



**8" Rewindable
High Efficiency System
PRODUCT CATALOG**





Franklin Electric



QUALITY



AVAILABILITY



SERVICE



INNOVATION



Quality in the Well



Franklin Electric

8" High Efficiency System



Franklin Electric is pleased to introduce the extended power range up to 150kW for its High Efficiency Submersible Borehole systems (HES). The system consists of an 8" synchronous submersible NEMA motor with associated variable frequency drive and matching output filter.

Ever since their introduction, our 6" HES have proven their world-class efficiency in more than 400 applications to date, saving up to 20% of electrical energy when compared to standard asynchronous motor system.

System Product advantages:

- One-stop shop - perfectly matching components guarantee first class performance/ efficiency
 - ⇒ *System payback < 2 years*
- Up to **8% improved motor efficiency** with excellent partial load behaviour
 - ⇒ *SKU Reduction*
- Significant lower motor heat rise
 - ⇒ *Increased lifetime*
- Higher power density
 - ⇒ *Lightweight*
- Easy set-up due to tailored pre-setting, user interface and own **Franklin Electric software**
- Speed control
 - ⇒ *Optimum aggregate operation - pump matches system any time*
- Incorporated Soft start and protection features
 - ⇒ *Increased lifetime*
 - ⇒ *No additional investment*
- Reduced amps
 - ⇒ *Smaller drop lead cross size*
- Power factor corrected input
 - ⇒ *No power compensation needed*
- Communication Modbus (RS485, Ethernet and optional Profibus)

System Technical Specification:

- Rating: 75 / 100 / 150kW
- Power Supply: Voltage 400V +/- 10%
Frequency 50Hz +/- 6%



Model Numbers

400V-50Hz High Efficiency System (Synchronous Motor, VFD & Filter)

P [kW]	For panel mount		For wall mount - IP54	
	dV/dt Filter	Sinus Filter	dV/dt Filter	Sinus Filter
75	308 014 001	308 014 101	308 014 201	308 014 301
100	308 016 001	308 016 101	308 016 201	308 016 301
150	308 017 001	308 017 101	308 017 201	308 017 301

Non-stock items

For lead length > 120m please consult Franklin Electric

System Options:

- Plug-in card 6x DI/DO - 308 170 201
- Plug-in card PT100 - 308 170 202
- Plug-in card Profibus - 308 170 203
- Plug-in card 1x AI & 2x AO 308 170 206
- Other voltages
- Sinus output filters in IP54 and IP00
- PT100 protection
- Motors in 316SS and 904L

Performance Data 400V-50Hz

	P [kW]	Thrust F [kN]	n_N [min ⁻¹]	I_N [A]	I_A / I_N^* [A]	η [%]	cos ϕ [%]	T_N [Nm]	T_A / T_N^* [Nm]
308 014 X01	45	45	3000	74	1	93,3	0,96	143	1
	55	45	3000	91	1	93,3	0,96	175	1
	67	45	3000	112	1	93	0,96	213	1
	75	45	3000	128	1	92,5	0,96	239	1
308 016 X01	75	45	3000	129	1	93,5	0,95	239	1
	83	45	3000	143	1	93,3	0,95	264	1
	93	45	3000	162	1	93	0,95	296	1
	100	45	3000	178	1	92,7	0,95	319	1
308 017 X01	100	45	3000	176	1	94,2	0,94	319	1
	110	45	3000	193	1	94,2	0,94	350	1
	130	45	3000	229	1	94	0,94	413	1
	150	45	3000	270	1	93,4	0,94	477	1

Performance data are based on measurements with Franklin Electric original equipment!

*Since this is an integrated system (motor plus electronics) these figures relate to VFD input

Control modes and necessary sensor technologies

Process reference	Control reference	Flow meter	Pressure sensor	Level sensor	PT100 sensor & Drive slot card	Flow switch (digital)
Q - Flow	No (Optional)	mandatory				
	P	mandatory	mandatory			
	H	mandatory		mandatory		
P - pressure	No (Optional)	Yes*	mandatory			
	Q	mandatory	mandatory			
	H		mandatory	mandatory		
H - level	No (Optional)	Yes*		mandatory		
	Q	mandatory		mandatory		
	P		mandatory	mandatory		
Manual Mode	No				Yes*	

*please consult Franklin Electric



8" High Efficiency Motor

Motor Features:

- 8" Motor in 304SS / CI (Powder Coated)
- PE2/PA winding as a standard
- SandFighter® SIC seal system
- Non-contaminating FES93 filling
- All motors pre-filled and 100% tested
- Max. storage temperature -15 ... +60°C
- Drinking water approved

Motor Technical Specification:

- 75 / 100 / 150kW
- Power supply 400V/100Hz
- 8" NEMA flange
- Protection IP68
- 10 Starts per hour
- Installation vertical (for horizontal operation please consult FE)
- Motor lead in 6 m length
- 30°C nominal ambient temperature with 0,5m/sec cooling flow

Motor Options:

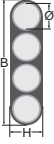
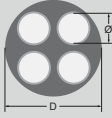
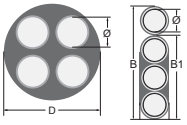

- Other voltages
- PT100 temperature sensor (retrofitable)
 ⇒ VFD PT100 Plug-in Card (308 170 202) necessary
- Motors complete in 316SS and 904L available



System model number	P [kW]	400V / 100 Hz 304SS/CI Motor model number
308 014 xxx	75	263 014 5311
308 016 xxx	100	263 016 5311
308 017 xxx	150	263 017 5311



8" Rewindable Motors - Motor Leads*

DOL										
Lead	kW	∅ (mm ²)	B / H (mm)		Lengths (m)	Qty.	Lead Mod.- Nr.	Lead seal Kit 304/316 Mod.- Nr.	Lead seal Kit 904L Mod.- Nr.	
	75	4G16	B	38,0	6	1	308 710 108	308 660 618	308 660 620	
			H	12,8						
	100	4G25	D	32	6	1	308 710 140	308 660 633	308 660 634	
	150	4G25 + 3X25	D	32	6	1	308 710 141	308 660 635	308 660 636	
			B X H	37,5 x 16						
Ground lead (optional)	kW	∅ (mm ²)	D (mm)		Lengths (m)	Qty.	Mod.-Nr.			
	all ratings	1G25	13,0		8	1	308 053 080			
Lead opening seal kit							30 – 93 kW DOL / YΔ	Mod.- Nr.:	304/316	308 660 617
								904L	308 660 625	

For PE2/PA engines additionally the special Tape 700 541 688 is absolutely necessary

*Cables are designed for submerged operation. For air operation please consult Franklin Electric..

Motor Drop Lead

Lead lengths in meters for 400V-50Hz / 460V-60Hz and max. 3% voltage drop at 50°C ambient

P _N [kW]	cable size mm ² , copper wire - 90°C rated insulation											
	16	25	35	50	70	95	120	150	185	240	300	400
45	65	100	140	200	280	370	460					
55		85	120	170	230	300	370	450				
67			90	130	180	240	300	360	420			
75			80	115	160	200	260	310	370	460		
83				100	140	190	235	285	340	420		
93					115	160	200	240	290	350	410	
110					100	140	170	210	250	305	360	440
130						115	145	175	210	260	305	370
150							120	150	175	215	255	310

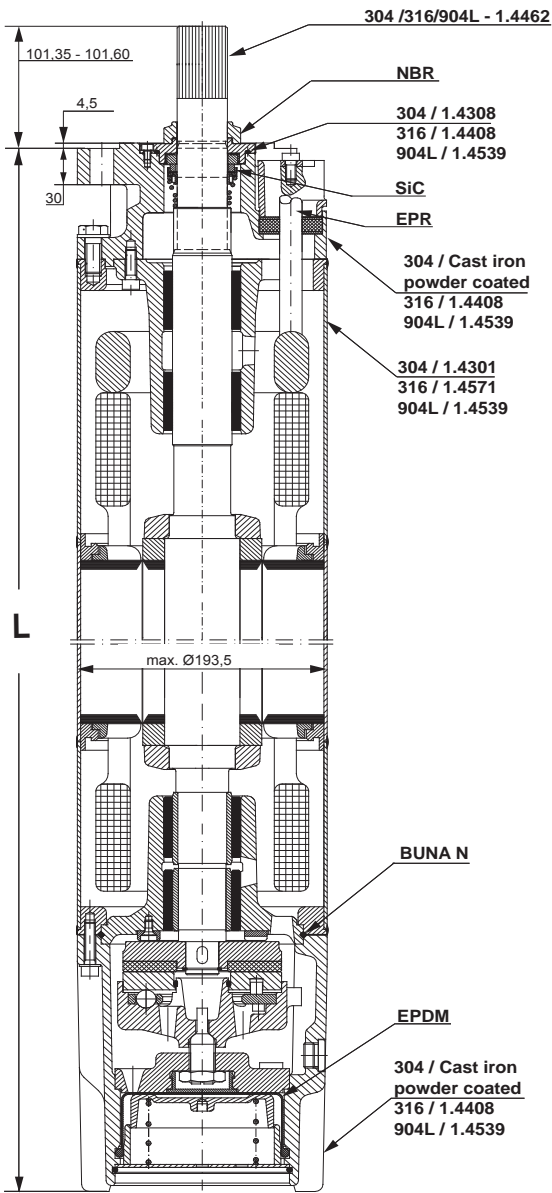
For lead length > 120m please consult Franklin Electric.

Further potential energy saving due to more conservative lead sizing (< 3% voltage drop)

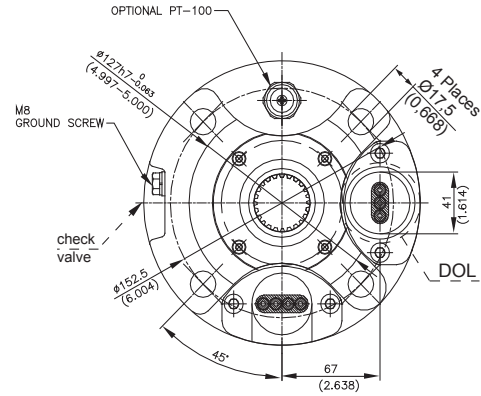


8" Rew Motor Design

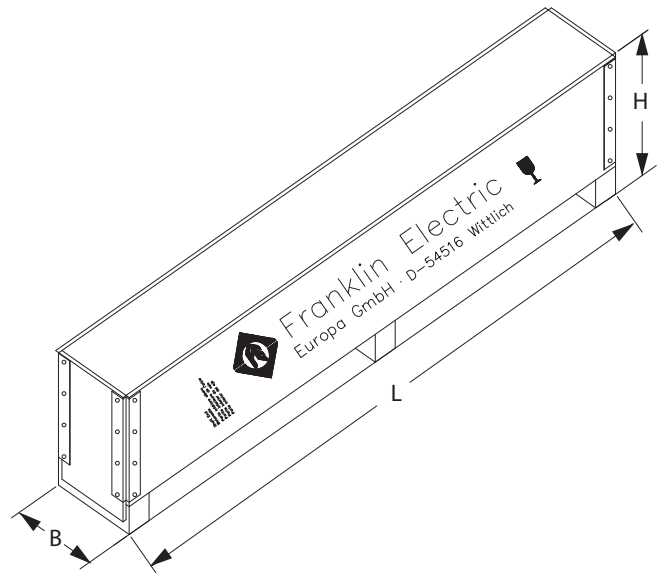
Motor - 304/316SS/904L



End Bell



Motor Box



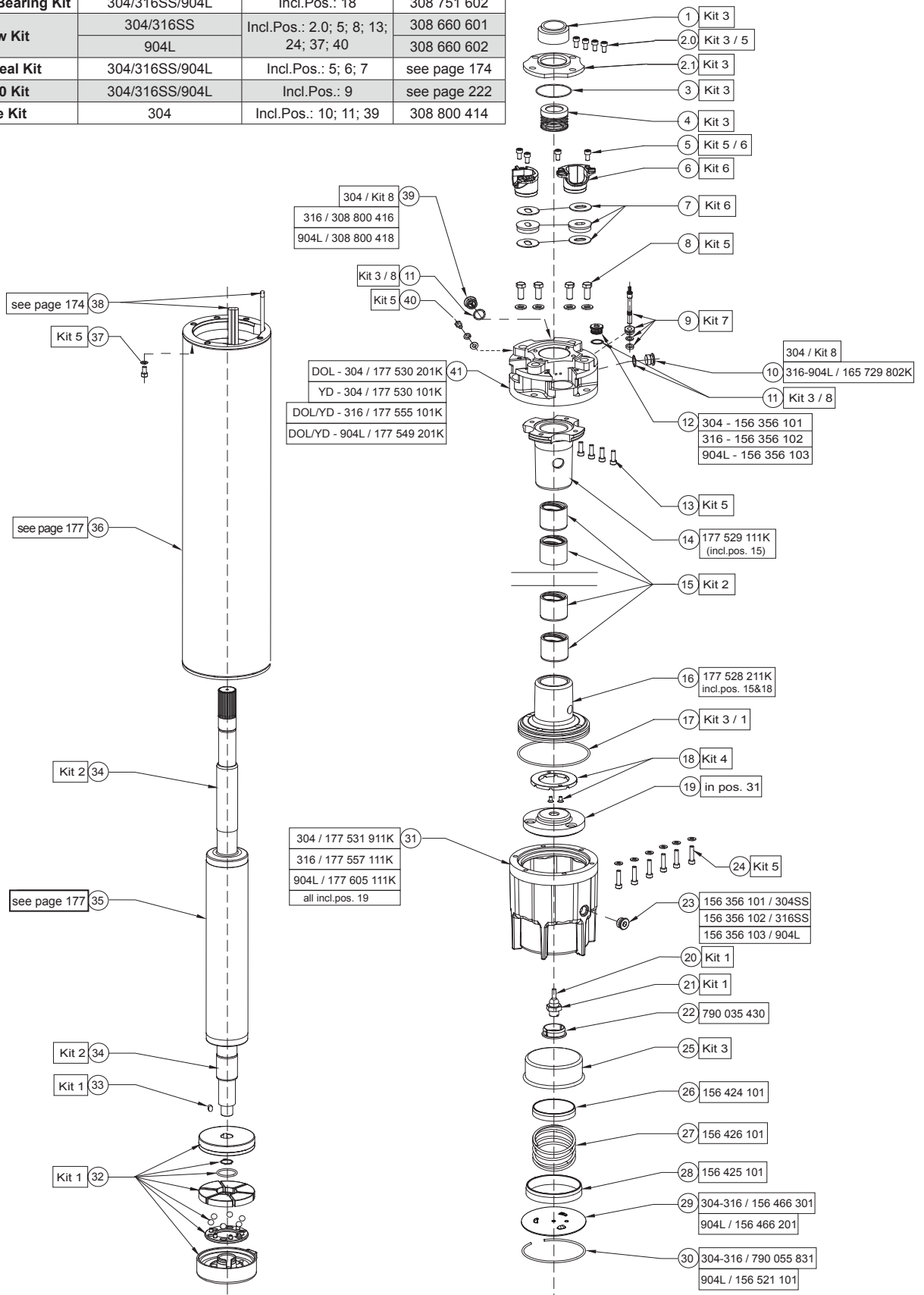
(sample drawing)

P [kW]	Motor Lengths L [mm]	Motor Weights [kg]		Motor Shipping Size [mm]		
	304 / 316 / 904L	304 / 316 / 904L	Incl. Pack [kg]	B	H	L
75	1175	150	179	310	472	1596
100	1286	169	198	310	472	1596
150	1560	215	252	310	472	1996



8" PM Rewindable Spare Parts 304 / 316SS / 904L

Kit 1 Thrust Bearing Kit	304/316SS/904L	Incl.Pos.: 17; 20; 21; 32; 33	308 750 601
Kit 2 Radial Bearing Kit	304/316SS/904L	Incl.Pos.: 15; 34	308 751 603
Kit 3 Seal Kit	304/316SS	Incl.Pos.: 1 - 4; 11; 17; 25	308 800 603
	904L		308 800 604
Kit 4 Up-Thrust Bearing Kit	304/316SS/904L	Incl.Pos.: 18	308 751 602
Kit 5 Screw Kit	304/316SS	Incl.Pos.: 2.0; 5; 8; 13; 24; 37; 40	308 660 601
	904L		308 660 602
Kit 6 Lead Seal Kit	304/316SS/904L	Incl.Pos.: 5; 6; 7	see page 174
Kit 7 PT100 Kit	304/316SS/904L	Incl.Pos.: 9	see page 222
Kit 8 Valve Kit	304	Incl.Pos.: 10; 11; 39	308 800 414





304 / 316SS Stator and Rotor Model Number 400V / 50Hz

P [kW]	Stator (incl. winding and 6m motor lead)		Rotor
	U _N [V]	DOL PE2/PA	
75	400V	327 154 901K	161 123 801K
100	400 V	327 155 901K	161 123 802K
150	400 V	327 156 901K	161 123 803K

Windings 400V-50Hz

P [kW]	U _N [V]	Mod.-No. Windingkit	Turns per coil	Wire diameter [mm]	Type of Isolation	Group connection	Total Wire length [m]	Resistance coil [Ω]	Resistance DOL (U1-V1) [Ω]
75	400	327 154 999	16	1,9/2,1&1,8/2,8 (2GR II)	PE2/PA	Parallel Y	290	0,146	0,146
	500	327 151 999	20	2,3/3,5 (2GR II)			350	0,235	0,235
100	400	327 155 999	12	2,0/3,1&2,1/3,3 (2GR II)	PE2/PA	Parallel Y	260	0,103	0,103
	500	327 144 999	17	2,5/3,8 (2GR II)			350	0,213	0,213
150	400	327 156 999	16	1,9/2,1&1,8/2,8 (4GR II)	PE2/PA	Parallel Y	432	0,114	0,057
	500	327 145 999	20	2,3/3,5 (4GR II)			540	0,188	0,094

Insulation resistance (20°C / 500 VDC)

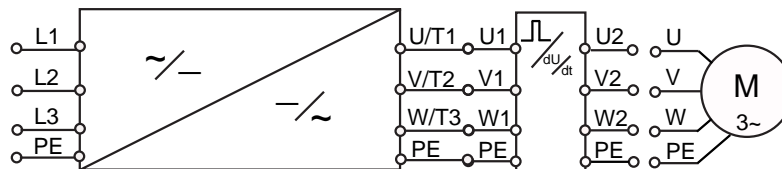
New motor without drop cable	400 >	MΩ
Used motor without drop cable	20 >	MΩ
New motor with drop cable	4 >	MΩ
Used motor with drop cable	1	MΩ

Motor Repair Instructions

Pictured Repair Instructions 304SS / 316SS / 904L	Mod.Nb.:	308 018 ***
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Electrical Connection

DOL



U	V	W	PE
brown	grey	black	yellow/green



Variable Speed Drive (VFD)

VFD Features:

- Supports induction and permanent magnet motors
- Top class protection IP54/21 enclosure classes
- Optimized for submersible permanent motor feeding – first class performance (Tailored pre-setting, user interface and software)



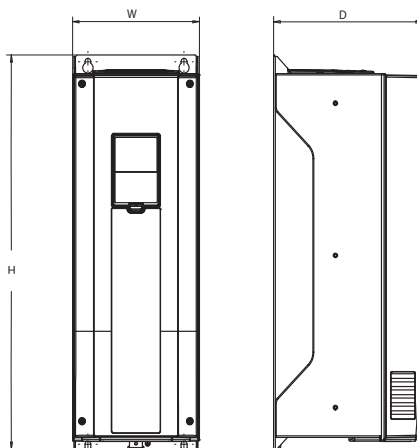
VFD Technical Specification:

Technical Data		
Power supply	Input voltage U_{IN}	380 - 500V ; -10%....+10%
	Input frequency f_{IN}	47 - 65Hz
	Starts per hour	20 ; with min 3min rest period
Motor connection	Output voltage	0 - U_N
	Output current	I_N at rated Ambient temperature (40°C) Overload:IP21: 1,1 x I_N
	Output frequency	0- f_N , resolution 0,01Hz
Performance	Efficiency	97,5%
Control characteristics	Switching frequency	3,6 6 kHz; default setting 4 kHz
Ambient conditions	Operation temperature	-10°C...+50°C (>40°C with derating)
	Storage temperature	-40°C+70°C
	Altitude	3000m (>1000m with derating)
EMC	Immunity & Emissions	Complies with EN 61800-3, Category C2 - first and second environment
Communication	RS 485	Standard: Modbus
	Ethernet	Standard: Modbus
I/O connections	Digital Input (DI)	6x
	Analog Input (AI)	2x
	Analog Output (AO)	1x
	Relay Output (RO)	2x (change-over contact)
For further details please see separate Franklin Electric Quick Installation guide and VFD literature.		



VFD Model Numbers and Dimensions 400-500V / 50-60Hz

IP54/21/00



VFD Model Numbers and Dimensions

System Model Number	AC Drive Type	IP Type	I _N [A]	Dimensions WxHxD [mm]	Weight [kg]
308 014 001/101	314 000 116	21	140	290x966x343	66
308 016 001/101	314 000 117	21	205*	290x966x343	66
308 017 001/101	314 000 118	00	310*	480x971x365	104
308 014 201/301	314 000 113	54	140	290x966x343	66
308 016 201/301	314 000 114	54	205*	290x966x343	66
308 017 201/301	314 000 115	54	310*	480x1150x365	108

* Without derating for default switching frequency setting

VFD Options:

- Plug-in card 6x DI/DO 308 170 201
- Plug-in card PT100 308 170 202
- Plug-in card Profibus 308 170 203
- Plug-in card 1x AI & 2x AO 308 170 206
- Replacement Battery VFD 308 170 205



Output Filter

Output Filter Features:

- dV/dt filter for lead lengths up to 120m, for lead lengths >120m please consult Franklin Electric.
- filter available in IP54 and IP00
- Optimized for submersible permanent magnet motor feeding



Output Filter Technical Specification:

- Voltage → 380 - 500V
- Frequency → 0 - 120 Hz
- Switching Frequency → 4kHz
- Ambient Temperature → < 40°C

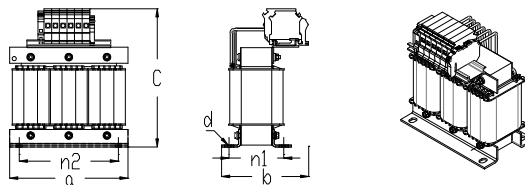
Output Filter Options:

- Sinus filter in IP54 and IP00 for lead length >120m and/ or special applications
- Other voltages

400/500V dV/dt Output Filter Model Data - Protection Class IP00

System model number	Filter order code	I _N [A]	Dimensions [mm]						weight [kg]	terminal / PE	clamping torque
			a	b	c	n1	n2	d		[mm ²]	[Nm]
308 014 001	314 005 130	140	240	160	350	90	190	11	18	35-150 / M8	12-20 (PE 25)
308 016 001	314 005 119	205	240	170	350	100	190	11	25	35-150 / M8	12-20 (PE 25)
308 017 001	314 005 120	310	300	220	299	135	250	11	40	(200) M10 / M10	85 (PE 50)

Filter outlines

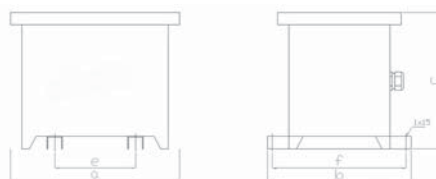


400/500V dV/dt Output Filter Model Data - Protection Class IP54

System model number	Filter order code	I _N [A]	Dimensions [mm]						cable Ø [mm]	weight [kg]	terminal / PE	clamping torque
			a	b	c	e	f	[mm ²]			[Nm]	
308 014 101	314 005 121*	140	520	340	420	240	230	6x24-35	55	35-150 / M8	12-20 (PE 25)	
308 016 101	314 005 122*	205	520	340	420	240	230	6x24-35	65	35-150 / M8	12-20 (PE 25)	
308 017 101	314 005 123*	310	520	340	420	240	230	6x24-35	85	70-240 / M10	25-30 (PE 50)	

*Floor mount

Floor mount outlines*

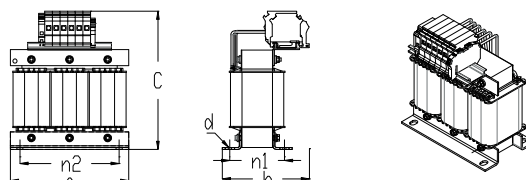




400/500V Sinus Filter Model Data - Protection Class IP00

System model number	Filter order code	I _N [A]	Dimensions [mm]						weight [kg]	terminal / PE	clamping torque
			a	b	c	n1	n2	d		[mm ²]	[Nm]
308 014 201	314 005 124	140	360	345	450	156	310	11	87	35-150 / M8	12-20 (PE 25)
308 016 201	314 005 125	205	420	375	505	182	370	11	105	35-150 / M8	12-20 (PE 25)
308 017 201	314 005 126	310	420	380	415	212	370	11	140	(200) M10 / M10	85 (PE 50)

Filter outlines

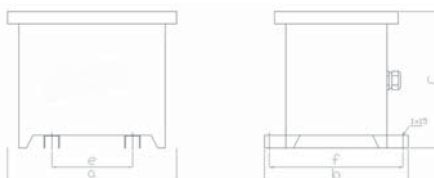


400/500V Sinus Filter Model Data - Protection Class IP54

System model number	Filter order code	I _N [A]	Dimensions [mm]					cable Ø [mm]	weight [kg]	terminal / PE	clamping torque
			a	b	c	e	f			[mm ²]	[Nm]
308 014 301	314 005 127*	140	660	560	590	370	520	6x24-35	155	35-150 / M8	12-20 (PE 25)
308 016 301	314 005 128*	205	1050	760	760	430	720	6x24-35	230	35-150 / M8	12-20 (PE 25)
308 017 301	314 005 129*	310	1050	760	760	430	720	6x24-35	335	70-240 / M10	25-30 (PE 50)

*Floor mount

Floor mount outlines*





Franklin Electric



SS Pump

For any pump support please refer to:
<http://www.etechnpumps.com>





FHOTON SOLARPAK

ALL-IN-ONE-PACKAGE

The Fhoton SolarPAK is the system solution to your solar pumping requirements. By utilizing quality components, innovative thinking based on global market inputs, and a technical expertise in groundwater pumping, Franklin Electric has developed a rugged, high-output system which tackles the challenges of harsh and remote environments. No other system delivers the features, benefits, and reliability of Fhoton SolarPAK in just one package!

Features

- High-flow system for faster tank-fill and significant water output
- Proven motor and pump technology for long-term reliability
- Robust IP66, NEMA 4 enclosure minimizes impact from wildlife, insects, dust, and weather
- DC solar array
- Operating status indicated by multi-color LED
- Terminals provided for an optional data communications board
- Max Power Point Tracking (MPPT) for maximizing efficiency of input power
- Soft-start feature prevents water hammer and increases system life
- Allows use of new solar array or retrofit to existing array (subject to size and performance check)
- Simple installation with no required maintenance
- Built-in diagnostics and protection
- C-Tick, cULus, CE, and UL approved



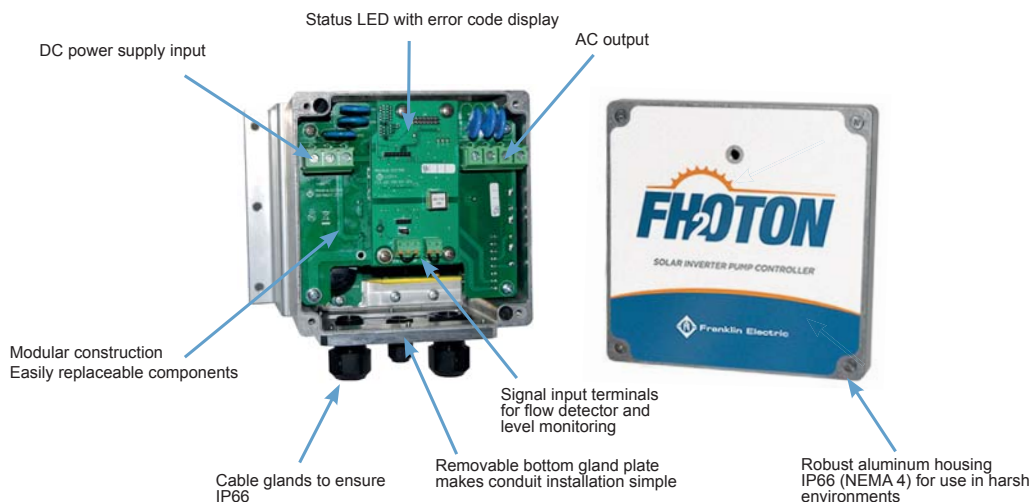
SOLARPAK CONTENTS

- Franklin Electric 4" submersible motor
- Franklin Electric 4" submersible pump
- Fhoton Solar controller
- Flow switch with 10 m cable
- Variety of flow rates available: 18, 25, 30, 45, 70, 100, 150, or 270 lpm
- Motor and drive ratings available: 0.55 or 1.1 kW

Drive Features

Technical Specifications

- Outside temperature: -25°C...+50°C, up to 100% humidity
- Housing protection IP 66 (NEMA 4)





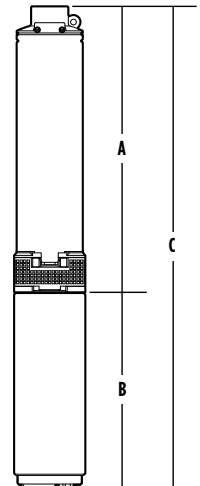
FHoton SolarPAK- Ordering Information

SolarPAK		FHoton Solar Controller		Solar Pump (BSPP)				Motor		Flow Switch (BSPP)	
Solar Kit Model	Order No.	Drive Model	Part No.	Solar Pump	Stg	LPM	Part No.	kW	Part No.	Model	Part No.
Base PAK											
FDSP-0,55kW	308 752 670	FD Solar 0,55kW N4	581 013 000 864					0,55	234 802 6700L	F21	226 019 101
FDSP-1,1kW	308 754 670	FD Solar 1,1kW N4	581 014 200 864					1,1	234 702 6700L	F21	226 019 101
Flow PAK											
FDSP-0,55kW-35	308 752 672	FD Solar 0,55kW N4	581 013 000 864	E-Tech VS 2/10	10	35	710 201 00	0,55	234 802 6700L	F21	226 019 101
FDSP-1,1kW-65	308 754 674	FD Solar 1,1kW N4	581 014 200 864	E-Tech VS 4/14	14	65	710 401 40	1,1	234 702 6700L	F21	226 019 101
Elevation PAK											
FDSP-0,55kW-65	308 752 674	FD Solar 0,55kW N4	581 013 000 864	E-Tech VS 4/7	7	65	710 400 70	0,55	234 802 6700L	F21	226 019 101
FDSP-1,1kW-100	308 754 676	FD Solar 1,1kW N4	581 014 200 864	E-Tech VS 6/9	9	100	710 600 90	1,1	234 702 6700L	F21	226 019 101

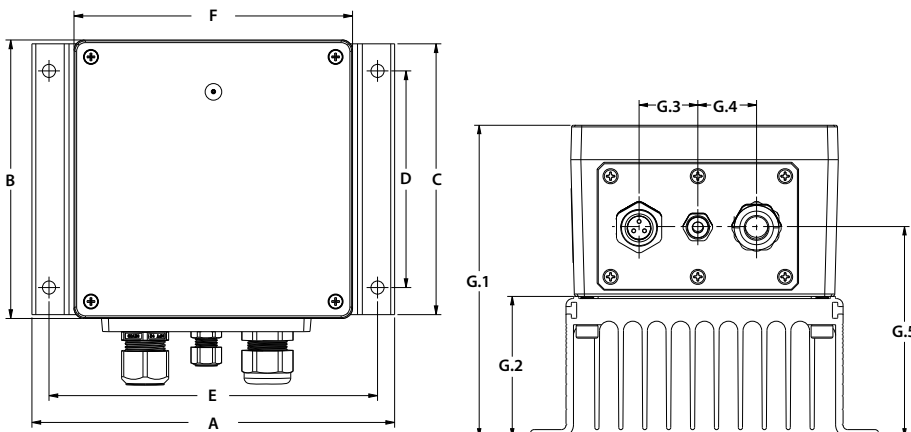
* a ~ 10 meter cable for use with the flow switch is included in the controller packaging
 ** 316 stainless steel motors available on request
 *** Motors shown above include an individual conductor lead installed in the motor. For replacement motors without a lead, use part number 2345041903S (1.1 kW)
 (a) High capacity pumps, 100 lpm and higher, in a SolarPAK are not supplied with an internal check valve.

FHoton SolarPAK- Dimension

Solar Motor/Pump (PMA) Dimensions									
Solar Kit Model	LPM	kW	Stages	A [mm]	B [mm]	C [mm]	Discharge [inch]	PE Weight [Kg]	PMA Weight [Kg]
FDSP-0,55kW-35	35	0,55	10	367	270	637	1 ¼	4	14
FDSP-1,1kW-65	65	1,1	14	438	298	736	1 ¼	5,1	18,1
FDSP-0,55kW-65	65	0,55	7	343	270	613	1 ¼	3,5	13,5
FDSP-1,1kW-100	100	1,1	9	461	298	759	2"	4	17



Solar Controller Dimensions								
Dimensions	A	B	C	D	E	F	G.1	G.2
[mm]	259	464	534	508	152	76	221	265





The Fhoton drive supports submersible and surface pumping applications

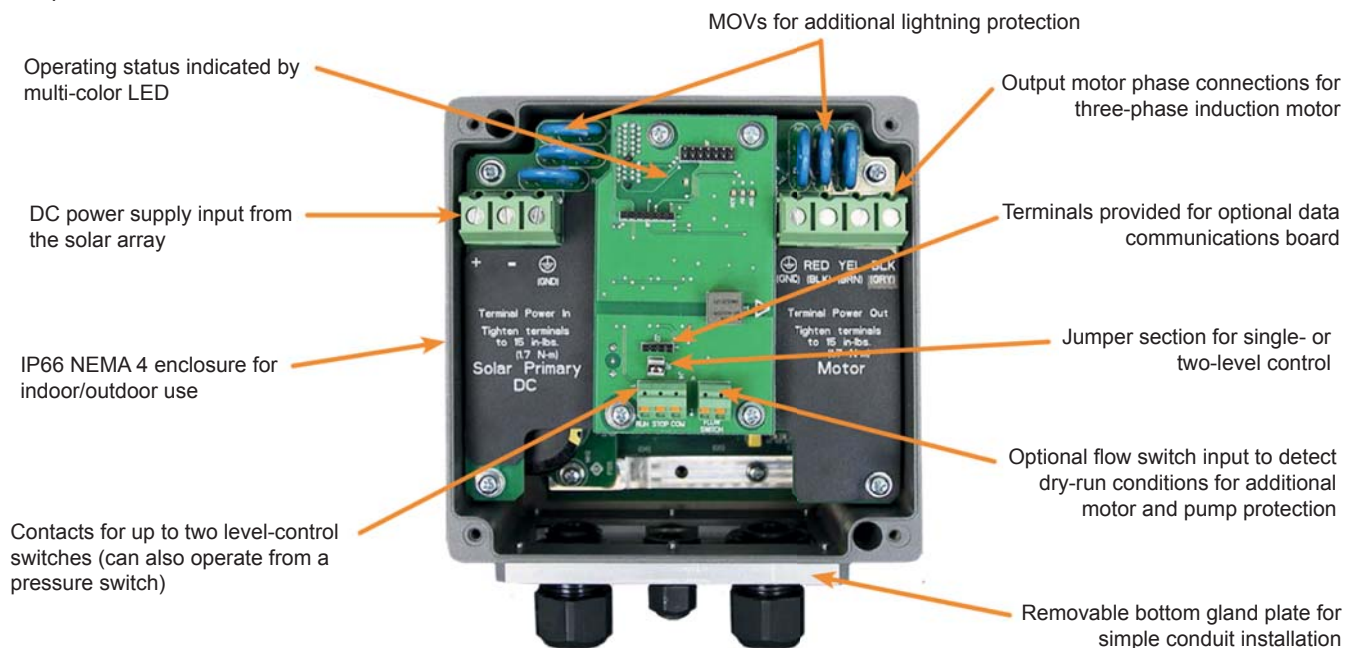
- Outside temperature: -25°C...+50°C, up to 100% humidity
- Housing protection IP 66 (NEMA 4)
- Livestock watering
- Tank/cistern filling
- Wildlife refuge and game farms
- Rural water supply for villages and homesteads
- Irrigation systems
- Fountains
- Vineyards
- Renewable energy projects
- Effluent pumping



Built-in Diagnostics & Protection

The Fhoton SolarPAK includes diagnostic features and built-in protection from potential harmful conditions, including:

- Surge
- Underload
- Undervoltage
- Locked pump
- Open circuit
- Short circuit
- Overheated controller
- Dry run
- Reverse polarity



FHoton Drive Model Numbers

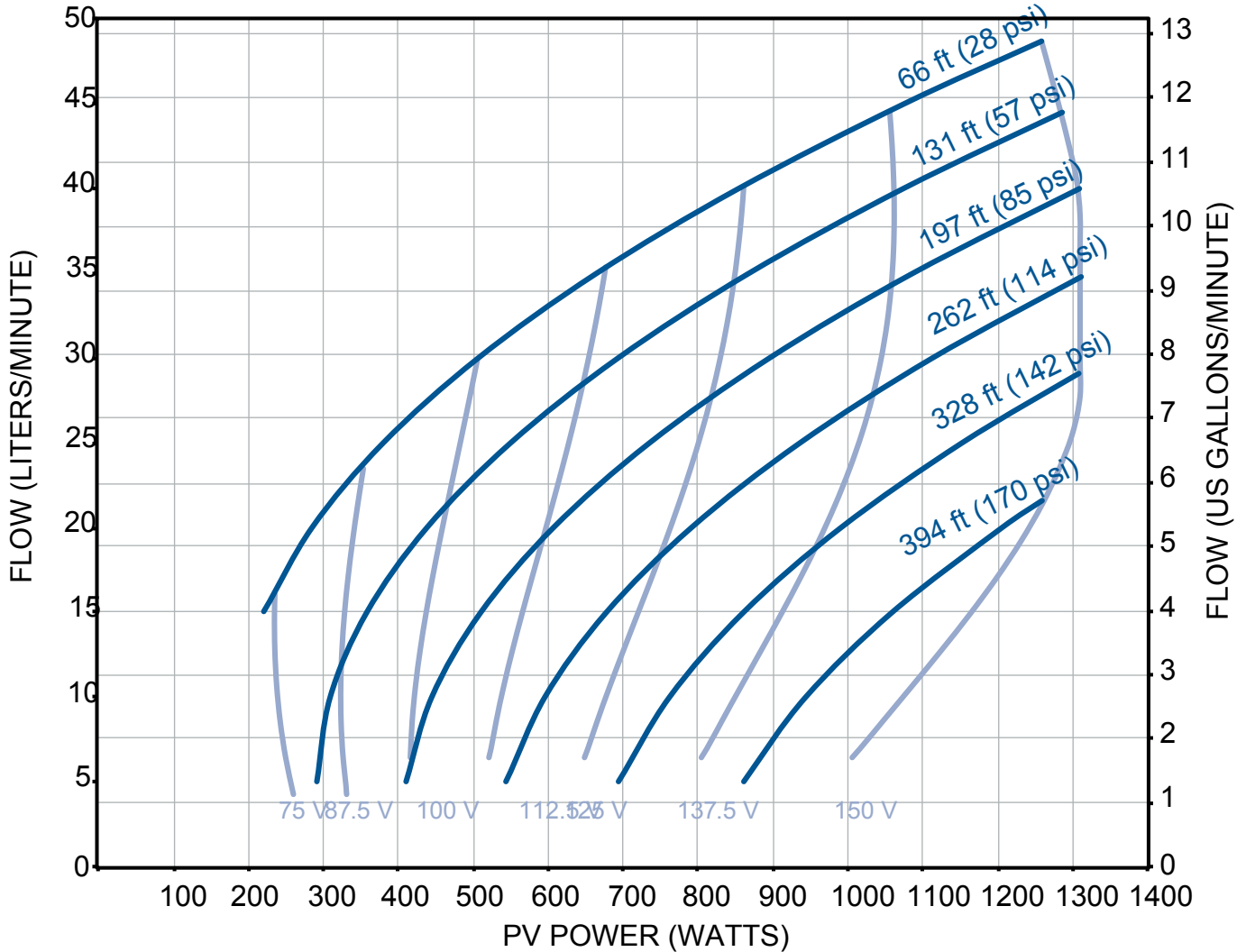
Drive Range [kW]	Tech. Data	Drive Model Number	Drive Design	Outline Size [inch / mm]
0,55	V_{IN} (DC max.): 30...210 Voc I_{IN} (DC max.): 8,7 A P_{MPP} : 1,4 kWp f_{OUT} : 30...60Hz	581 01 210 086 4		6" x 6" x 7.5" 152,5x152,5x190,5
1,1	V_{IN} (DC max.): 50...420 Voc I_{IN} (DC max.): 7 A P_{MPP} : 2,0 kWp f_{OUT} : 30...58Hz	581 01 420 068 4		9" x 9" x 7.5" 228,6x228,6x190,5



FHOTON SOLARPAK - 0.55 kW PERFORMANCE

FDSP-0.55 kW / 35

Photon Solar 0.55 kW Controller, 35 LPM 0.55 kW Pump End, 0.55 kW Motor



TDH (ft)	PV Power (Watts)											
	200	300	400	500	600	700	800	900	1000	1100	1200	1300
	Flow (USGPM)											
66		5	7	8	9	9	10	11	11	12	12	
131		2	5	6	7	8	9	9	10	11	11	
197				4	5	6	7	8	9	9	10	10
262					3	4	5	6	7	8	8	9
328						1	3	4	5	6	7	8
394								2	3	4	5	

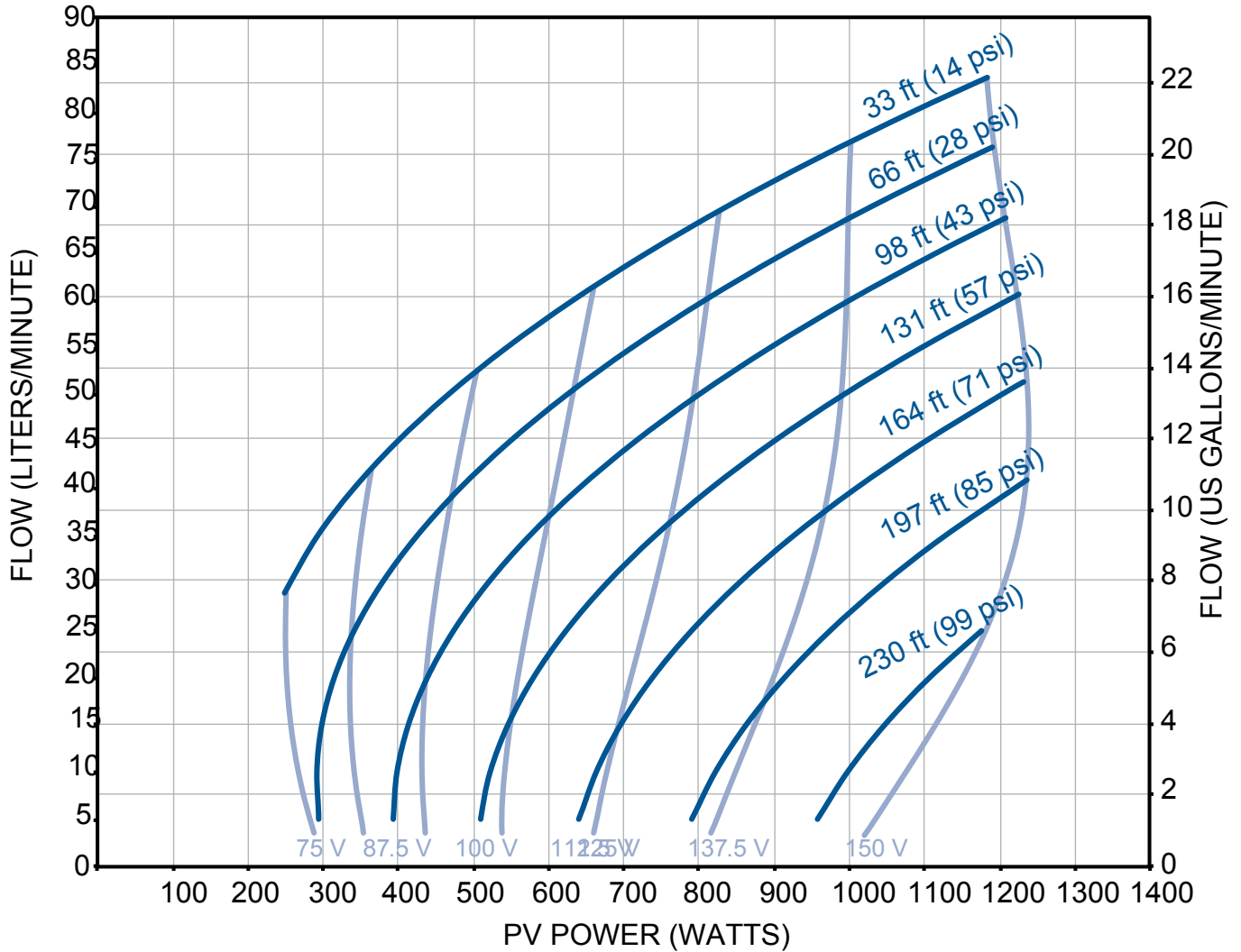
NOTE: Refer to drive specifications table in this catalog for PV source power and voltage-recommended operating ranges



FHOTON SOLARPAK - 0.55 kW PERFORMANCE

FDSP-0.55 kW / 65

Photon Solar 0.55 kW Controller, 65 LPM 0.55 kW Pump End, 0.55 kW Motor



TDH (ft)	PV Power (Watts)											
	200	300	400	500	600	700	800	900	1000	1100	1200	1300
	Flow (USGPM)											
33		9	12	14	15	17	18	19	20	21		
66		4	8	11	13	14	16	17	18	19		
98			3	7	10	12	13	15	16	17	18	
131					6	8	10	12	13	14	16	
164						4	7	9	10	12	13	
197							2	5	7	9	10	
230									3	5		

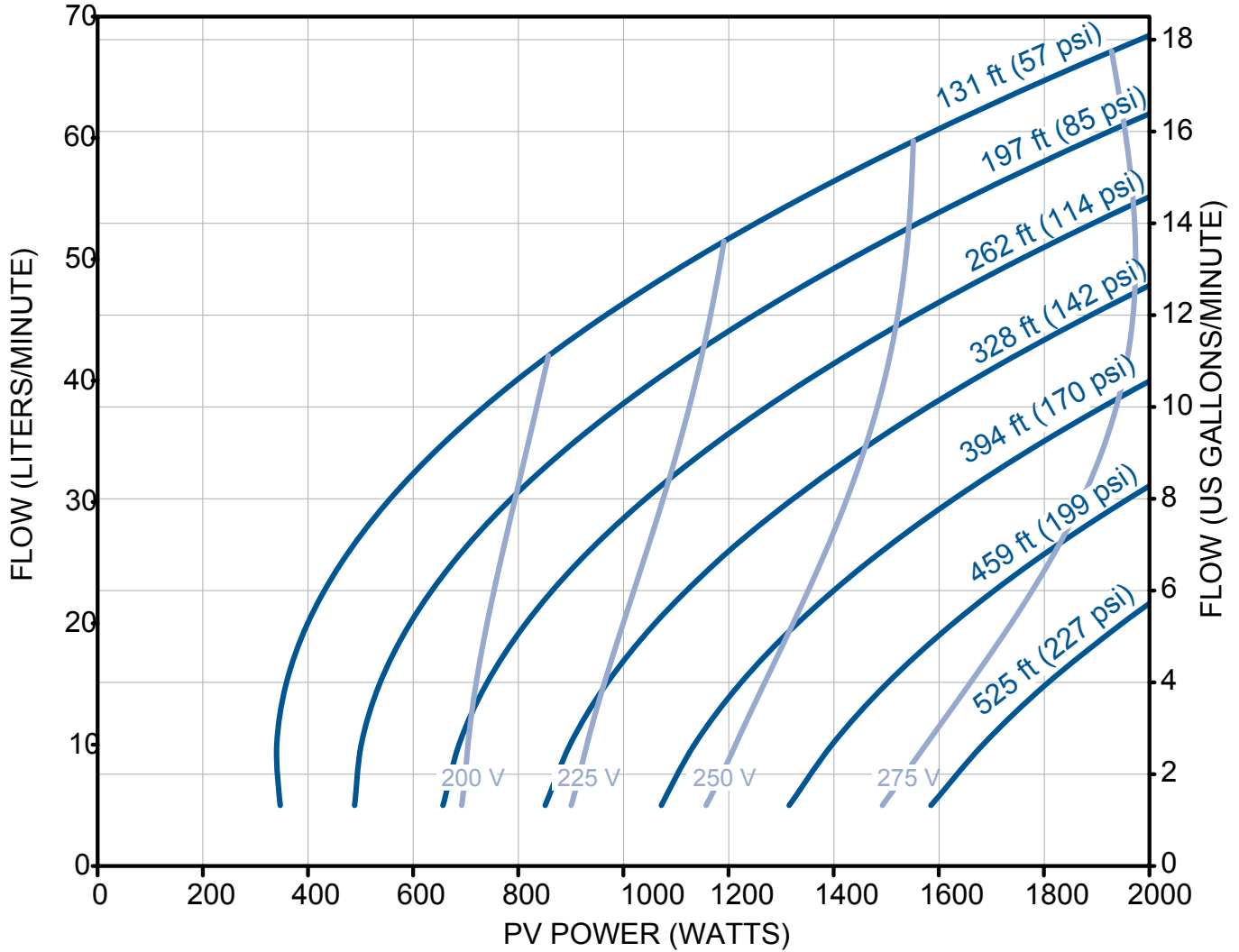
NOTE: Refer to drive specifications table in this catalog for PV source power and voltage-recommended operating ranges



FHOTON SOLARPAK - 1.1 kW PERFORMANCE

FDSP-1.1 kW / 65

Photon Solar 1.1 kW Controller, 65 LPM 1,5 kW Pump End, 1.1 kW Motor



TDH (ft)	PV Power (Watts)									
	200	400	600	800	1000	1200	1400	1600	1800	2000
Flow (USGPM)										
131		5	8	11	12	14	15	16	17	18
197			6	8	13	12	13	14	15	16
262				5	8	10	11	12	13	15
328					4	7	9	10	11	13
394						4	6	8	9	11
459							3	5	9	8
525								2	4	6

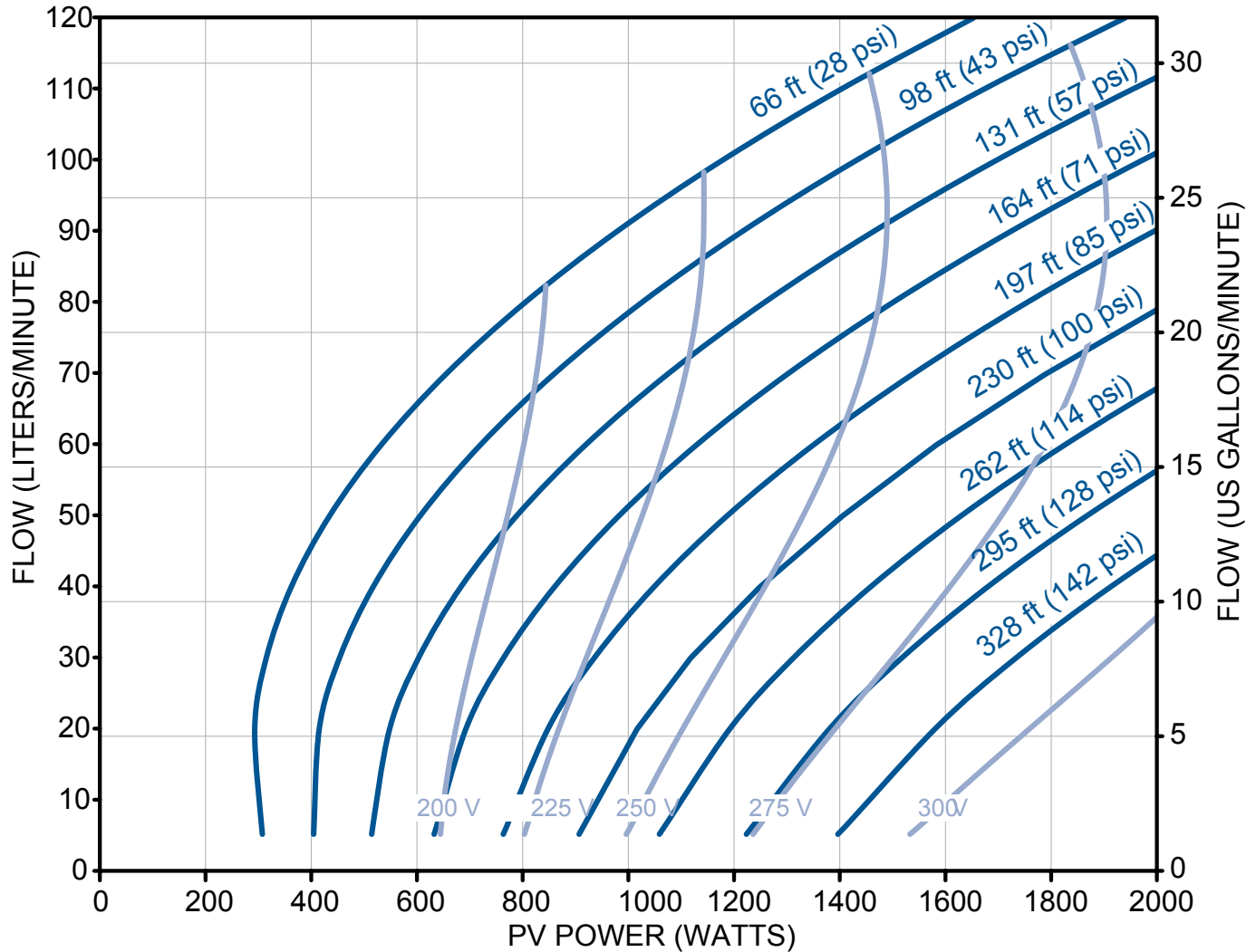
NOTE: Refer to drive specifications table in this catalog for PV source power and voltage-recommended operating ranges



FHOTON SOLARPAK - 1.1 kW PERFORMANCE

FDSP-1.1kW / 100

Photon Solar 1.1 kW Controller, 100 LPM 1,5 kW Pump End, 1.1 kW Motor



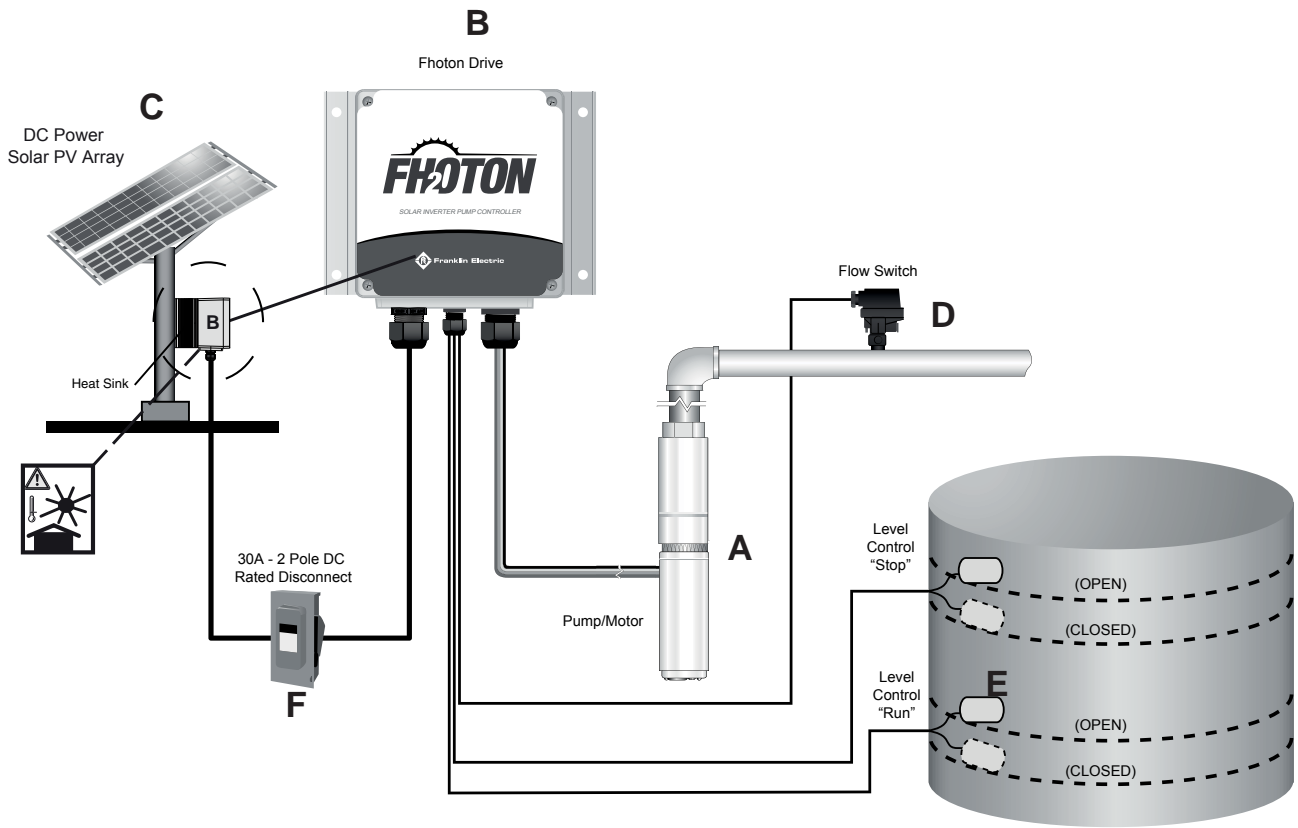
TDH (ft)	PV Power (Watts)									
	200	400	600	800	1000	1200	1400	1600	1800	2000
	Flow (USGPM)									
66		12	17	21	24	27	29	31		
98			13	17	21	24	26	28	30	
131			8	13	17	20	23	25	27	30
164				9	14	17	20	22	25	27
197				3	10	13	17	19	22	24
230					5	10	13	16	19	21
262						6	10	13	15	18
295							6	9	12	15
328							1	6	9	12

NOTE: Refer to drive specifications table in this catalog for PV source power and voltage-recommended operating ranges



FHoton Installation

The Franklin Electric Fhoton Drive is designed to be part of a system that consists of:



- A. Standard Pump and Motor
- B. Fhoton Solar Drive
- C. Solar Array (not included)
- D. Flow Switch (with sensor cable)
- E. Control Switches (optional, not included)
- F. Rated DC Disconnect - Per applicable codes
 - 0 - 11A/800V DC - 308 170 313
 - 14 - 22A/800V DC - 308 170 325

2 Level Control Switch Operation

FHoton SolarPAK - Drive Specification

Solar Controller

	0,55 kW Model	1,1 kW Model
Controller Model No.	581013000864-SP075HP	581014200864-SP150HP
	Output	
Max. Output Voltage	100V AC, 3-phase	200V AC, 3-phase
Max. Amps (RMS)	8.6 A, each phase	6.8 A, each phase
Output Frequency	30-60 Hz	30-60 Hz
Efficiency at Max Power	98%	98%
	PV Source	
Input Voltage at MPP	45 - 165 VDC	**190 – 330 V DC
Max. Amps Input	8.7 A DC, continuous	7 A DC, continuous
Power at MPP	Up to 1400 watts	Up to 2000 watts

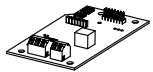
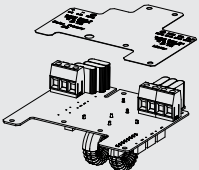
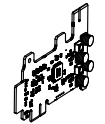
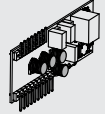
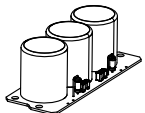
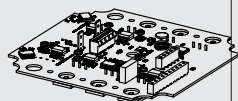

* Drive will attempt to start the pump/motor at 95 V DC, and attempt to continue operation down to 75 V DC.

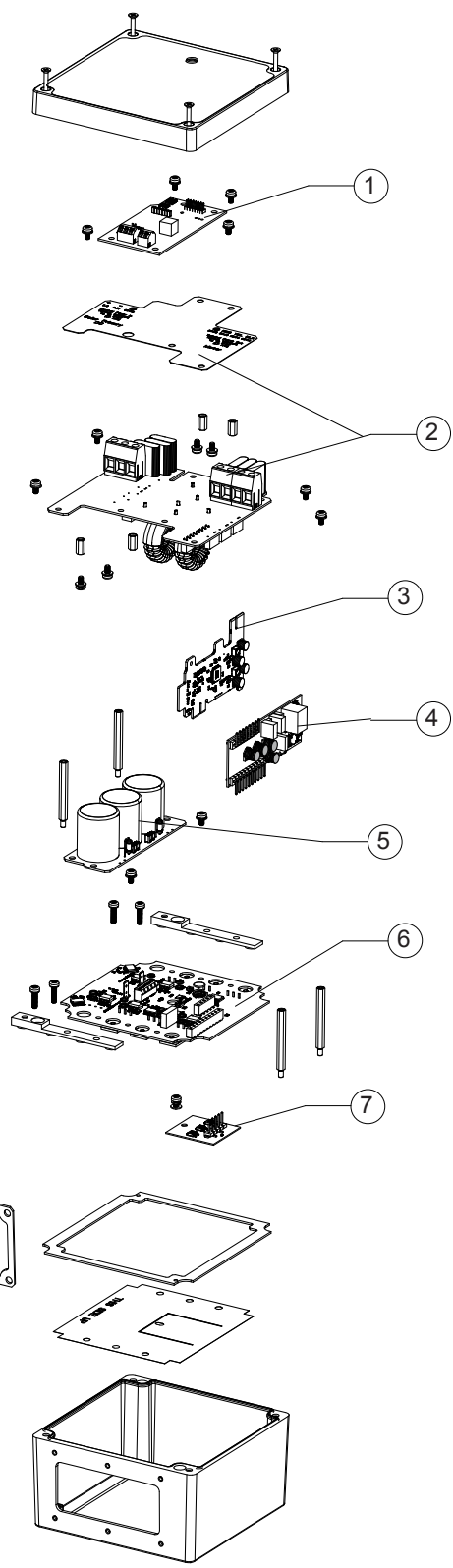
** Drive will attempt to start the pump/motor at 190 V DC, and attempt to continue operation down to 150 V DC.

Absolute maximum open circuit voltage input to the controller = 420 VOC for all controller models.



FPhoton Drive Spare Parts

No.	Part Description	Layout	Qty.	Rating [kW]	Spare Part number
1	User Interface Card		1	0,55 - 1,1	308 752 101
2	Terminal Block and Filter Card		1	0,55	308 752 102
				1,1	308 754 101
3	Motor Control Card		1	0,55 - 1,1	308 752 103
4	Power Supply Card		1	0,55	308 752 104
				1,1	308 754 102
5	Capacitor Board		1	0,55	308 752 105
				1,1	308 754 103
6	Inverter Card		1	0,55 - 1,1	308 752 106
7	IMS Resistor Card		1	0,55	308 752 107
				1,1	308 754 104





6" High Efficiency Solar System

Quality in the Well

Franklin Electric is pleased to announce the introduction of the extended SOLAR feature for its 6" High Efficiency Submersible Borehole systems (HES).

These systems, consisting of a full stainless, synchronous submersible NEMA motor associated with a variable frequency drive and matching output filter have proven their world-class efficiency in over 300 applications to date, saving up to 20% of electrical energy when compared to standard synchronous motor systems.



System Product advantages:

- One-stop shop – perfectly matching components guarantee first class performance / efficiency
⇒ *Less panels, more water respectively*
- Direct DC feeding
- Special MPP algorithm for centrifugal borehole pumps
- Top class protection with Electronics in IP66/54
⇒ *No cabinet - no cooling fan/ dust filter - no maintenance*
- GORE® vent
⇒ *No condensation*
- Easy set-up due to tailored pre-setting, user interface and **Franklin Electric software**
- Reduced amps
⇒ *Smaller drop lead cross size*
- Higher power density
⇒ *Lightweight*
- Significant lower motor heat rise
⇒ *Increased lifetime*
- Communication Modbus (RS485 and Ethernet)

System Technical Specification:

- Rating: 4 - 30kW
- Power Supply: Voltage 400 - 800V DC (min. starting voltage 440V)
- Frequency 30 - f_N (50 respectively 60Hz)

System Options:

- Plug-in card 6x DI/DO - 308 170 201
- Plug-in card PT100 - 308 170 202
- Plug-in card Profibus - 308 170 203
- Plug-in card 1x AI & 2x AO 308 170 206
- Other voltages
- Sinus output filters in IP54
- PT100 protection
- Motors in 316SS and 904L



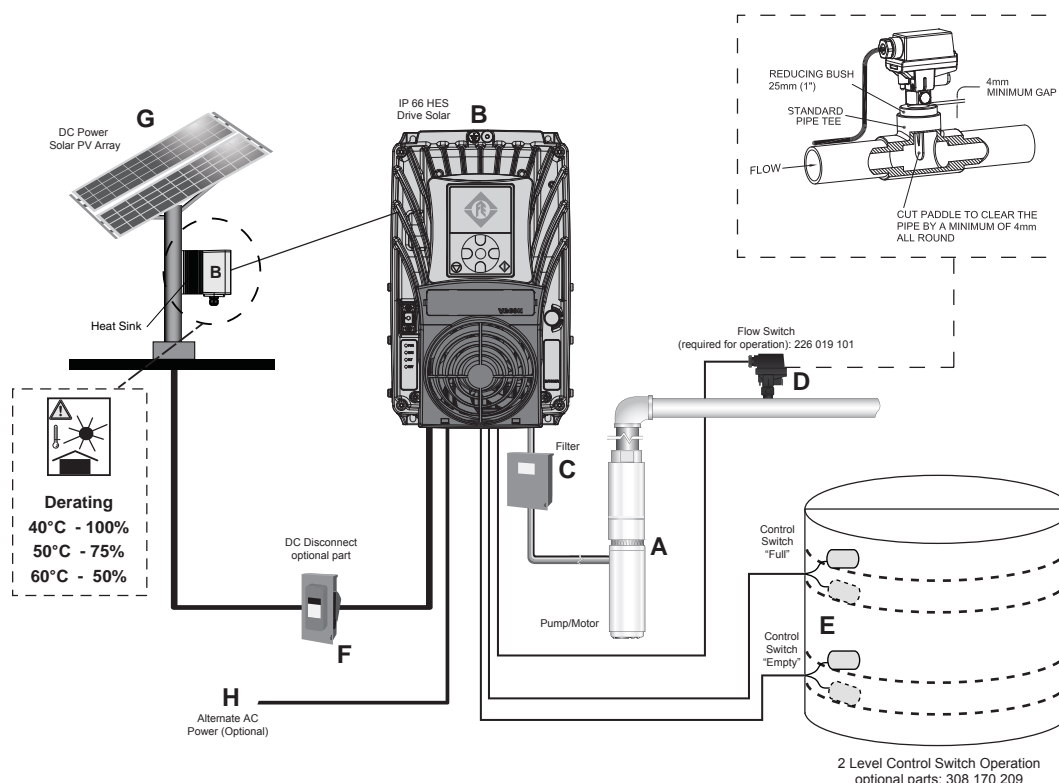
Model Numbers Solar System Option

400V High Efficiency Solar System (304SS Motor, VFD & Filter and Flow switch)

P _N [kW]	VFD IP66 & Filter IP54	
	du/dt Filter	Sinus Filter
4,0 - 7,5	308 010 216S	308 010 316S*
9,3 - 11	308 014 223S	308 014 323S*
13 - 18,5	308 014 238S	308 014 338S*
22 - 30	308 016 261S	308 016 361S*

*Non-stock items

For lead length > 120m please consult Franklin Electric



- A. High Efficiency Motor and Pump
- B. IP66 HES Drive Solar
- C. OutputFilter
- D. Flow Switch (226 019 101)
- E. Level Control Switch (not included- serarate order 308 170 209)
- F. DC Disconnect, not included- separate order:
0 - 11A/800V DC - 308 170 313
12 - 22A/800V DC - 308 170 325
- G. Solar Array (not included)
- H. AC Alternative Power supply (not included)

Control modes and necessary sensor technologies

Process reference	Control reference	Flow meter	Pressure sensor	Level sensor	PT100 sensor & Drive slot card	Flow switch (digital)
Manual Mode	No				Yes*	
Solar	No				Yes*	mandatory

*please consult Franklin Electric

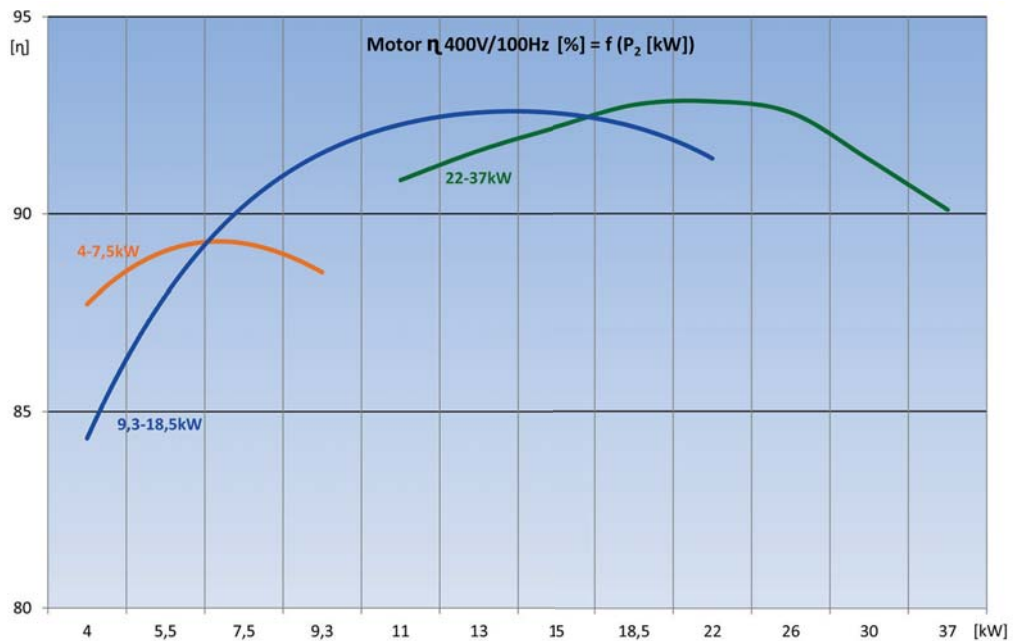


Performance Data 400V-50Hz / 460V/60Hz

400V-50Hz / 460V-60Hz	P _N [kW]	Thrust F [kN]	n _N [min ⁻¹]	I _N [A]	I _A / I _N [*] [A]	η [%]	PF [cos φ]	T _N [Nm]	T _A / T _N [*] [Nm]
308 010 X16	4	15,5	3000 / 3600	8	1	88	0,95	12,9	1
	5,5	15,5	3000 / 3600	10	1	89	0,95	17,5	1
	7,5	15,5	3000 / 3600	13	1	89,5	0,95	23,8	1
308 014 X23	9,3	15,5	3000 / 3600	18	1	91,5	0,95	29,6	1
	11	15,5	3000 / 3600	20	1	92	0,95	35	1
308 014 X38	13	15,5	3000 / 3600	23	1	92,5	0,95	41,5	1
	15	15,5	3000 / 3600	26	1	92,5	0,95	46,1	1
	18,5	15,5	3000 / 3600	32	1	92	0,95	59	1
308 016 X61	22	27,5	3000 / 3600	39	1	93	0,95	70	1
	26	27,5	3000 / 3600	46	1	92,5	0,95	82,6	1
	30	27,5	3000 / 3600	54	1	91,5	0,95	95,5	1
308 016 X87	37	27,5	3000 / 3600	72	1	90	0,95	117,8	1

Performance data are based on measurements with Franklin Electric original equipment!

*Since this is an integrated system (motor plus electronics) these figures relate to VFD input





6" High Efficiency Motor



Motor Features:

- Motor complete in 304SS
- PE2/PA winding as a standard
- SandFighter® SIC seal system
- Easy rewinding - winding housings removable
- Non-contaminating FES93 filling
- All motors pre-filled and 100% tested
- Max. storage temperature -15 ... +60°C
- Drinking water approved

Motor Technical Specification:

- 4 – 37kW
- Power supply 400V/100Hz
- 6" NEMA flange with studs (M12)
- Protection IP68
- 20 Starts per hour
- Installation vertical (for horizontal operation please consult FE)
- Motor lead in 4m length
- 30°C nominal ambient temperature with 0,2m/sec cooling flow

Motor Options:

- Other voltages
- PT100 temperature sensor (retrofitable)
 - ⇒ VFD PT100 Plug-in Card (308 170 202) necessary
- Motors complete in 316SS and 904L

System model number	P _N [kW]	Motor model number		
		304SS	316SS	904L
308 010 xxx	4 - 7,5	262 010 8711	262 010 6711	262 010 7711
308 014 xxx	9,3 - 18,5	262 014 8711	262 014 6711	262 014 7711
308 016 xxx	22 - 37	262 016 8711	262 016 6711	262 016 7711



Motor Short Leads*

DOL	P _N [kW]	St.#	Ø [mm ²]	H / B [mm]	Length [m]	Lead Mod.- Nr.	Lead seal Kit
	4 - 18,5	1	4G4	8,2 x 23,0	4	308 710 101	308 660 812
	22 - 37	1	4G6	9,0 x 25,0	4	308 710 103	308 660 813

additionally the special Tape **700 541 688** is absolutely necessary

*Cables are designed for submerged operation.

Motor Drop Lead

Lead lengths in meters for 400V-50Hz / 460V-60Hz and max. 3% voltage drop at 50°C ambient

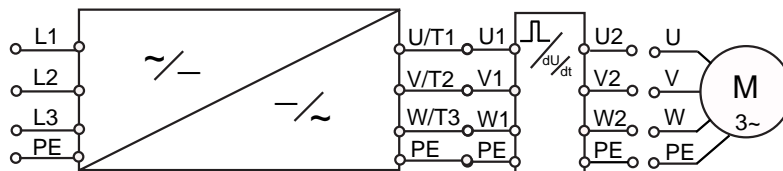
P _N [kW]	cable size mm ² , copper wire - 90°C rated insulation						
	4	6	10	16	25	35	50
4	160	250	410	-	-	-	-
5,5	140	200	340	530	-	-	-
7,5	100	150	250	390	-	-	-
9,3	75	110	190	300	460	-	-
11	65	100	160	260	400	-	-
13	55	85	140	220	340	460	-
15	-	70	120	190	300	400	-
18,5	-	60	100	160	240	320	440
22	-	-	80	130	200	270	370
26	-	-	65	110	170	230	320
30	-	-	55	90	140	190	270
37	-	-	-	65	100	140	200

For lead length > 120m please consult Franklin Electric.

Further potential energy saving due to more conservative lead sizing (< 3% voltage drop)

Electrical Connection

DOL

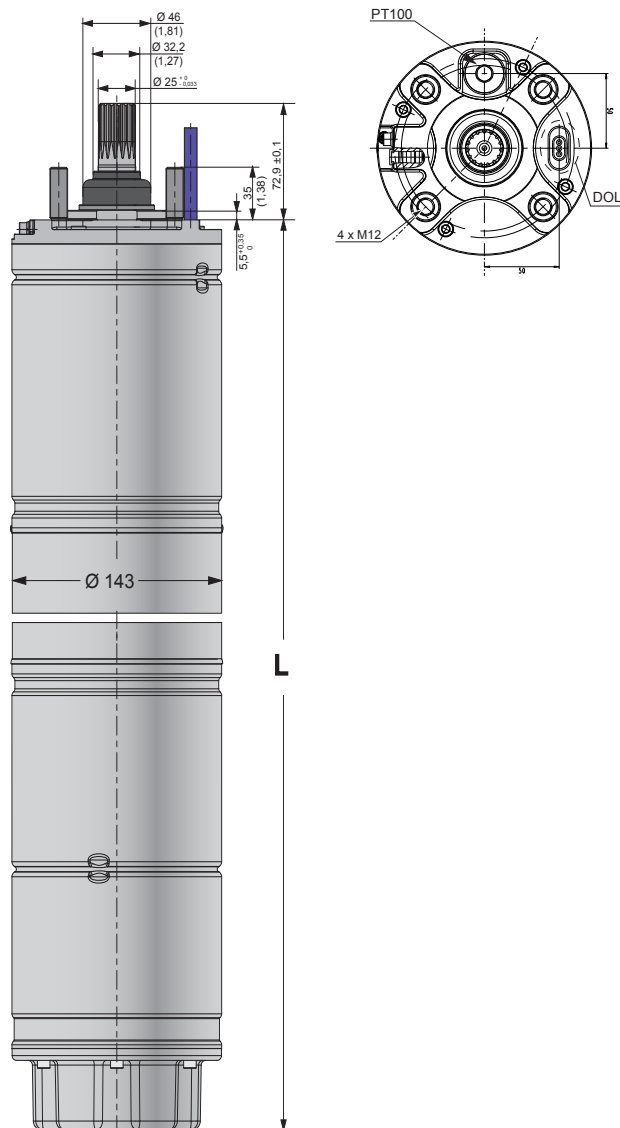


U	V	W	PE
brown	grey	black	yellow/green



Motor Design

304SS / 316SS / 904L



Construction Materials

Component	304SS	316SS	904L
Shaft Extensions	1.4021	1.4462	1.4462
Slinger	NBR	NBR	NBR
Seal	SiC/SiC	SiC/SiC	SiC/SiC
End bell, NEMA	1.4308	1.4408	1.4539
Stator Shell	1.4301	1.4571	1.4539
Diaphragm	EPDM	EPDM	EPDM
Diaphragm Cover	1.4301	1.4404	1.4539

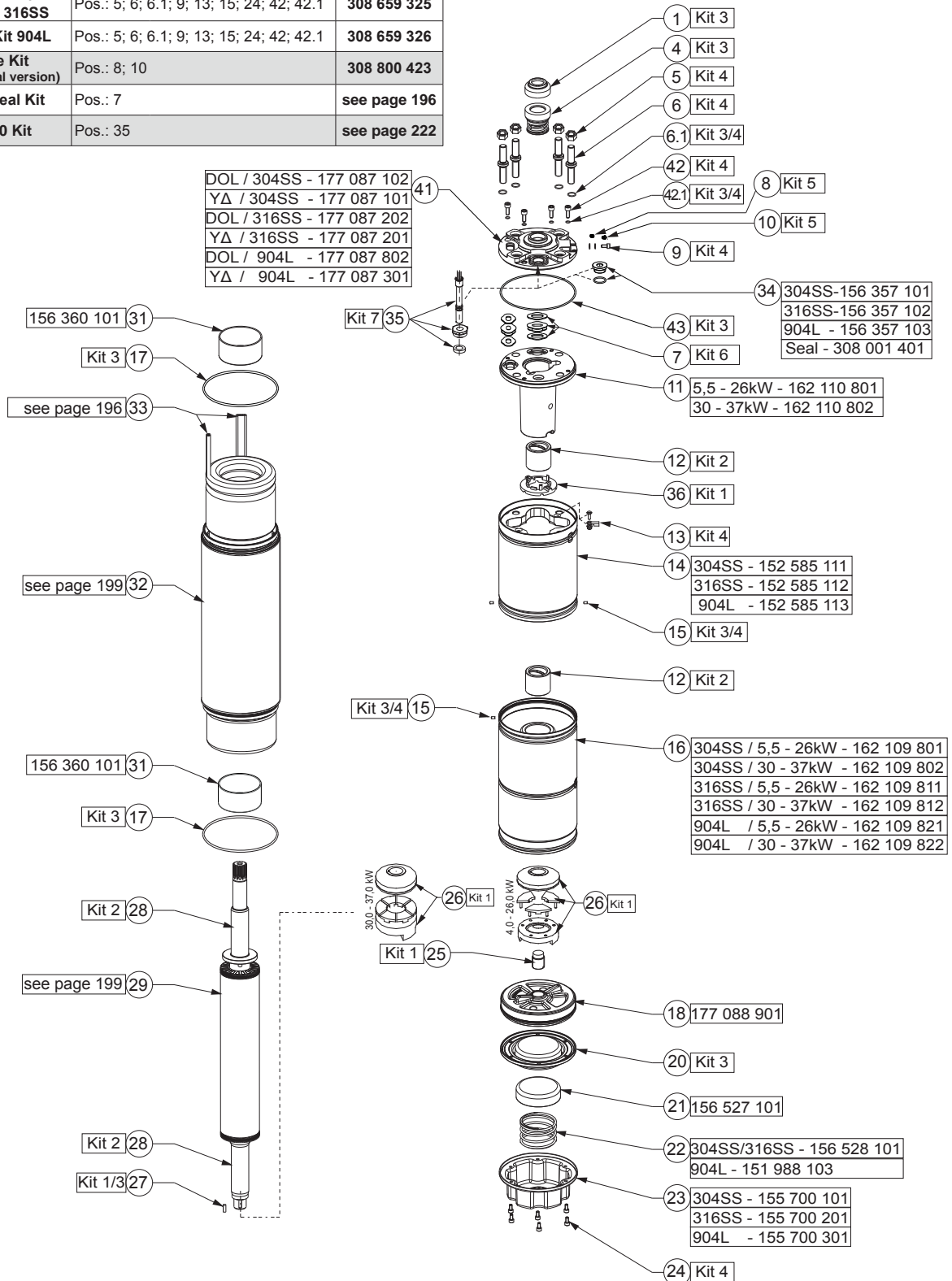
Motor Lengths and Weights

P [kW]	Motor Lengths L [mm]	Motor weights [kg]		Motor Shipping Size		
		Motor	incl. pack	B [mm]	H [mm]	L [mm]
4 - 7,5	655	41	46	155	270	905
9,3 - 18,5	809	56	61	155	270	1135
22 - 37	971	72	77			



Motor Spare Parts 304SS / 316SS / 904L

Kit 1	Thrust Bearing Kit	4-18,5kW	Pos.: 17; 25; 26; 27; 36	308 750 301
		22-37kW		308 750 302
Kit 2	Radial Bearing Kit	4-18,5kW	Pos.: 12; 28	308 750 401
		22-37kW		308 750 403
Kit 3	Seal Kit 304SS / 316SS / 904L	Pos.: 1; 4; 6.1; 15; 17; 20; 34; 42.1, 43		308 800 422
Kit 4	Screw Kit 304SS / 316SS	Pos.: 5; 6; 6.1; 9; 13; 15; 24; 42; 42.1		308 659 325
	Screw Kit 904L	Pos.: 5; 6; 6.1; 9; 13; 15; 24; 42; 42.1		308 659 326
Kit 5	Valve Kit (all Material version)	Pos.: 8; 10		308 800 423
Kit 6	Lead Seal Kit	Pos.: 7		see page 196
Kit 7	PT100 Kit	Pos.: 35		see page 222





304SS Stator and Rotor Model Number (400V-50Hz / 460V/60Hz)

P_N [kW]	Stator (incl. winding and 4m motor lead)	Rotor
4 - 7,5	327 086 701K	161 122 805K
9,3 - 18,5	327 075 701K	161 122 802K
22 - 37	327 076 701K	161 122 803K

Windings 400V-50Hz / 460V/60Hz

P_N [kW]	Mod.-No. Windingkit	Turns per coil	Wire diameter [mm]	Type of Isolation	Group connection	Total Wire length [m]	Resistance coil [Ω]	Resistance DOL (U1-V1) [Ω]
4 - 7,5	327 086 999	28+28+28+28	1,3 / 2,2	PE2/PA	Serie Y	212	0,2393	1,914
9,3 - 18,5	327 075 999	14+14+14+14	2 / 3,1	PE2/PA	Serie Y	161	0,0794	0,635
22 - 37	327 076 999	18+18+18+18	1,7 / 2,7	PE2/PA	Serie / Parallel Y	276	0,1797	0,359

Insulation resistance (20°C / 500 VDC)

New motor without drop cable	400 >	MΩ
Used motor without drop cable	20 >	MΩ
New motor with drop cable	4 >	MΩ
Used motor with drop cable	1	MΩ

Motor Repair Instructions

Pictured Repair Instructions 304SS / 316SS / 904L	308 018 624
Motor Mounting Kit	308 239 214



Variable Speed Drive (VFD)



VFD Features:

- Supports induction and permanent magnet motors
- Top class protection IP66 with Aluminium die casting powder coated enclosure . Alternative in IP21 with plastic enclosure
- Optimized for submersible permanent motor feeding – first class performance (Tailored pre-setting, user interface and software)

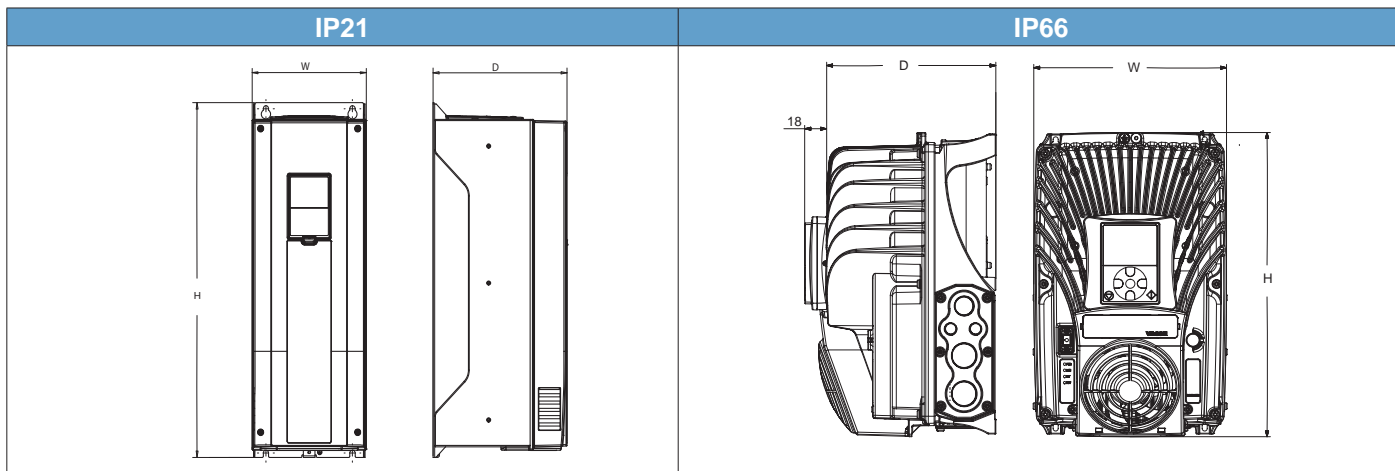
VFD Technical Specification:

Power supply	Input voltage U_{IN}	380 - 500V ; -10%...+10% 400 - 840V DC - min starting voltage 440V
	Input frequency f_{IN}	47 - 65Hz
	Starts per hour	20 ; with min 3min rest period
Motor connection	Output voltage	0 - U_N
	Output current	I_N at rated Ambient temperature (40°C) Overload: IP66: 1,5 x I_N (1min/10min) IP21: 1,1 x I_N
	Output frequency	0- f_N , resolution 0,01Hz
Performance	Efficiency	97,5%
Control characteristics	Switching frequency	3,6 6 kHz; default setting 4 kHz
Ambient conditions	Operation temperature	-10°C...+50°C (>40°C with derating) - 40°C optional for IP66
	Storage temperature	-40°C+70°C
	Altitude	3000m (>1000m with derating)
EMC	Immunity & Emissions	Complies with EN 61800-3, Category C2 - first and second environment
Communication	RS 485	Standard: Modbus
	Ethernet	Standard: Modbus
I/O connections	Digital Input (DI)	6x
	Analog Input (AI)	2x
	Analog Output (AO)	1x
	Relay Output (RO)	2x (change-over contact)

For further details please see separate Franklin Electric Quick Installation guide and VFD literature.



VFD Model Numbers and Dimensions 400V-50Hz / 460V/60Hz



VFD High Efficiency System Model Numbers and Dimensions 400V-50Hz / 460V/60Hz IP21 up to 37kW

System Model Number	AC Drive Type	IP Type	I_N [A]	Dimensions WxHxD [mm]	Weight [kg]
308 010 016/116	314 000 108	21	16	144 x 419 x 214	10,0
308 014 023/123	314 000 101	21	23	144 x 419 x 214	10,0
308 014 038/138	314 000 102	21	38	195 x 557 x 229	20,0
308 016 061/161	314 000 103	21	61	195 x 557 x 229	20,0
308 016 087/187	314 000 104	21	87	237 x 660 x 259	37,5

VFD High Efficiency System 400V-50Hz / 460V/60Hz IP66 up to 30kW

System Model Number	AC Drive Type	IP Type	I_N [A]	Dimensions WxHxD [mm]	Weight [kg]
308 010 216/316	314 000 109	66	16	233 x 368 x 214	14,9
308 014 223/323	314 000 105	66	23	233 x 368 x 214	14,9
308 014 238/338	314 000 106	66	38	350 x 500 x 236	31,5
308 016 261/361	314 000 107	66	61	350 x 500 x 236	31,5

VFD Options:

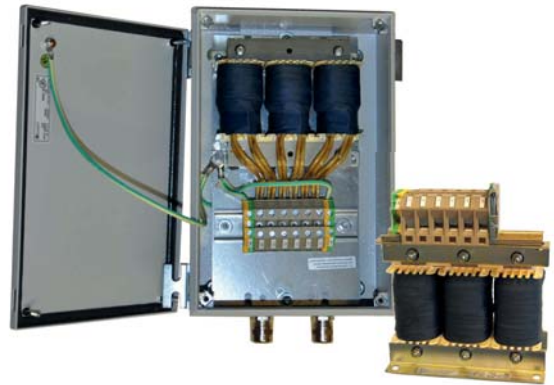
- 200V - 230V
- Plug-in card 6x DI/DO 308 170 201
- Plug-in card PT100 308 170 202
- Plug-in card Profibus 308 170 203
- Plug-in card 1x AI & 2x AO 308 170 206
- Replacement Battery VFD IP21 - 308 170 205
- Replacement Battery VFD IP66 - 308 170 204



Output Filter

Output Filter Features:

- du/dt filter for lead lengths up to 120m, for lead lengths >120m please consult Franklin Electric.
- filter available in IP54 and IP00
- Optimized for submersible permanent magnet motor feeding



Output Filter Technical Specification:

- Voltage → 380 - 500V
- Frequency → 0 - 120 Hz
- Switching Frequency → 4kHz
- Ambient Temperature → < 40°C

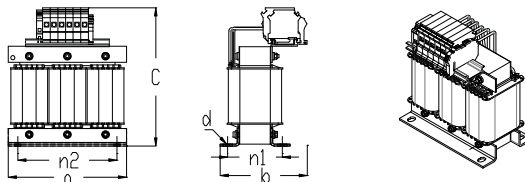
Output Filter Options:

- Sinus filter in IP54 and IP00 for lead length >120m and/ or special applications
- Other voltages

Output Filter du/dt High Efficiency System 400/500V Model Data - Protection Class IP00

System model number	Filter order code	I _N [A]	Dimensions [mm]						weight [kg]	terminal	clamping torque
			a	b	c	n1	n2	d		[mm ²]	[Nm]
308 010 016 308 014 023	314 005 101	23	125	100	165	55	100	5	3,4	2,5 - 16	2,5 - 5,0
308 014 038	314 005 102	38	155	110	190	57,5	130	8	4	2,5 - 35	2,5 - 5,0
308 016 061	314 005 103	61	155	130	215	72	130	8	6	2,5 - 35	2,5 - 5,0
308 016 087	314 005 104	87	190	130	260	60	170	8	10	16 - 50	3,0 - 6,0

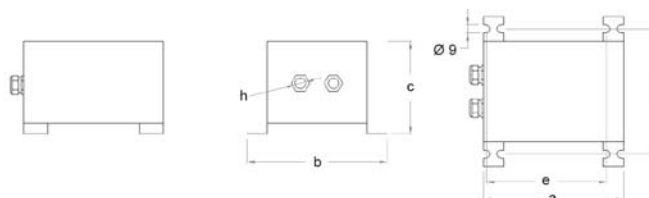
Filter outlines



Output Filter du/dt High Efficiency System 400/500V Model Data Protection Class IP54

System model number	Filter order code	I _N [A]	Dimensions [mm]						cable Ø [mm]	weight [kg]	terminal [mm ²]	clamping torque [Nm]
			a	b	c	e	f					
308 010 216 308 014 223	314 005 110	23	300	260	135	250	230	2x24-35	8	2,5 - 16	2,5 - 5,0	
308 014 238	314 005 111	38	300	260	135	250	230	2x24-35	12	2,5 - 35	2,5 - 5,0	
308 016 261	314 005 112	61	450	360	215	400	330	2x32-42	22	2,5 - 35	2,5 - 5,0	

Filter outlines

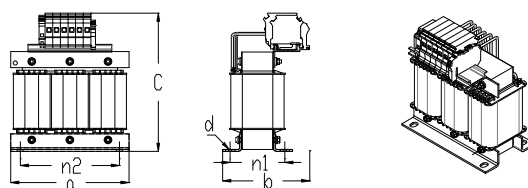




Output Filter Sinus High Efficiency System 400/500V Model Data - Protection Class IP00

System model number	Filter order code	I _N [A]	Dimensions [mm]						weight [kg]	terminal [mm ²]	clamping torque [Nm]
			a	b	c	n1	n2	d			
308 010 116	314 005 105	16	240	185	285	95	190	11	19	2,5 - 35	2,5 - 5
308 014 123/131	314 005 106	31	240	205	270	115	190	11	24	2,5 - 35	2,5 - 5
308 014 138/146	314 005 107	46	300	225	354	133	250	11	42	16 - 50	3 - 6
308 016 161	314 005 108	72	360	310	425	135	300	11	52	16 - 50	3 - 6
308 016 187	314 005 109	105	360	310	425	126	310	11	61	25 - 95	6 - 12

Filter outlines

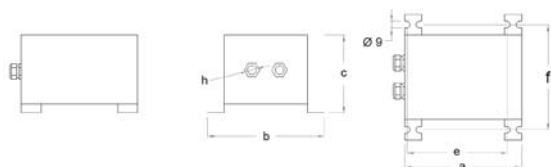


Output Filter Sinus High Efficiency System 400/500V Model Data Protection Class IP54

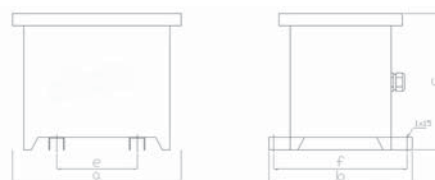
System model number	Filter order code	I _N [A]	Dimensions [mm]						cable Ø [mm]	weight [kg]	terminal [mm ²]	clamping torque [Nm]
			a	b	c	e	f					
308 010 316	314 005 117	16	300	300	215	250	330	2x24-35	34	2,5 - 35	2,5 - 5	
308 014 323*	314 005 113	23	520	480	480	240	440	2x24-35	75	2,5 - 35	2,5 - 5	
308 014 338*	314 005 115	38	660	560	590	310	520	2x24-35	100	16 - 50	3 - 6	
308 016 361*	314 005 116	72	660	560	590	310	520	2x38-48	110	16 - 50	3 - 6	

*Floor mount

Wall mount outlines



Floor mount outlines





Franklin Electric



SS Pump

For any pump support please refer to:
<http://www.etechpumps.com>





Motor Filling Liquid

Filling liquid 5 L FES92					
4" Encapsulated	→	FES93	8" Encapsulated Standard	→	FES91
6" Encapsulated Standard	→	FES91	8" Encapsulated HighTemp75	→	FES92
6" Encapsulated HighTemp90	→	FES92	6" / 8" / 10" / 12" Rew Motors 6" / 8" Rew PM Motors		FES93



Part number:
308 353 941

FES91	FES92	FES93

Motor Filling Kit

This kit contains all necessary tools to check and replenish Franklin Electric submersible motors with FES 91, 92 or 93 filling liquid (fill solution/concentrate must be ordered separately).

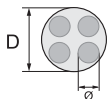


Part number: 308 726 103

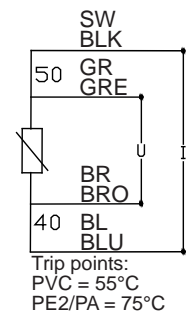
PT100 Rewindable Motors

- Fitted into the upper end bell flange, all end bells 6", 8", 10" and 12" Rewindable are prepared for installation PT100
- Measures the temperature of the filling liquid
- Conductor with a resistance proportional to the temperature
- Allows monitoring the temperature continuously

The above-ground equipment is not available from Franklin Electric and is typically part of a custom panel or data acquisition system. PT100 sensor retrofit kits from Franklin Electric come with complete instructions and allow for easy field installation.



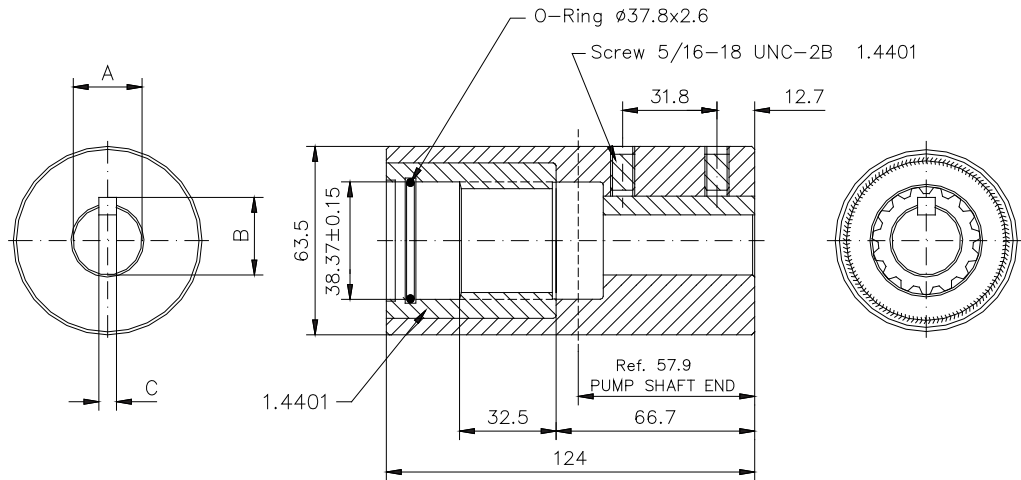
	Ø [mm ²]	D [mm]	Lead Lengths [m]	Mod.- No.:	6" Rew Redesign starting 08.2012		6" (Cast Iron/304SS) / 8" / 10" / 12"	
					304/316	904L	304/316	904L
PT 100	4X0,5	8	10	Mod.- No.:	308 016 501	308 016 522	308 016 401	308 016 422
PT 100	4X0,5	8	20	Mod.- No.:	308 016 502	-	308 016 402	-
PT 100	4X0,5	8	30	Mod.- No.:	308 016 503	-	308 016 403	-
PT 100	4X0,5	8	50	Mod.- No.:	308 016 505	308 016 526	308 016 405	308 016 426





8" Motor-Pump Couplings

Outline Drawing:



Ordering information

Part No.	Coupling Material DIN / AISI	Dimension A (mm) Max. / Min.	Dimension B (mm) Max. / Min.	Dimension C (mm) Max. / Min.
156 563 901	1.4005 (304)	25,425 / 25,413	28,27 / 28,17	6,38 / 6,32
156 563 921	1,4404 (316SS)			
156 563 902	1.4005 (304)	30,188 / 30,175	33,73 / 33,63	7,96 / 7,91
156 563 922	1,4404 (316SS)			
156 563 903	1.4005 (304)	31,775 / 31,763	35,36 / 35,26	7,96 / 7,91
156 563 923	1,4404 (316SS)	38,125 / 38,113		
156 563 904	1.4005 (304)	38,125 / 38,113	42,37 / 42,27	9,55 / 9,50
156 563 924	1,4404 (316SS)	38,125 / 38,113		
156 563 905	1.4005 (304)	19,085 / 19,063	20,70 / 20,52	4,84 / 4,79
156 563 906	1.4005 (304)	30,188 / 30,175	33,02 / 32,92	6,38 / 6,32
156 563 926	1,4404 (316SS)	30,188 / 30,175	33,02 / 32,92	6,38 / 6,32
156 563 907	1.4005 (304)	22,250 / 22,238	24,54 / 24,36	6,43 / 6,38
156 563 908	1.4005 (304)	22,024 / 22,011	25,53 / 25,32	8,03 / 7,98
156 563 931	1,4404 (316SS)			
156 563 929	1,4404 (316SS)	42,888 / 42,850	47,12 / 47,04	9,55 / 9,50
156 563 909	1.4005 (304)	25,024 / 25,011	28,70 / 28,30	8,03 / 7,98
156 563 932	1,4404 (316SS)			



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