat will switch off the electrical heaters at 80 °C.

- Temperature Relief Valve: Protects users against high temperature&scalding (Optional).

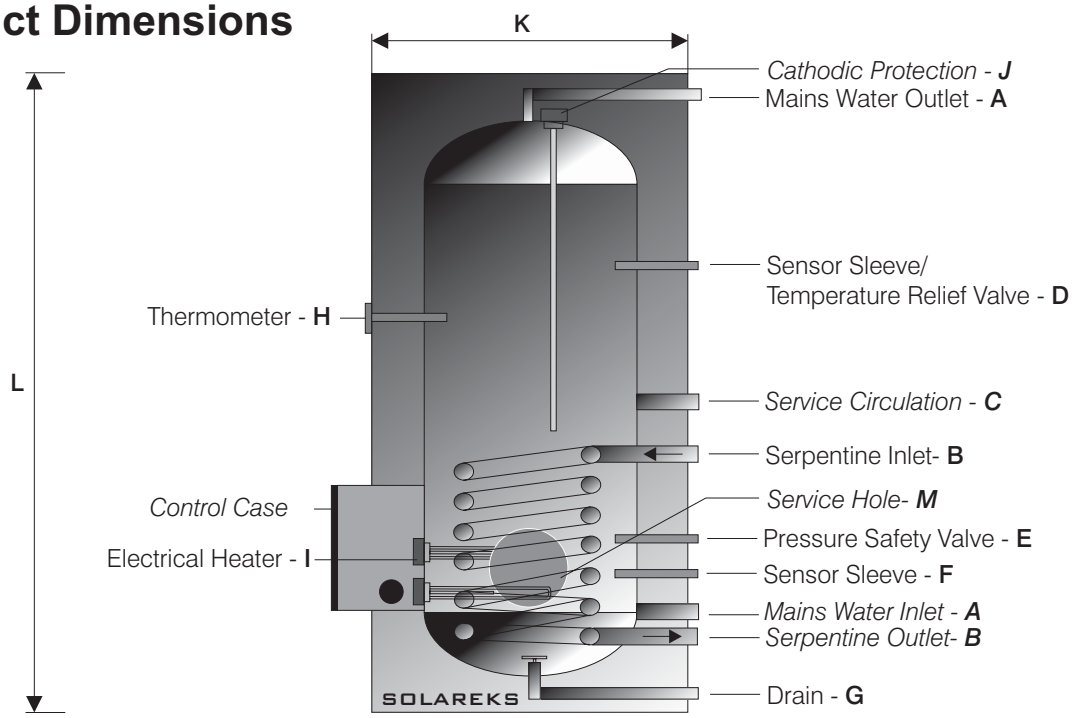
- Thermostatic Mixing Valve: Mixes hot water with cold water to deliver tempered water at a controlled temperature (Optional)

- Boiler Mounting Equipments: Special hanging apparatus are use against boiler falling over.

- Emergency Lamp: Lamp is turned on in water temperature which exceeds the adjusted value, or when leakage current occurs (Optional).

- Low Water cutout device to prevent dry firing of heating elements (Optional).

Product Dimensions



Capacity	100 lt	160 lt	200 lt	300 lt	400 lt	500 lt	600 lt	750 lt	1000 lt	1250 lt
A- Mains Water Inlet/Outlet	¾"	¾"	¾"	1"	1"	1"	1"	1 ¼"	1 ¼"	1 ¼"
B- Serpentine Inlet/Outlet	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"
C- Service Circulation	¾"	¾"	¾"	1"	1"	1"	1"	1 ¼"	1 ¼"	1 ¼"
D- Sensor Sleeve/Temperature Relief Valve	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"
E- Pressure Safety Valve	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"
F- Sensor Sleeve	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"
G- Drain	½"	½"	½"	½"	½"	½"	¾"	¾"	¾"	¾"
H- Thermometer	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"
I- Electrical Heater- 440 V - 60 Hz - 3 phase	2x4,5 kW	2x4,5 kW	2x4,5 kW	3x4,5 kW	3x6 kW	3x7,5 kW	3x7,5 kW	3x10 kW	3x15 kW	3x15 kW
J- Cathodic Protection - Ø 26 (mm)	700	700	700	700	700	700	700	1400	1400	1400
K- Diameter (mm)	500	550	600	650	780	780	850	900	990	1100
L- Height (mm)	1000	1300	1300	1560	1500	1830	1700	1850	2090	2250
M- Service Hole	4"	4"	4"	4"	4"	4"	4"	4"	4"	4"
N- Weight (kg)	40	58	73	89	108	127	140	185	253	315

Capacity	1500 lt	1750 lt	2000 lt	2500 lt	3000 lt	4000 lt	5000 lt
A- Mains Water Inlet/Outlet	1 ½"	1 ½"	1 ½"	1 ½"	2"	2"	2"
B- Serpentine Inlet/Outlet	1"	1"	1"	1"	1"	1"	1"
C- Service Circulation	1 ½"	1 ½"	1 ½"	1 ½"	2"	2"	2"
D- Sensor Sleeve/Temperature Relief Valve	½"	½"	½"	½"	½"	½"	½"
E- Pressure Safety Valve	½"	½"	½"	½"	½"	½"	½"
F- Sensor Sleeve	½"	½"	½"	½"	½"	½"	½"
G- Drain	1"	1"	1"	1"	1 ¼"	1 ¼"	1 ¼"
H- Thermometer	½"	½"	½"	½"	½"	½"	½"
I- Electrical Heater- 440 V - 60 Hz - 3 phase	3x20 kW	3x20 kW	3x30 kW	3x30 kW	4x30 kW	5x30 kW	5x30 kW
J- Cathodic Protection - Ø 26 (mm)	1400	2100	2100	2100	2100	2100	2100
K- Diameter (mm)	1300	1340	1390	1600	1640	1890	2090
L- Height (mm)	2050	2100	2190	2150	2190	2200	2200
M- Service Hole	4"	4"	4"	4"	4"	4"	4"
N- Weight (kg)	375	462	550	645	725	948	1225

SOLAREKS STANDART SPECIFICATIONS

Products are shipped at the specifications which are written below, if needed options should be note down.

Material Specifications

	Material	ASTM (USA)	EN (Europe)	UNS (USA)	BS (Great Britain)	JIS (Japan)	NF (France)	SIS (Sweden)	GOST (Russia)
Inner Tank	Stainless Steel	304 L	1.4306 - X12 CrNi 19-11	S30403	304S11	SUS 304 L	Z 3 CN 18-10	2352	03Ch18N11
Serpentine	Stainless Steel	316 L	1.4432 - X5 CrNiMo 17-12-3	S31603	316S13	SUS 316 L	Z 3 CND 17-12-03	2353	03Ch17N14M3
Electrical Heater	Stainless Steel	316 L	1.4432 - X5 CrNiMo 17-12-3	S31603	316S13	SUS 316 L	Z 3 CND 17-12-03	2353	03Ch17N14M3
Cathodic Protection	Magnesium	**ASTM -** B843AZ63(H-1)							
Insulation	Rockwool	**EN -** 13162							
Outer Coverage	Stainless Steel	304 L	1.4306 - X12 CrNi 19- 11	S30403	304S11	SUS 304 L	Z 3 CN 18-10	2352	03Ch18N11
Mounting Parts	Stainless Steel	304 L	1.4306 - X12 CrNi 19- 11	S30403	304S11	SUS 304 L	Z 3 CN 18-10	2352	03Ch18N11

Control Case Specs.

Phase Signal Lamp
Main Circuit Breaker
Emergency Stop Button
Heaters Can be Operated Seperately
Digital Controller/Thermostat (Coding System)
Safety Thermostat
Analog Temperature Gauge
Dielectric Current Relay
Flap Type Gate
Reset Button

Electrical Heater Capacities 440 V - 60 Hz - 3 Phase

Capacity	Heater Capacity	Total Heater Capacity	Heating Time* (minute)
100 lt	2x4,5 kW	9 kW	31
160 lt	2x4,5 kW	9 kW	50
200 lt	2x4,5 kW	9 kW	62
300 lt	3x4,5 kW	13,5 kW	62
400 lt	3x6 kW	18 kW	62
500 lt	3x7,5 kW	22,5 kW	62
600 lt	3x7,5 kW	22,5 kW	74
750 lt	3x10 kW	30 kW	70
1000 lt	3x15 kW	45 kW	62

Capacity	Heater Capacity	Total Heater Capacity	Heating Time* (minute)
1250 lt	3x15 kW	45 kW	77
1500 lt	3x20 kW	60 kW	70
1750 lt	3x20 kW	60 kW	81
2000 lt	3x30 kW	90 kW	62
2500 lt	3x30 kW	90 kW	77
3000 lt	4x30 kW	120 kW	70
4000 lt	5x30 kW	150 kW	74
5000 lt	5x30 kW	150 kW	93

* Considering heating from 10°C up to 50°C

Standart Accessories

Adjustable Pressure Safety Valve
Non Return Valve
Electrical Heater Wrench

Material Options

	Optional Feature	Optional Code	Explanation
Inner Tank	Stainless Steel	316 L	More durable in acidic water conditions than 304 L Stainless steel.
Inner Tank	Hot Deep Galvanized	GD	Has cost advantage compared to stainless steel. 2 years guarantied.
Electrical Heater	Stainless Steel	316 Ti	Is more durable than 316 L quality stainless steel.
Outer Coverage	Stainless Steel	430	Corrosion durability is less than 304 Stainless Steel, has cost advantage.
Outer Coverage	Hot Deep Galvanized Paited Steel	BS	Hot deep galvanized steel is painted by hot deep painting method. Has the nearly same durability with 430 quality steel which as cost advantage.

Control Case Options

Optional Feature	Optional Code	Explanation
Cooling Fan	PF	Cools the electrical equipments in control case.
Low Water Cutout Device	SS	Is used to prevent dry firing of heating elements.
Open door cut off switch	AA	Switches off the electricity when the service door is opened while changing the electrical heater against getting an electric shock.
Operation Lamp	SL	Three coloured lamp indicates that system is on/off or broken down.
Circulation Pump/Valve Automation	SP	Serpentine circuit pump or Automatic Valve can be controlled by control case.
Additional Option	XX	Customized features, please consult factory.

Optional Accessories

Optional Feature	Optional Code	Explanation
Temperature Relief Valve	SEV	Protects users against high scalding.
Mixing Valve	KV	Mixes hot water with cold water to deliver tempered water at a controlled temperature.
Additional Anod	KK	Cathodic Protection Element which should be changed every two years
Additional Heating Element	T	-
Flange Connections	F	Flanged inlet and outlet connections (Please specify size).
Additional Option	XX	Customized features, please consult factory.

HEATING TIMES for DIFFERENT CAPACITIES OF HEATING ELEMENTS

440 V - 3 Phase - 60 Hz

Electrical Heater Capacities

Capacity	2 x 4,5 kW 9 kW	2 x 6kW 12 kW	3 x 4,5 kW 13,5 kW	2 x 7,5 kW 15 kW	3 x 6 kW 18 kW	3 x 7,5 kW 22,5 kW	4 x 6 kW 24 kW	3 x 10 kW 30 kW	3 x 15 kW 45 kW	3 x 20 kW 60 kW	4 x 20 kW 80 kW
100 lt	31										
160 lt	50	37									
200 lt	62	46	41								
300 lt	93	70	62	56	46						
400 lt	124	93	83	74	62	50	46				
500 lt		116	103	93	77	62	58	46			
600 lt		139	124	111	93	74	70	56			
750 lt			155	139	116	93	87	70	46		
1000 lt						124	116	93	62	46	
1250 lt						155	145	116	77	58	44
1500 lt								139	93	70	52
1750 lt								163	108	81	61
2000 lt									124	93	70
2500 lt									155	116	87
3000 lt										139	105
4000 lt											139
5000 lt											174

Heating Time *(minute)

Electrical Heater Capacities

Capacity	3 x 30 kW 90 kW	4 x 30 kW 120 kW	5 x 30 kW 150 kW
1500 lt			
1750 lt			
2000 lt	62		
2500 lt	77	58	
3000 lt	93	70	56
4000 lt	124	93	74
5000 lt	155	116	93

Heating Time *(minute)

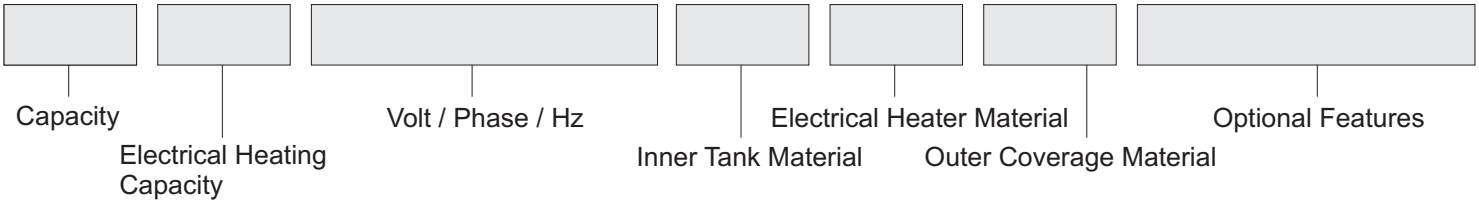
* Considering heating from 10°C up to 50°C

OPTIONAL FEATURE

Optional Feature	Optional Code
Temperature Relief Valve	SEV
Mixing Valve	KV
Additional Anod	KK
Additional Heating Element	T
Cooling Fan	PF
Low Water Cutout Device	SS
Open door cut off switch	AA
Operation Lamp	SL
Circulation Pump/Valve Automation	SP
Flange Connections	F
Additional Option	XX
316 L Quality Stainless Steel Inner Tank	316 L
Hot Deep Galvanized Inner Tank	GD
316 Ti Quality Stainless Steel Electrical Heater	316 Ti
430 quality Stainless Steel Outer Coverage	430
Hot Deep Galvanized Painted Steel Outer Coverage	BS

Electrical Heater (Volt - Phase - Hz)	Code
440 - 3 - 60	440 - 3 - 60
120 - 1 - 60	120 - 1 - 60
208 - 1 - 60	208 - 1 - 60
208 - 3 - 60	208 - 3 - 60
240 - 1 - 60	240 - 1 - 60
277 - 1 - 60	277 - 1 - 60
240 - 3 - 60	240 - 3 - 60
380 - 3 - 50/60	380 - 3 - 50/60
415 - 3 - 50/60	415 - 3 - 50/60
480 - 3 - 60	480 - 3 - 60
575 - 3 - 60	575 - 3 - 60

HOW to ORDER PRODUCT



Example: 500 / 3 x 7,5 kW / 440 - 3 - 60 / 304 L / 316 L / 304 / T x 3 - SEV - KK

A 500 liters tank with three piece of 7,5 kW electrical heater is ordered. Inner tank material is 304 L quality stainless steel, electrical heater material is 316 L quality stainless steel, outer coverage is 304 quality stainless steel. 3 piece of additional electrical heater, temperature relief valve, additional anod is ordered as option.

Note: If not written the features of the boilers will be as Solareks standart production as written in catalogue. If different electrical heater capacity will be ordered the values in page 8 can be used to determine the heating capacities.

Although we will make every effort to give notice, Specifications subject to change without notice.

SI-METRIC Conversions

Liters x 0,2641 = US Gallons

Liters x 0,219975 = Great Britain Gallons

Watt x 3,41214 = BTU/hr

°F = (°C x 1,8) + 32

Bar x 14,5 = psi

kg x 2,2 = Lbs

m^3 x 264,2 = Gallons

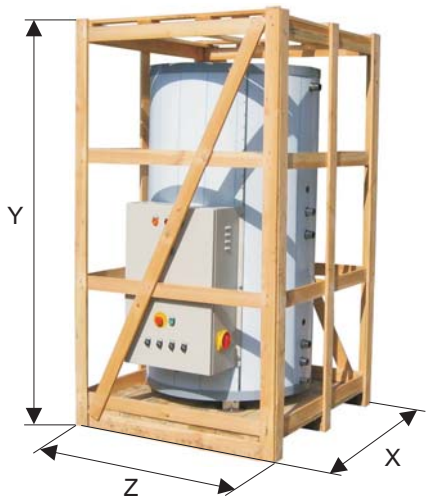
m x 39,37 = Inch

m x 3,28084 = Foot

PACKING&SHIPPING DETAILS

Packing Method

Capacity	Packing
100 - 5000 lt	Nylon + Wood Box



Packed Product Dimensions

Capacity	Volume (m^3)	Weight (kg)	X x Y x Z (mm)
100 lt	0,66	46	840 x 1190 x 660
160 lt	0,94	66	890 x 1490 x 710
200 lt	1,06	84	940 x 1490 x 760
300 lt	1,40	102	990 x 1750 x 810
400 lt	1,78	118	1120 x 1690 x 940
500 lt	2,12	139	1120 x 2020 x 940
600 lt	2,27	154	1190 x 1890 x 1010
750 lt	2,68	200	1240 x 2040 x 1060
1000 lt	3,48	280	1330 x 2280 x 1150
1250 lt	4,42	345	1440 x 2440 x 1260
1500 lt	5,37	405	1640 x 2240 x 1460
1750 lt	5,77	490	1680 x 2290 x 1500
2000 lt	6,38	594	1730 x 2380 x 1550
2500 lt	7,99	685	1940 x 2340 x 1760
3000 lt	8,48	760	1980 x 2380 x 1800
4000 lt	10,92	995	2230 x 2390 x 2050
5000 lt	13,06	1285	2430 x 2390 x 2250

Container&Truck Dimensions

	Height x Width x Length	Volume (m^3)
20” Container	2335 x 2290 x 5890 mm	33,3
40” Container	2335 x 2260 x 12015 mm	66,9
40” High Cube Container	2580 x 2260 x 12015 mm	76
Truck (Euro Norm)	2500 x 2450 x 13400 mm	73

SOLAREKS Contact Details

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