

DANKOFF ETAPUMP®



SOLAR SUBMERSIBLE PUMPS

VERSION 3.2 MARCH 2004

The world's most economical solar pumps

Lift from as deep as 750 feet (230m)

Maximum 16,000 gallons per day (60 cu.m.)

ETAPUMP eliminates the costs of fuel delivery, engine maintenance, and pollution.

In many cases it is LESS COSTLY than a conventional pump and generator installation!

- Great reliability and life expectancy
- Only one moving part, brushless motor
- Fits 4" and larger well casings

HIGH EFFICIENCY = LOWER COST

ETA is a Greek letter that engineers use to represent ENERGY EFFICIENCY.

In solar pumping, HIGH ETA = LOW SYSTEM COST.

ETAPUMP uses a solar array of 20-50% less power than other solar pumps, to do the same work. It is the most economical solar submersible pump available.

RELIABLE AND MAINTENANCE-FREE

The pump has only one moving part —*no failure-prone diaphragms or motor brushes to replace.*

The controller is above ground for easy access and greatest reliability. Be cautious of solar pumps with controls sealed inside the motor—if *one tiny part fails, the pump must be pulled and the whole motor replaced.*

ETAPUMP INTEGRATED SYSTEM™ is complete and ready to install

An *ETAPUMP INTEGRATED SYSTEM* is a complete system kit, engineered for the lift and daily volume that you require. It includes premium crystalline UL-listed solar modules (panels) with a life expectancy beyond 30 years. The fixed solar array rack is engineered for 90 MPH (145 km/h) wind, tracked rack is for 75 MPH (120 km/h) The controller is weather-sealed for all climates.

SYSTEM INSTALLATION

Install the pump by the same methods and materials used for conventional submersible pumps. The solar array requires nuts-and-bolts assembly and standard wiring practice. The *ETAPUMP* instruction manual is clearly illustrated. No special product training is required.



ETAPUMP INTEGRATED SYSTEM™

This is ETA-300 / fixed array.
Components vary with the system number.

*"I'm very satisfied with ETAPUMP. My local pump installer was very impressed, and agreed that this is a step up for the solar pumping world."
G.P., remote home owner, California*

ETAPUMP INTEGRATED SYSTEM™ INCLUDES

- Pump • Pump controller • Solar modules (panels)
- Solar array mounting rack (top-of-pole)
- Junction box with internal PV disconnect switch
- Flexible conduit, junction box to controller, pre-wired
- Submersible cable splice kit • Low-water probe
- Complete illustrated instruction manual

THESE ITEMS ARE NOT INCLUDED

They are available from local suppliers.

- Steel pole and concrete to support the solar array (schedule 40 pipe, size and length specified in the rack instructions)
- Drop pipe (refer to a pipe sizing chart)
- Submersible pump cable, 3-wire + ground
- Water well safety rope (1/4")
- Wire and standard electrical hardware

DEEP WELL APPLICATIONS

ETAPUMP can be submersed as deep as necessary.

SURFACE WATER APPLICATIONS

ETAPUMP can be installed in a stream, pond, tank or shallow well. It can be positioned at any angle. There is no need for a pump house or for periodic priming.

DRY RUN PROTECTION

A low water sensor (included) turns the pump off to prevent dry-run damage. Reset is automatic after 20 minutes. The controller has an RPM limit adjustment to reduce the maximum flow rate to about 50%, to help match a limited water source.

CONTROLLER DISPLAY

Lights indicate: system on, pump on, tank full, water source low, overload, and battery low (battery models only).

STORAGE REQUIREMENT

A storage tank (not included) should be sized to supply a minimum of 5-10 days' water supply, depending on climate and application. Water storage is generally more economical than energy storage in batteries.

BATTERY SYSTEMS

ETAPUMP battery versions are for pressurizing systems or where a storage tank is not desirable. They use a different controller than solar-direct systems. Voltages: 24V and 48V. Request the "Battery System Performance Table".

DROP PIPE AND PIPE SIZING

Models ETA-75C, ETA-14, and ETA-20 have 1 1/4" outlet. Others have 1" outlet. Drop pipe larger than the outlet is not recommended because sand may accumulate during low flow. Use any conventional drop pipe material. A torque arrestor is not required. For sizing of long pipelines, consult a pipe sizing chart.

DIMENSIONS & WEIGHTS

PUMP & MOTOR

- Diameter: 3.78" (96mm)
- Height: 20"-32" (500-800mm) depending on model
- Weight: 25lbs (11.5kg) or less, depending on model

CONTROLLER & Junction/PV-Disconnect Box

- Controller: 17" x 7" x 6" (425 x 175 x 150mm)
- Junction box: 10.2" x 7.1" x 4" (260 x 180 x 100mm)
- Flex conduit and wiring harness, length: 35" (90cm)
- J-box 3 conduit holes: 3/4" (2) and 1 1/4" (28 and 45 mm)
- Wire size capacity of pump terminals in j-box: #6
- Weight, controller + junction box: 14.5 lbs (6.6 kg)
- Enclosures: gasket-sealed, weatherproof

SOLAR ARRAY: Size and weight can be estimated from the array watts (the last 3 digits of the system number).

- Approximate area in sq. feet = watts/10 (sq.m=watts/100).
- Approximate weight (including mounting rack) in lbs = watts x .3 (kg = watts x .14) Tracker option adds approximately 20% to the weight.

WETTED MATERIALS

304 and 316 stainless steel, brass (check valve only, 2% Pb), chromium, NBR rubber, natural rubber, polyurethane, POM.

TEMPERATURE LIMITS

- PUMP: Optimum water temp. is 46°F to 72°F (8°C to 22°C). Higher temp. may cause the pump to stop temporarily due to expansion of the rubber stator. Higher and lower temp. ranges are available by special order.
- CONTROLLER: Ambient -22°F to 113°F (-30°C to 45°C).

ACCESSORIES

- FLOAT SWITCH for full-tank shutoff, Item #10320
- FLOAT SWITCH CABLE, 18 AWG, shielded, burial, UV for max. 2000 feet from controller to switch, Item #10326

- LOW WATER SENSOR WIRE, #14 AWG submersible, 1 conductor. Two wires are required. Order 2X the length from controller to pump. Item #11421
- AC POWER PACK for 115/230VAC backup, Item #11930

HOW TO SELECT AN

ETAPUMP INTEGRATED SYSTEM™

REFER TO THE SIZING TABLE

Daily volume is calculated for worst-case conditions. Your results may be better.

VERTICAL LIFT = total dynamic head = the vertical distance from the draw-down level in the water source, to the pipe outlet or top of storage tank + pipe friction losses.

CLIMATE ZONE Three solar radiation zones are shown on the table, defined by *peak sun hours/day*. 7.5 is average for summer in central and western USA, and for most locations during dry summer weather.

PERFORMANCE RELATED TO WEATHER These systems are selected for optimum daily output in clear, dry weather. For improved performance in cloudy weather, select a system that produces about 50% more water than you require at 4.5 peak sun hours, or ask your supplier for advice. For satisfactory winter performance, it may be necessary to adjust the solar array tilt. This is an easy adjustment to perform, twice per year.

SOLAR TRACKING A solar tracker automatically aims the solar array at the sun throughout the day. In clear weather, tracking increases the daily water volume by about 40% in summer (15% in winter). This is shown on the sizing table, where you can select either *fixed* or *tracked* systems. The tracker's drive is non-mechanical (passive) and highly reliable, using only the flow of fluid against gravity. **Tracker Option must be specified with the original purchase.** For optimum performance during cloudy weather, or with frequent highly turbulent wind, a tracked system is not recommended.

DOUBLE SYSTEM Two pump systems can be installed in the same water source if the well casing is not less than 6" inside diameter. This doubles the daily water volume.

MANUFACTURER'S WARRANTY

4 YEARS for pump and controller when purchased as part of an ETAPUMP Integrated System™
Solar modules 20 or 25 YEARS

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Dankoff Solar Products, Inc.

www.DankoffSolar.com 888 396 6611

EXCLUSIVE IMPORTER, PARTS & SERVICE

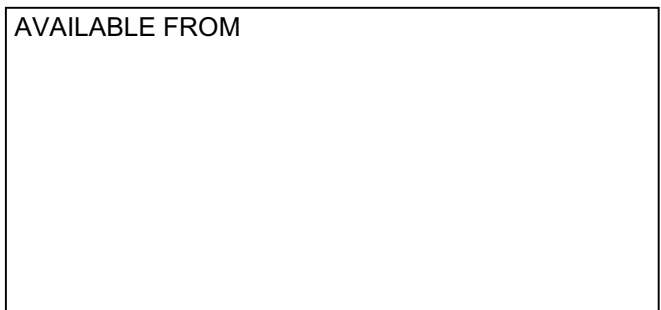
Dankoff Solar Products, Inc.
Solar pumping since 1983



bp solar

Distributor

AVAILABLE FROM



ETAPUMP INTEGRATED SYSTEMS™
48V SOLAR-DIRECT (non-battery) *

SIZING TABLE

VERSION 3.2
March 2004

VERTICAL LIFT	25 Feet 8m		50 Feet 15m		75 Feet 23m		100 Feet 30m		125 Feet 38m		150 Feet 46m		175 Feet 53m		200 Feet 61m		250 Feet 76m	
	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked
GALLONS PER DAY																		

SMALLER SYSTEMS to 165 ft. (50m) – Use the new ETAPUMP Mini™

PEAK SUN hours/day	7.5	4900	7340	3740	5620	2590	3890	1810	1870	1500	1870	1210	1820	1070	1600	860	1300	580	860
	6.0	3740	5430	2680	3880	1840	2670	1530	1870	1150	1670	920	1340	750	1090	580	840	400	580
	4.5	2880	3890	1270	1710	1500	2020	1070	1440	780	1050	550	740	400	540	290	390	230	310
SYSTEM #	ETA-14-260				Use ETA-04-260				ETA-04-260				ETA-03H-260						
GPM	9.8		7.9		6.6		3.6		3.1		2.7		2.6		2.3		1.5		
Wire size / max. length	#12 / 80 ft.		#12 / 120 ft.		#12 / 216 ft.		#12 / 216 ft.		#10 / 280 ft.		#10 / 280 ft.		#10 / 330 ft.		#10 / 330 ft.		#10 / 330 ft.		

PEAK SUN hours/day	7.5	5870	8800	4270	6400	3200	4800	1840	1870	1650	1870	1520	1870	1310	1870	1120	1680	910	1360
	6.0	4530	6570	3600	5220	2130	3090	1680	1870	1470	1870	1230	1780	1010	1470	770	1120	610	890
	4.5	3470	4680	2530	3420	1070	1440	1330	1800	990	1330	720	970	590	790	430	580	210	290
SYSTEM #	ETA-14-300				ETA-04-300				ETA-04-300				ETA-04-300						
GPM	10.8		9.8		8.2		3.6		3.5		3.4		3.3		2.8		2.2		
Wire size / max. length	#12 / 80 ft.		#10 / 150 ft.		#12 / 240		#12 / 240		#10 / 280 ft.		#10 / 280 ft.		#10 / 330 ft.		#10 / 330 ft.		#10 / 330 ft.		

PEAK SUN hours/day	7.5	8180	12270	5760	6940	4250	6370	3150	4720	2130	3200	1760	1870	1730	1870	1540	1870	1230	1840
	6.0	7240	10490	4780	6940	3150	4560	2200	3190	1890	2400	1640	1870	1350	1870	1130	1640	820	1190
	4.5	5350	7220	3530	4760	1730	2340	1100	1490	1600	2160	1070	1440	940	1440	750	1020	440	590
SYSTEM #	ETA-20-400		ETA-14-400				ETA-07-400		ETA-04-400										
GPM	16.4		10.6		9.5		7.9		5.0		3.4		3.3		2.9		2.4		
Wire size / max. length	#12 / 80 ft.		#10 / 150 ft.				#10 / 240		#10 / 280 ft.				#10 / 330 ft.		#10 / 330 ft.		#10 / 330 ft.		

PEAK SUN hours/day	7.5	8960	13440	6720	6930	5600	6930	4340	6510	3080	4620	2660	3200	2350	3200	2020	3020	1540	1870
	6.0	8120	11770	5600	6930	4760	6900	3360	4870	2240	3250	1960	2840	1680	2440	1540	2230	1230	1790
	4.5	6440	8690	4200	5670	3360	4540	2130	2870	1620	2190	1260	1700	1120	1510	1120	1510	780	1060
SYSTEM #	ETA-20-500		ETA-14-500				Use ETA-07-500 with #10/240ft.		ETA-07-500				Use ETA-04-500 with #10/280ft.		ETA-04-500				
GPM	16.4		11.9		11.1		9.5		7.4		5.5		5.0		4.6		3.4		
Wire size / max. length	#12 / 80 ft.		#10 / 130 ft.				#8/150 ft.		#10 / 190 ft.				#8/300 ft.		#8/300 ft.		#8/300 ft.		

PEAK SUN hours/day	7.5	11730	17600	8000	12000	6400	6930	5200	6930	4270	6400	3470	5200	2930	4400	2430	3200	2030	3040
	6.0	10130	14690	7200	10440	5600	6930	4270	6190	3200	4640	2670	3870	2400	3480	1950	2820	1600	2320
	4.5	6670	9000	5600	7560	4270	5760	2930	3960	2000	2700	1870	2520	1730	2340	1330	1800	1120	1510
SYSTEM #	ETA-75C-600		ETA-20-600		ETA-14-600				Use ETA-07-600 with #10 / 190 ft.				ETA-07-600						
GPM	23.8		15.9		11.9		11.4		9.5		10.0		7.7		5.3		5.2		
Wire size / max. length	#12 / 55ft		#10 / 130 ft.				#8 / 230		#8 / 193 ft.				#8 / 276 ft.		#8 / 276 ft.		#8 / 276 ft.		

PEAK SUN hours/day	7.5	15840	18670	10940	14670	7490	9330	6340	6930	5470	6930	4610	6910	3740	5620	2740	3200	2590	3200
	6.0	13540	18670	8640	12530	6910	8800	5470	6930	4750	6890	3740	5430	2590	3760	2530	3200	2190	3170
	4.5	9790	13220	5760	7780	5180	7000	4030	5440	3170	4280	2220	3000	1300	1750	1810	2450	1530	2060
SYSTEM #	ETA-75C-780		ETA-20-780		ETA-14-780				ETA-07-780										
GPM	29.1		22.5		15.1		11.4		10.6		10.3		10.0		5.3		5.2		
Wire size / max. length	#12 / 65 ft.		#10 / 130				#8 / 230 ft.		#8 / 207 ft.				#8 / 303 ft.		#8 / 303 ft.		#8 / 303 ft.		

PEAK SUN hours/day	7.5	16530	18670	12530	14670	8000	10670	7200	6930	5600	6930	5070	6930	4560	6840	2830	3200	2670	3200
	6.0	14670	18670	10130	14670	7470	10830	6400	6930	5070	6930	4270	6190	3630	5260	2670	3200	2450	3200
	4.5	11470	15480	7200	9720	5870	7920	4800	6480	4050	5470	2670	3600	2130	2880	2050	2770	1870	2520
SYSTEM #	ETA-75C-900		ETA-20-900		ETA-14-900				ETA-07-900										
GPM	29.1		26.4		15.1		14.8		10.8		10.6		10.3		5.3		5.2		
Wire size / max. length	#10 / 125		#10 / 174				#10 / 160		#8 / 207 ft.				#8 / 317 ft.		#8 / 317 ft.		#8 / 317 ft.		



Dankoff Solar Products, Inc.
Santa Fe, NM USA
www.dankoffsolar.com

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LIFT LIMITS

These systems are selected for optimum performance. To allow unexpected drawdown, each system can handle an additional 15% lift.

*** FOR BATTERY SYSTEMS**
24V and 48V
request additional data sheet

HOW DAILY WATER VOLUME IS CALCULATED

Daily volume is calculated by integrating real flow vs. realistic solar (PV) output through the day. (peak sun hours/day = kWh/sq.m/day)

Calculations are for WORST-CASE CONDITIONS. PV output is degraded 28% for heat (cell temp. 60°C), dust, and manufacturer's lowest guaranteed output. Cable losses are included at maximum allowable length. The solar array is fixed at tilt angle = latitude of the location. For central USA, seasonal adjustment of the tilt angle increases daily volume by about 8% summer, 5% winter. Flow rates may vary +/- 10%.

Specifications are subject to change. Please use the newest version.

METRIC WIRE
 nearest larger
 equivalent
 AWG sq. mm

#18	1
#12	4
#10	6
#8	10
#6	16

M O R E
W A T E R

METRIC CONVERSION: 1 cubic meter = 264 gallons
 1 gpm = 3.79 lpm = .063 lps

300 Feet 91m		350 Feet 107m		400 Feet 122m		450 Feet 137m		500 Feet 152m		550 Feet 167m		600 Feet 183m		650 Feet 200m		750 Feet 230m		VERTICAL LIFT
Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	Fixed	Tracked	

GALLONS PER DAY

520	780	430	650
370	540	290	420
140	190	90	120
ETA-03H-260			
1.4		1.3	
#10 / 330 ft.		#8 / 370 ft.	

690	1040	590	880	530	800	450	680	400	600		
530	770	430	620	370	540	320	460	290	430		
370	500	270	360	190	250	130	180	80	110		
ETA-03H-300											
1.7			1.6			1.4		1.3		1.2	
#10 / 330 ft.			#8 / 500 ft.								

940	1070	790	1180	750	1130	690	1040	600	900		
720	1070	600	870	540	780	470	680	410	590		
570	760	410	550	280	380	220	300	190	260		
ETA-03H-400											
2.0			1.8			1.8		1.7		1.5	
#10 / 330 ft.			#8 / 550 ft.								

1400	1810	1230	1850	1060	1600	930	1070	840	1040	760	1040	670	1010	590	880	450	670									
1040	1500	870	1260	760	1100	730	1070	650	940	530	770	480	690	420	610	310	450									
620	830	480	640	420	570	590	800	500	680	420	570	370	490	280	380	200	270									
ETA-04H-500									ETA-03H-500																	
3.0			2.9			2.5			1.9			1.8			1.8			1.4			1.3			1.2		
#8 / 330 ft.			#6 / 420 ft.			#8 / 850 ft.			#8 / 850 ft.			#8 / 850 ft.			#8 / 850 ft.			#6 / 700 ft.			#6 / 700 ft.					

1600	1810	1390	1810	1200	1800	1070	1600	930	1040	850	1040	800	1040	720	1040	610	920						
1330	1810	1230	1780	1010	1470	930	1350	830	1040	720	1040	670	970	590	850	450	660						
1040	1400	880	1190	670	900	530	720	640	860	530	720	430	580	370	500	320	430						
ETA-04H-600									ETA-03H-600														
3.4			3.3			3.3			3.2			1.9			1.8			1.8			1.7		
#6 / 545 ft.			#6 / 545 ft.			#6 / 490 ft.			#8 / 500 ft.			#8 / 650 ft.			#8 / 750 ft.								

2190	3280	1760	1810	1640	1810	1500	1810	1350	1810	1010	1070	950	1040	890	1040	810	1040									
1640	2380	1440	1810	1330	1810	1210	1760	1090	1590	890	1040	830	1040	780	1040	660	960									
950	1280	1090	1480	890	1210	780	1050	660	890	780	1010	690	930	630	860	490	660									
ETA-07-780									ETA-04H-780									ETA-03H-780								
5.0			3.3			3.2			3.2			3.1			1.8			1.8			1.8			1.7		
#8 / 303 ft.			#6 / 545 ft.			#6 / 490 ft.			#8 / 500 ft.			#8 / 650 ft.			#8 / 750 ft.											

2450	3200	1760	1810	1630	1810	1550	1810	1440	1810	1010	1070	960	1040	930	1040	850	1040									
2050	2980	1600	1810	1470	1810	1360	1810	1250	1820	960	1040	910	1040	880	1040	800	1040									
1330	1800	1310	1760	1120	1510	990	1330	880	1190	850	1040	830	1040	750	1010	640	860									
ETA-07-900									ETA-04H-900									ETA-03H-900								
5.0			3.3			3.2			3.2			3.1			1.8			1.8			1.8			1.7		
#8 / 317 ft.			#6 / 565 ft.			#6 / 545 ft.			#8 / 500 ft.			#8 / 650 ft.			#8 / 750 ft.											

INSTRUCTIONS

- Find the LIFT required, and read the column below it.
- Find the DAILY VOLUME you require.
 at 7.5 peak sun hrs/day – gal/day
 at 6.0 peak sun hrs/day – gal/day
 at 4.5 peak sun hrs/day – gal/day
 (7.5 = moderately dry summer weather)
 For more water, look down the column.
- Order this SYSTEM NUMBER
 For a "Tracked" array, add "Tracking Option"
- Use the PEAK FLOW RATE for pipe sizing.
- Pump wire size / max. length (see below)

PEAK	7.5
SUN	6.0
hours/day	4.5
SYSTEM #	
<i>GPM</i>	
Wire size / max. length	

PEAK	7.5
SUN	6.0
hours/day	4.5
SYSTEM #	
<i>GPM</i>	
Wire size / max. length	

PEAK	7.5
SUN	6.0
hours/day	4.5
SYSTEM #	
<i>GPM</i>	
Wire size / max. length	

PEAK	7.5
SUN	6.0
hours/day	4.5
SYSTEM #	
<i>GPM</i>	
Wire size / max. length	

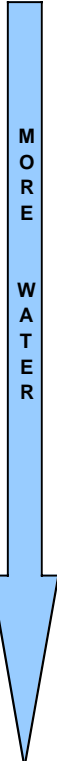
PEAK	7.5
SUN	6.0
hours/day	4.5
SYSTEM #	
<i>GPM</i>	
Wire size / max. length	

PEAK	7.5
SUN	6.0
hours/day	4.5
SYSTEM #	
<i>GPM</i>	
Wire size / max. length	

PEAK	7.5
SUN	6.0
hours/day	4.5
SYSTEM #	
<i>GPM</i>	
Wire size / max. length	

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WIRE SIZES

PUMP CABLE, EXAMPLE: #6 = AWG (American Wire Gauge) / 565 ft. = maximum allowable length (controller to pump) for that wire size.

VARIATIONS

GREATER LENGTH: for each 150% increase, the next larger wire size is required.
 SHORTER LENGTH: for each 33% decrease, the next smaller wire is allowed.

ARRAY TO CONTROLLER if <20 ft. (3m): #10 minimum
 CONTROLLER TO LOW-WATER PROBE: #18 min. 2-conductor
 CONTROLLER TO FLOAT SWITCH: #18 min. 2-conductor

FIXED SOLAR ARRAY MOUNTING POLE SIZE	
ETA system # last 3 digits	Schedule 40 pipe size
240-600	4"
720,900	6"
FOR TRACKED ARRAY PLEASE INQUIRE	

PUMP OUTLET PIPE SIZE	
SYSTEM#	NPT inches
ETA-75C	1 1/4"
ETA-14,20 all others	1"