

Table 4.18 Characteristics of water lifting devices.

KEY TO SYMBOLS		
Water Source	Power Source	Use
St = Stream, river, canal	H = Human	Do = Domestic
La = Lake, pond, tank	A = Animal	L = Livestock
Dw = Dug well	W = Wind	Ir = Irrigation
Bh = Bore-hole	IC = Diesel, Petrol	Dr = Land Drainage
	E = Electrical	
	Es = Solar-electric	

Other

Var. = Variable, FD = Free discharge, DL = Delivery lift

TYPE OF EQUIPMENT	WATER SOURCE				LIFT Approx. range m	OUTPUT Average m ³ /h	POWER SOURCE						USE			
	St	La	Dw	Bh			H	A	W	IC	E	Es	Do	L	Ir	Dr
Buckets and Scoops																
Swing basket	*	*			0.1-0.6	5	*								*	*
Scoop	*	*			0.1-1.0	8	*								*	*
Counterpoise lift (shadouf)	*	*	*		1.5-2.5	5	*						*	*	*	*
Rope and bucket	*	*	*		1.5-10	1	*						*	*		
Rope and bucket (mohte)	*	*	*		4-9	12		*					*	*		
Water ladder	*	*			0.75-3.5	5	*						*	*	*	*
Chain and washer pump	*	*	*		1.5-6	18	*						*	*	*	*
Persian wheel, saqia	*	*			1.5-9	14		*					*	*		*
Noria	*	*			0.3-1.8	90		*					*	*	*	*
Noria	*	*			0.3-1.8	var.				*	*		*	*	*	*
Water wheel	*				3-7	var.			*				*	*	*	*
Positive Displacement Pumps																
Reciprocating, barrel above ground—Shallow well, FD	*	*	*		up to 6	var.	*		*	*			*	*	*	*
—Shallow well, DL	*	*	*		var.	var.	*		*	*			*	*	*	*
Reciprocating, barrel below ground—Deep well, FD			*	*	var.	var.	*		*	*	*		*	*	*	*
—Deep well, DL			*	*	var.	var.	*		*	*	*		*	*	*	*
Semi-rotary	*	*	*		var.	var.	*						*	*	*	*
Archimedean screw	*	*			0.25-0.75	22	*								*	*
Archimedean screw	*	*			3-10	var.			*	*					*	*
Helical rotor ('Mono')				*	var.	var.	*		*	*			*	*	*	*
Diaphragm	*	*	*		var.	var.	*		*	*			*	*	*	*
Rotodynamic Pumps																
Centrifugal, single stage	*	*	*		up to 100	var.			*	*	*		*	*	*	*
Centrifugal, multi-stage	*	*	*		100-1000	var.			*	*	*		*	*	*	*
Vertical spindle				*	var.	var.			*	*	*		*	*	*	*
Propeller or axial flow	*	*			up to 30	var.			*	*	*		*	*	*	*
Submersible				*	up to 1000	var.			*	*	*		*	*	*	*
Miscellaneous																
Hydraulic ram	*				up to 200	var.			*				*	*		
Air lift				*	var.	var.			*	*			*	*		

Sources: James Goodman, 'A Study of the use, efficiency and performance of simple water lifting devices used for irrigation'. National College of Agricultural Engineering, Silsoe, UK., 1977.
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