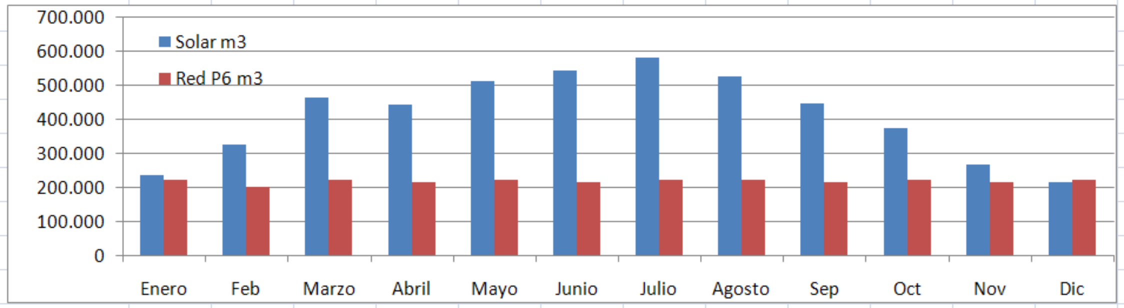
Flows pumped from both the available solar energy (200 kW) and from the grid (100 kW)

EQUIPO DE BOMBEO, SOLAR 2 EJES + RED P6												
Potencia nominal bomba SOLAR (kW)		200	Potencia nominal bomba RED (kW)			100	Elevación bomba (m.c.a.)			34		
Caudal bomba (m^3/h)		1800	Caudal bomba (m^3/h)			900						
	Enero	Feb	Marzo	Abril	Mayo	Junio	Julio	Agosto	Sep	Oct	Nov	Dic	TOTAL anual
Horas equivalentes Seg 2 ejes	131,7	181,0	258,3	246,9	284,9	302,6	322,8	292,4	248,1	207,6	148,1	119,3	2747,2
8 horas noche Tarifa P6 (2017)	248	224	248	240	248	240	248	248	240	248	240	248	2920,0



	Enero	Feb	Marzo	Abril	Mayo	Junio	Julio	Agosto	Sep	Oct	Nov	Dic	TOTAL anual
Solar m^3	236.995	325.868	464.875	444.366	512.730	544.633	581.094	526.403	446.645	373.723	266.620	214.663	4.944.996
Red P6 m^3	223.200	201.600	223.200	216.000	223.200	216.000	223.200	223.200	216.000	223.200	216.000	223.200	2.628.000
Solar+Red P6 m^3	460.195	527.468	688.075	660.366	735.930	760.633	804.294	749.603	662.645	596.923	482.620	437.863	7.572.996

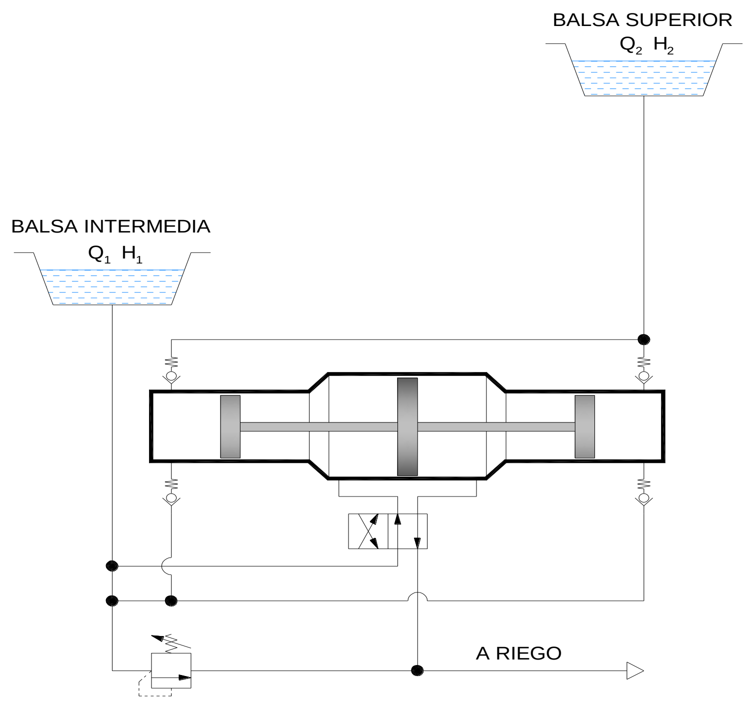
The sum of pumped quantities (off-grid solar plus on-grid nocturnal) represents low-cost pumping capacities

HYDRAULIC PUMPING

The positive displacement of water stored at a higher elevation is forms one of the principles of our design of linear hydraulic motors which drive our pumps, resulting in an 85% performance improvement.

The diagram demonstrates how the potential energy accumulated in the Intermediate Pond is used to re-pump part of its flow at higher levels, while it is irrigated, provided that it meets the condition that the product Q1 H1 is greater than or equal to 0,85 Q2 H2.

This design allows us to maintain a constant level of performance, at any discharge flow range.



Central Offices
Polígono Malpica – Alfindén
C/ La Sabina, 13
50171 La Puebla de Alfindén
Zaragoza (ESPAÑA)
Tel.: +34 976 57 11 93
Fax: +34 876 24 60 24

More Information,
visit our Website
www.ades.tv

Production & Technologic Center
Polígono Industrial Tarazona
C/ Galicia, Parcela 76
50500 Tarazona
Zaragoza (ESPAÑA)
Tel.: +34 976 199 662
Fax: +34 976 640 825

44-BOMBEO SOLAR EOLICO DE ALTO RENDIMIENTO-V9

HIGH PERFORMANCE SOLAR / HYDRAULIC PUMPING

Patent ES201700151 www.ades.tv

A PROFITABLE SOLUTION

The current evolution of irrigation has led to pumping resulting in **water displacement to a certain elevation as the best solution to ensure water pressure and address efficient automation**.

On the other hand, the energy consumption for the drive required for pumps displacing water to a higher elevation involves a higher cost which, in the case of communities of irrigators, also results in an increased not deductible value added tax.

The more cost effective and efficient performance of solar and wind energy provide isolated or hybrid solutions thereby guaranteeing a more sustainable energy supply.

However, it is necessary to solve the challenge of pumping water from fluctuating energy sources such as variations in solar irradiation, changes in temperature, passage of clouds and / or wind gusts.

ADES has developed a unique solution that overcomes this challenge, and with it, provides a system allowing for pumping with maximum performance even at low energy levels.

HIGH PERFORMANCE POSITIVE DISPLACEMENT PUMP © ADES

Pumping is produced by linear displacement of a piston inside its cylinder at reduced speed, giving rise to the concept of positive displacement pump.

A unique design that allows to displace water to a higher elevation in an amount directly proportional to the energy captured at each instant.

The pump is designed for a constant manometric charge. The power demanded in the motor shaft is set forth according to the following equation:

$$kW = Q\ (l/s) \times H\ m.c.a. / 85$$

The pump's high performance is based on two principles. The first principle, involves the use of force being applied in the same direction of resistance. The second principle involves the use of hydrostatic transmission capable of transmitting power at a minimum level resulting in maximum performance.

This application allows ADES to provide engineering solutions resulting in increased pumping hours at lower cost (daytime) and consequently, lower fee structures.

GENERAL CHARACTERISTICS

Maximum Manometer Height	530 meters
Maximum flow	500 l/s
Maximum power	400 kW
Maximum displacement	4,2 m3

ACTIVATION

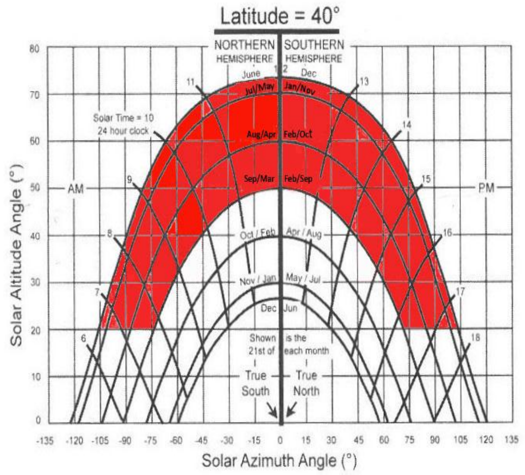
The system can use different sources of energy, whether individually or mixed (solar – wind-hydraulic - electrical grid) without the need to hybridize electrically between those sources.

The objective is to pump during daylight hours with the maximum available flow from solar power. Thereafter, if necessary as a complement, energy from the grid will be used to complement performance during night-time hours, involving a reduced fee structure. At sites with wind potential, our turbines designed for direct pumping by hydrostatic transmission will be used, whether working in isolation or in conjunction with other energy sources.
When water is displaced to a higher elevation, pumping can be achieved with hydraulic energy.

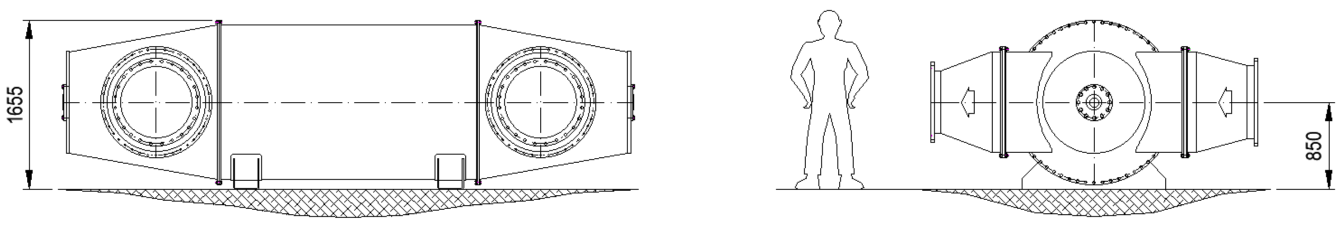
SOLAR CAPTURE

ADES dual-axis solar trackers©, contain solar panels arranged in offset rows at different levels to improve cooling. This unique design allows greater energy capture in less space, thereby minimizing the occupied surface and optimizing the photovoltaic field.

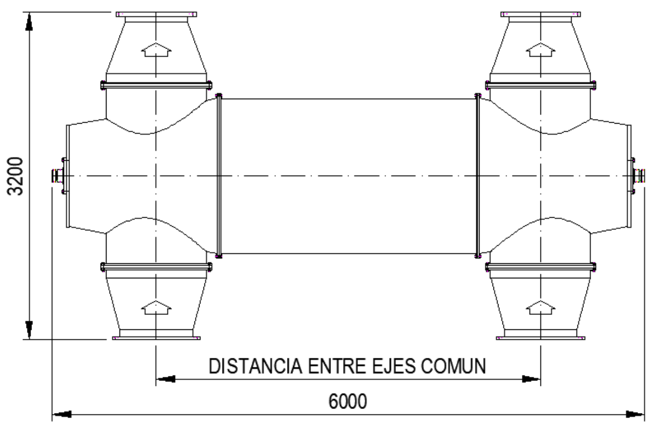
The graph to your right sets forth the azimuthal and zenith angles of the solar trajectory as a function of the months and the solar time for a site located at the 40th parallel. The red zone highlights the data for the typical irrigation season (March-September) in which pumping commences upon the sun reaching a height of 20º. At an azimuthal angle of ± 120º with respect to solar noon, the sun reaches a zenith of 74º, on June 24, at which time pumping for 11 hours (from 6:30 am to 5:30 pm solar hours), can be achieved by ADES dual-axis solar trackers ©.



PUMPING MODEL SPECIFICATIONS



Modelo del ejemplo: talla 60"



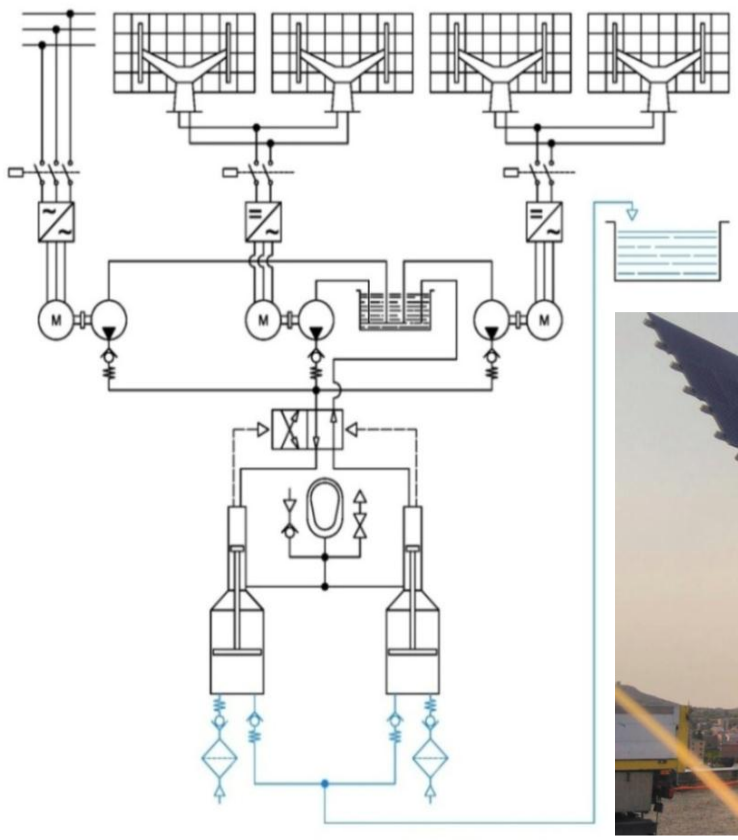
GAMA Y PRESTACIONES A 400 kW						
Talla	Litros embolada	Caudal max l/s	Altura max m.c.a.	Brida aspiración	Brida impusión	Distancia entre ejes
60"	4200	490	80	DN700 PN6	DN600 PN10	3760 mm
48"	2700	300	130	DN600 PN6	DN450 PN16	3760 mm
40"	1850	205	190	DN450 PN6	DN350 PN25	3760 mm
30"	1040	114	340	DN350 PN6	DN250 PN40	3760 mm
24"	650	73	530	DN250 PN6	DN200 PN40	3760 mm

EN TOMAS ABIERTAS, SE SUSTITUYEN LAS BRIDAS DE ASPIRACIÓN POR FILTROS

ades TEMPERO GROUP — HIGH PERFORMANCE SOLAR/HYDRAULIC PUMPING

AN EXAMPLE OF PUMPING: SOLAR + ELECTRICAL GRID

An isolated pumping installation needs to collect previously discharged 500 l/s, and pump them at 32 m.c.a. A parallel, electrical grid is available to provide the specific energy deficit thereby guaranteeing pumping at a constant flow. The power demanded will be: kW = 500 x 30/85 = 188 kW.
Assuming an engine performance (0.96), an inverter (0.97) and a maximum loss (in Summer) of 22%, the photovoltaic power to be installed will be 258 kWp.



The photovoltaic field will consist of four ADES dual-axis four solar trackers ©, of 63.3 kWp with 192 panels arranged in 8 rows at different levels to improve cooling. Two trackers will operate a 100 kW engine. A third motor of the same power will be connected to the network to provide the deficits, as shown in the diagram.

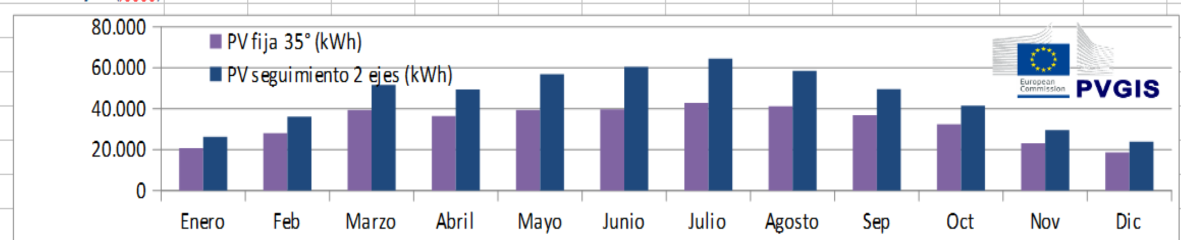
The graph below, sets forth the energy gains obtained with ADES dual-axis four solar trackers © versus a fixed installation at a 35 degree angle.

DATOS DE LA INSTALACIÓN FOTOVOLTAICA				
Instalación:	Bombeo Solar			
Potencia instalada por seguidor 2 ejes:	63,3	kWp	4	(nº de seguidores)
Potencia instalada:	253,2	kWp		
Pérdidas teóricas del sistema según PVGIS:	22%*	(*con paneles refrigerados por nebulización)		

ades TEMPERO Group

COMPARATIVA DE PRODUCCION FOTOVOLTAICA, FIJA Vs DOS EJES

	Enero	Feb	Marzo	Abril	Mayo	Junio	Julio	Agosto	Sep	Oct	Nov	Dic	TOTAL anual
PV fija 35° (kWh)	20.762	28.105	39.499	36.461	39.499	39.752	42.791	41.272	36.967	32.410	23.117	18.737	400.056
PV seguimiento 2 ejes (kWh)	26.333	36.208	51.653	49.374	56.970	60.515	64.566	58.489	49.627	41.525	29.624	23.851	549.444



	Enero	Feb	Marzo	Abril	Mayo	Junio	Julio	Agosto	Sep	Oct	Nov	Dic	TOTAL anual
Ganancia dos ejes:	26,8%	28,8%	30,8%	35,4%	44,2%	52,2%	50,9%	41,7%	34,2%	28,1%	28,1%	27,3%	37,3%