

SOLAR VARIABLE SPEED DRIVES

www.himel.com

Solar series VSD

Himel Solar VSD is an innovative solution that uses solar power as a reliable energy source for pumping water. It allows to harness maximum solar energy to run the pump for maximum duration in a day by controlling the speed of the motor based on the power available from the solar panel.

Series	Voltage Class	Motor Capacity Table																									
		0.4	0.75	1.5	2.2	4	5.5	7.5	11	15	19	22	30	37	45	55	75	90	110	132	160	185	200	220	250	280	315
Solar	Single-phase 220V±15%	■																									
	Three-phase 380V±15%	■																									
Solar -SM	Single-phase 220V±15% To drive single phase motor	■																									

- 2S = 220V±15% Single Phase; 4T = 380V±15% Three Phase;
- SM= Drive Single Phase Motor

Build-in MPPT

Maximum power point tracking ensures that you get the most power output possible from your solar panel and maximizes the performance of your pump throughout the day.

Dual supply (AC & DC) capability

The VSD is customized to operate in dual supply mode, so the grid connected supply is used in the absence of energy from PV cells.

Automatic start-run-stop through out the day

With water level detection in the tank and pump overload and under-load protection.

Easy to use

- Compact design
- Easy to install with Din rail
- Can run with default setting, no parameter set need
- One-key recovery function

Special program function

- Energy meter
- Flow calculation
- Support single phase motor water pump

Pump-specific protection

- Dry run detection.
- Voltage limit
- Overvoltage , overcurrent, overload protection
- Phase-loss protection
- Short-circuit protection

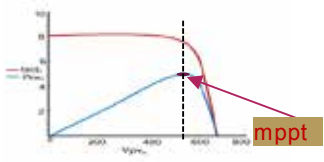

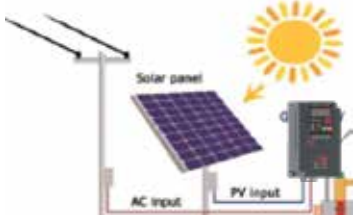
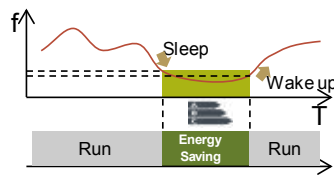
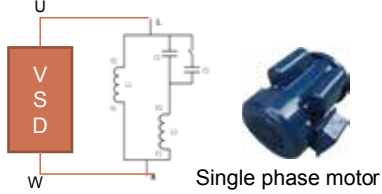



Online Content

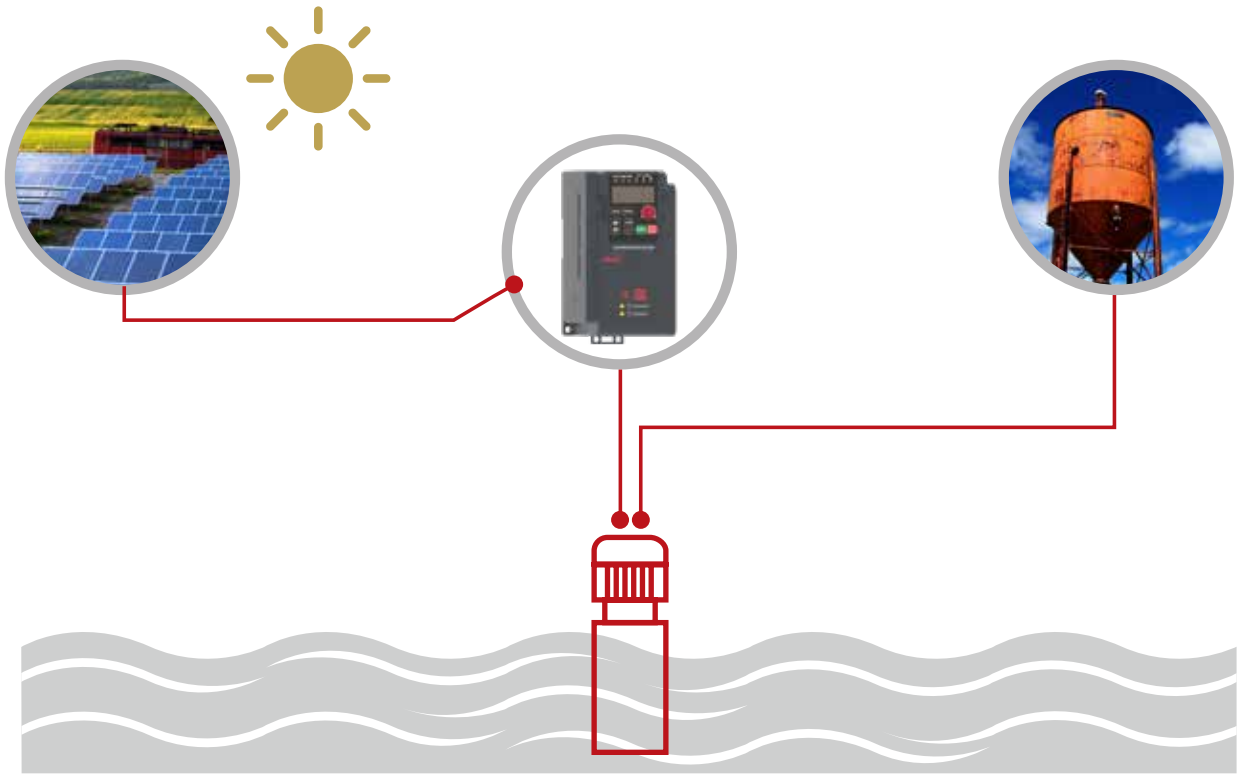


SOLAR Series

General Highlights

Features	Your benefits
Build-in MPPT	
	<ul style="list-style-type: none"> ◆ Maximum power point tracking ensures that you get the most power output possible from your solar panel ◆ maximizes the performance of your pump throughout the day
Easy to use	
	<ul style="list-style-type: none"> ◆ Compact design ◆ Easy to install with Din rail ◆ Can run with default setting ◆ One-key recovery function ◆ Makes it possible to use in smaller cabinets ◆ No need to set additional parameters anymore ◆ Easy to operate and maintain
Dual supply (AC & DC) capability	
	<ul style="list-style-type: none"> ◆ The VSD is customized to operate in dual supply mode ◆ The grid connected supply is used in the absence of energy from PV cells
Automatic start-run-stop	
	<ul style="list-style-type: none"> ◆ Automatic start and stop according to the power of solar cell ◆ With water level detection in the tank and pump overload and under-load protection ◆ No need to operate ◆ Save more time and maintain cost
Special program function	
	<ul style="list-style-type: none"> ◆ AVR function ◆ Energy meter ◆ Flow calculation ◆ Support single phase motor water pump ◆ Automatic adaptation in case of unstable power supply ◆ Visible energy savings and flow ◆ Easy system upgrade
Pump-specific protection	
	<ul style="list-style-type: none"> ◆ Dry run detection ◆ Voltage limit ◆ Overvoltage, overcurrent, overload protection ◆ Phase-loss protection ◆ Short-circuit protection ◆ Automatic adaptation in case of unstable power supply ◆ Long lifecycle running in high humidity and high dust occasions ◆ Easy to maintain

Target Application



Target Application



Successful Applications



Swimming Pool



Livestock



Fountain



Fish Farming





Irrigation





Domestic Water Supply

Specification

Range Name		Solar VSD	
Range type		*2S/2S*SM	*4T*
Design			
Capacity range	AC input voltage(V)	220(±15%)(1PH)	380(±15%)(3PH)
	Power rating	0.4~4kW	0.75~160kW
	Mix. DC voltage(V)	440	800
	Start voltage(V)	200	300
	Min. DC voltage(V)	150	250
	DC input range(V)	200~400	300~750
	MPPT working voltage(V)	330	550
Frequency	Input frequency	50/60Hz	50/60Hz
	Output frequency	0-400Hz	0-400Hz
Overload capacity	Capacity	150% for 1min, 190% for 3s, 200% for 1s	150% for 1min, 190% for 3s, 200% for 1s
Control method	V/f	√	√
	Sensorless vector control	√	√
	Eco mode control	-	-
Start torque		0.5Hz, 150%	
Built-in PID		√	√
Keypad		Removable Keyboard	Removable Keyboard
Display		LED	
Multispeed Sequence		-	
I/O	DI1-DI4	NPN/PNP;Input: 9-30VDC	
	DO1	9-30VDC, max.50mA	
	AI1	V: 0-10V	
		I:0-20mA	
	AO1	V: 0-10V	
		I:0-20mA	
RO(Ta, Tb, Tc)	NO: AC 250V below 3A/DC30V below 3A		
	NC: AC 250V below 3A/DC30V below 3A		
Built-in communication (Max. speed)		0.4~15kW: extension card; ≥18.5kW: Build in	
Option	Communication	RS485,Modbus RTU (38.4kbps)	
	Extension operation panel	Support, cable length:2m, 5m	
Functionality		MPPT function	
		Support AC/DC supply	
		Auto start-run-stop	
		Energy/ flow calculator	
		Low Light protection	
		Eco-mode/PID with sleep mode/Special pump protection	
Installation Way		Wall mounted,Din-rail	
Environment and certificate	Operation temperature	The ambient temperature of inverter is -10°C~50°C while air temperature change should be less than 0.5°C per minute.The inverter will be derated once ambient temperature exceeds 40°C. It is not recommended to use the inverter if ambient temperature is above 50°C	
	Humidity	≤95%RH	
	Altitude	≤1000m, no capacity reduction	
	IP level	IP20	
	Global certificates	CE	

Specification

Range Name		Solar VSD	
Range type		*2S/2S*SM	*4T*
Design			
Features	Velocity ratio	1:200	
	Velocity precision at steady state	≤±0.2%	
	Frequency precision	±0.01Hz	
	Frequency resolution	±0.01%	
	Torque rise	Integrated auto-torque raising function; with manual- setting: 0.1%~10.0%	
	V/F control curve definition	1: Straight line V/F curve; applying to the constant torque load 2: Multi-dots V/F curve 3: Torque-stepdown characteristic curve (1.3 order) 4: Torque-stepdown characteristic curve (1.7 order) 5: Torque-stepdown characteristic curve (2.0 order) 6: Customized V/F(V/F separation)	
	Acceleration/Deceleration Time	four groups of ACC/DEC time which can be selected by F28	
	DC braking	Start frequency: 0.00~Max. output frequency; braking time: 0.0~50.0S braking current: 0.0~100%	
	Automatic voltage regulation(AVR)	The output voltage of the inverter is automatically adjusted to eliminate the influence of bus voltage fluctuations on the output voltage of the inverter	
	Auto current limitation	Limit current automatically to avoid tripping from frequent over current.	
	Auto PMW adjustment	Can adjust the PWM frequency automatically according to the load characteristic	
Protection	Special pump protection	Voltage limit, dry run,pump load monitor,Motor overload	
	VSD protection function	Over-current, over-voltage, under-voltage, over-heat, over-load, short circuit,phase loss	
	Cooling	Air- cooling, Forced air cooling	

Reference Selection

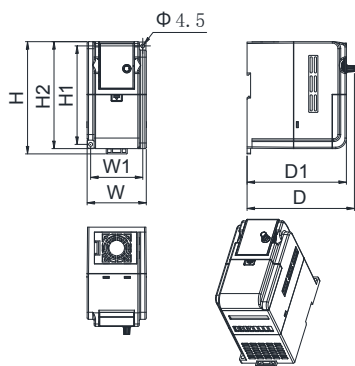
Range Name	Series Name	Input	Adaptation	Inverter
HAV	SO	2S	0015	G-SM
	↓	↓	↓	↓
HA: Himel Automation		2: 220V±15% 4: 380V±15%	Adaptation 0004: 0.4kW 0007: 0.75kW 0015: 1.5kW 0022: 2.2kW 0040: 4kW	Torque Type G: Heavy-duty SM: single phase motor
V: VSD M: Motion H: HMI P: PLC	SO: Solar	S: Single-phase T: Three-phase		

Selection

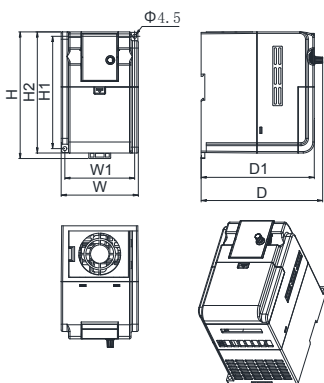
Range	Input Voltage	HIMEL-reference	Rated Capacity	Rated input current	Heavy duty(constant torque) G-type			Dimensions (mm)			Mounting Dimensions (mm)			CAD
					Motor Power (kW)	Motor Power (HP)	Continuous Output Current (A)	W	H	D	W1	H1	D1	
Solar	AC:220V(±15%) Single Phase DC:150V-440V	HAVSO2S0004GSM	1.5	9.5	0.4	0.5	5	84	152	148.4	74	140	141	(a)
		HAVSO2S0007GSM	2.7	15.7	0.75	1.0	7	105	165	161.4	95	153	154	(b)
		HAVSO2S0015GSM	3.8	27	1.5	2.0	10	105	165	161.4	95	153	154	(b)
		HAVSO2S0022GSM	5.3	29.4	2.2	3.0	14	145	230	177.4	133	218	170	(c)
		HAVSO2S0040GSM	6.5	32.8	4	5.0	17	145	230	177.4	133	218	170	(c)
		HAVSO2S0004G	0.8	6.5	0.4	0.5	3	84	152	148.4	74	140	141	(a)
		HAVSO2S0007G	1.5	9.5	0.75	1.0	5	84	152	148.4	74	140	141	(a)
		HAVSO2S0015G	2.7	15.7	1.5	2.0	7	105	165	161.4	95	153	154	(b)
		HAVSO2S0022G	3.8	27	2.2	3.0	10	105	165	161.4	95	153	154	(b)
		HAVSO2S0040G	6.5	32.8	4	5.0	17	145	230	177.4	133	218	170	(c)
	AC:380V(±15%) Three Phase DC:250V-800V	HAVSO4T0007G	1.5	3.4	0.75	1.0	3	84	152	148.4	74	140	141	(a)
		HAVSO4T0015G	3	5	1.5	2.0	4.5	84	152	148.4	74	140	141	(a)
		HAVSO4T0022G	4	6.8	2.2	3.0	6	105	165	161.4	95	153	154	(b)
		HAVSO4T0040G	5.9	10.5	4	5.0	9.5	105	165	161.4	95	153	154	(b)
		HAVSO4T0055G	8.5	15.5	5.5	7.5	13	145	230	177.4	133	218	170	(c)
		HAVSO4T0075G	11	20.5	7.5	10.0	17	145	230	177.4	133	218	170	(c)
		HAVSO4T0110G	17	26	11	15.0	25	180	285	167.4	168	273	160	(d)
		HAVSO4T0150G	21	35	15	20.0	32	180	285	167.4	168	273	160	(d)
		HAVSO4T0185G	24	38.5	18.5	25.0	37	260	340	223	245	325	210.5	(e)
		HAVSO4T0220G	30	46.5	22	30.0	45	260	340	223	245	325	210.5	(e)
		HAVSO4T0300G	40	62	30	40.0	60	250	430	-	160	415	220	(f)
		HAVSO4T0370G	50	76	37	50.0	75	250	430	-	160	415	220	(f)
		HAVSO4T0450G	60	92	45	60.0	90	300	530	-	240	515	270	(g)
		HAVSO4T0550G	72	113	55	75.0	110	300	530	-	240	515	270	(g)
		HAVSO4T0750G	100	157	75	100.0	152	340	580	-	260	565	313	(h)
		HAVSO4T0900G	116	180	90	120.0	176	340	580	-	260	565	313	(h)
		HAVSO4T1100G	138	214	110	150.0	210	340	580	-	260	565	313	(h)
		HAVSO4T1320G	165	256	132	180.0	253	400	940	367	300/365	910	336	(i)
HAVSO4T1600G	197	305	160	200.0	300	400	940	367	300/365	910	336	(i)		

CAD Diagrams

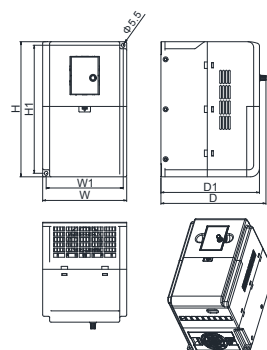
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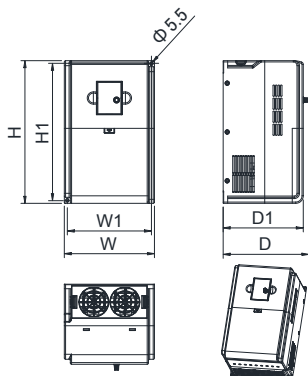
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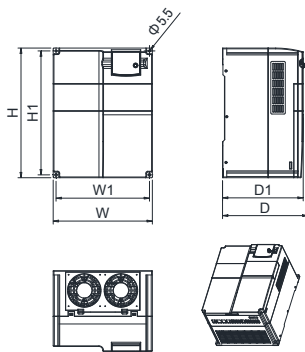
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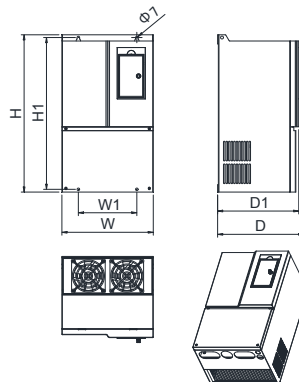
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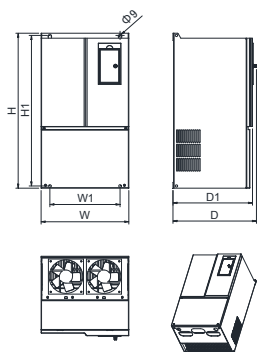
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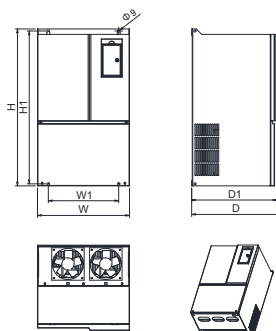
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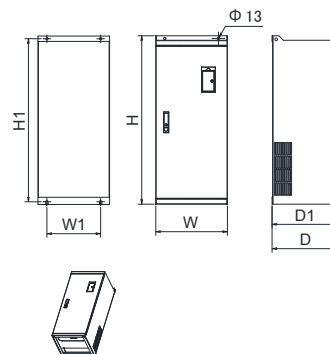
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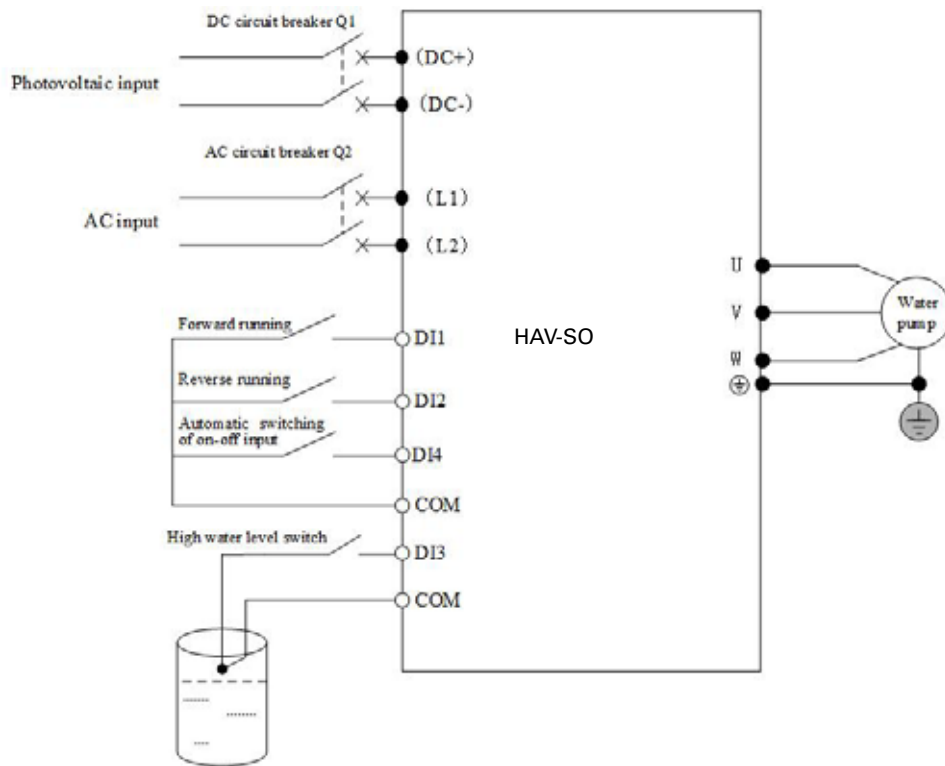
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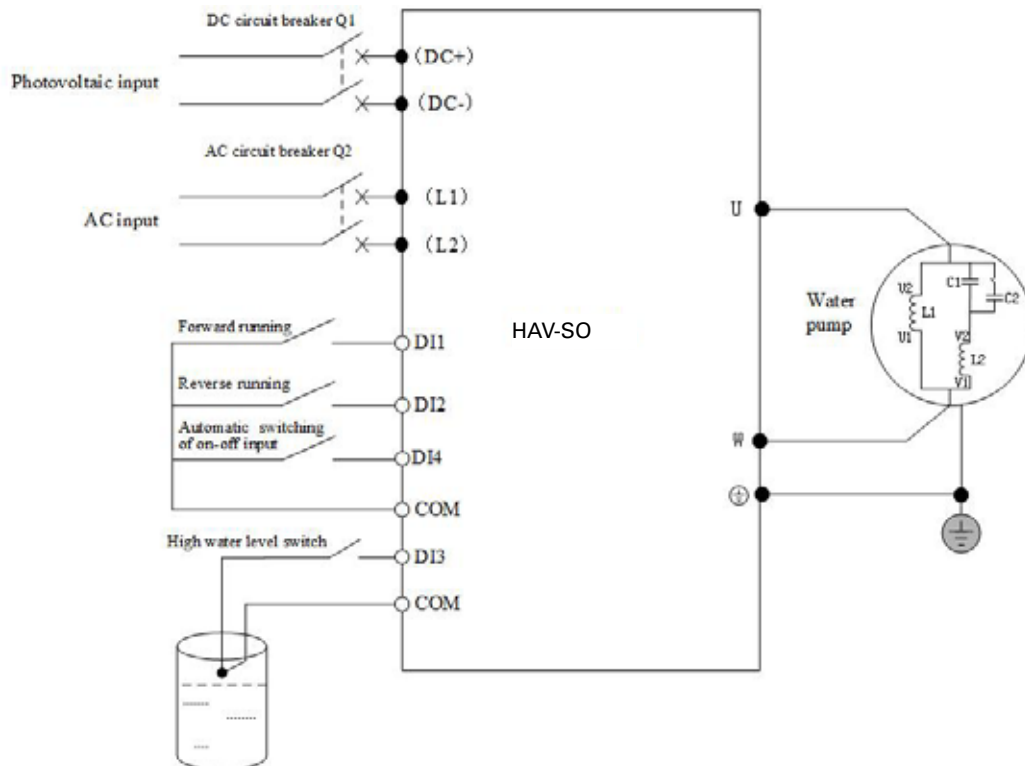
(i)



Wiring Diagrams






Three phase motor



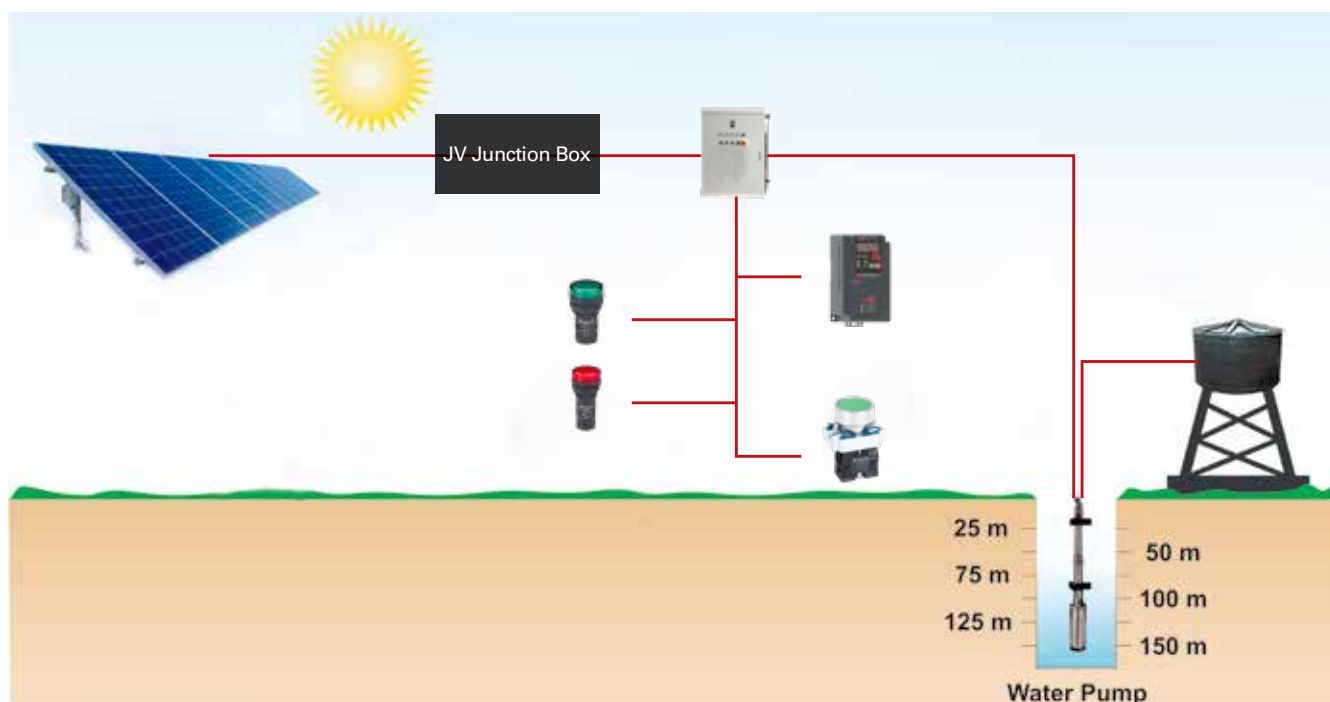
Singler phase motor

Accessories

Type	Commercial Reference	Short Description	Applicable Product		Pictures
			Applicable Commercial Reference	Specifications	
Keypad cable	HAV-SO-CAB	Keyboard extension cable, Length: 2m, 5m	HAVSO Series(0.4~160kW)	2S:0.4-4.0kW 4T:0.7-160kW	
RS485 Communication Extension card	HAV-SO-485	Support MODBUS-RTU protocol	HAV-SO Series(0.4~15kW)	2S:0.4-4.0kW 4T:0.7-15kW	
Power frequency & PV switching solution	HAV-SO-AS055-2	Size: W×H×D:240×90×125 W1×H1×D:229×65×1254×Ø6	HAV-SO Series	2S:0.4-4.0kW	
	HAV-SO-AS055-4	Size: W×H×D:240×90×125 W1×H1×D:229×65×1254×Ø6	HAV-SO Series	4T:0.7-15kW	
	HAV-SO-AS110-4	Size: W×H×D:240×90×125 W1×H1×D:229×65×1254×Ø6	HAV-SO Series	4T:18.5-37kW	

* 2S = 220V±15% Single Phase, 2T = 220V±15% Three Phase, 4T = 380V±15% Three Phase

Solar Pump Solution



Solar Array Selection

Range	Input Voltage	Commercial Reference	Solar panel selection			
			37±1V		45±1V	
			Cell panel power±5Wp	Panel per array*arraies	Panel power±5Wp	Panel per array*arraies
Solar	AC:220V(±15%) Single Phase DC:150V-440V	HAVSO2S0004GSM	250	11*1	300	9*1
		HAVSO2S0007GSM	250	11*1	300	9*1
		HAVSO2S0015GSM	250	11*1	300	9*1
		HAVSO2S0022GSM	250	11*1	300	9*1
		HAVSO2S0040GSM	250	11*2	300	9*2
		HAVSO2S0004G	250	11*1	300	9*1
		HAVSO2S0007G	250	11*1	300	9*1
		HAVSO2S0015G	250	11*1	300	9*1
		HAVSO2S0022G	250	11*1	300	9*1
		HAVSO2S0040G	250	11*2	300	9*2
	AC:380V(±15%) Three Phase DC:250V-800V	HAVSO4T0007G	250	18*1	300	15*1
		HAVSO4T0015G	250	18*1	300	15*1
		HAVSO4T0022G	250	18*1	300	15*1
		HAVSO4T0040G	250	18*2	300	15*2
		HAVSO4T0055G	250	18*2	300	15*2
		HAVSO4T0075G	250	18*2	300	15*2
		HAVSO4T0110G	250	18*3	300	15*3
		HAVSO4T0150G	250	18*4	300	15*4
		HAVSO4T0185G	250	18*5	300	15*5
		HAVSO4T0220G	250	18*6	300	15*6
		HAVSO4T0300G	250	18*8	300	15*8
		HAVSO4T0370G	250	18*10	300	15*10
		HAVSO4T0450G	250	18*12	300	15*12
		HAVSO4T0550G	250	18*15	300	15*15
		HAVSO4T0750G	250	18*20	300	15*20
		HAVSO4T0900G	250	18*25	300	15*25
		HAVSO4T1100G	250	18*30	300	15*30
		HAVSO4T1320G	250	18*36	300	15*36
		HAVSO4T1600G	250	18*43	300	15*43

Electric Device Selection

Range	Input Voltage	Commercial Reference	AC Circuit Breaker	DC Circuit Breaker	AC contactor	SPD	Fuse
Solar	AC:220V(±15%) Single Phase DC:150V-440V	HAVSO2S0004GSM	16	16A/1000VDC	16	Type 1000VDC	30A Fast fuse
		HAVSO2S0007GSM	16		16		
		HAVSO2S0015GSM	25		25		
		HAVSO2S0022GSM	40	25A/1000VDC	40		
		HAVSO2S0040GSM	50	63A/1000VDC	50		
		HAVSO2S0004G	16	16A/1000VDC	16		
		HAVSO2S0007G	16		16		
		HAVSO2S0015G	25		25		
		HAVSO2S0022G	40	25A/1000VDC	40		
		HAVSO2S0040G	50	63A/1000VDC	50		
	AC:380V(±15%) Three Phase DC:250V-800V	HAVSO4T0007G	10	16A/1000VDC	12		
		HAVSO4T0015G	10		12		
		HAVSO4T0022G	10		12		
		HAVSO4T0040G	25		25		
		HAVSO4T0055G	25	25A/1000VDC	25		
		HAVSO4T0075G	40		40		
		HAVSO4T0110G	50		50		
		HAVSO4T0150G	63	63A/1000VDC	63		
		HAVSO4T0185G	63		63		
		HAVSO4T0220G	100	100A/1000VDC	95		
		HAVSO4T0300G	100		95		
		HAVSO4T0370G	125		115		



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