



**ESP TECHNICAL
CATALOG**

**ARTIFICIAL LIFT
SOLUTIONS**

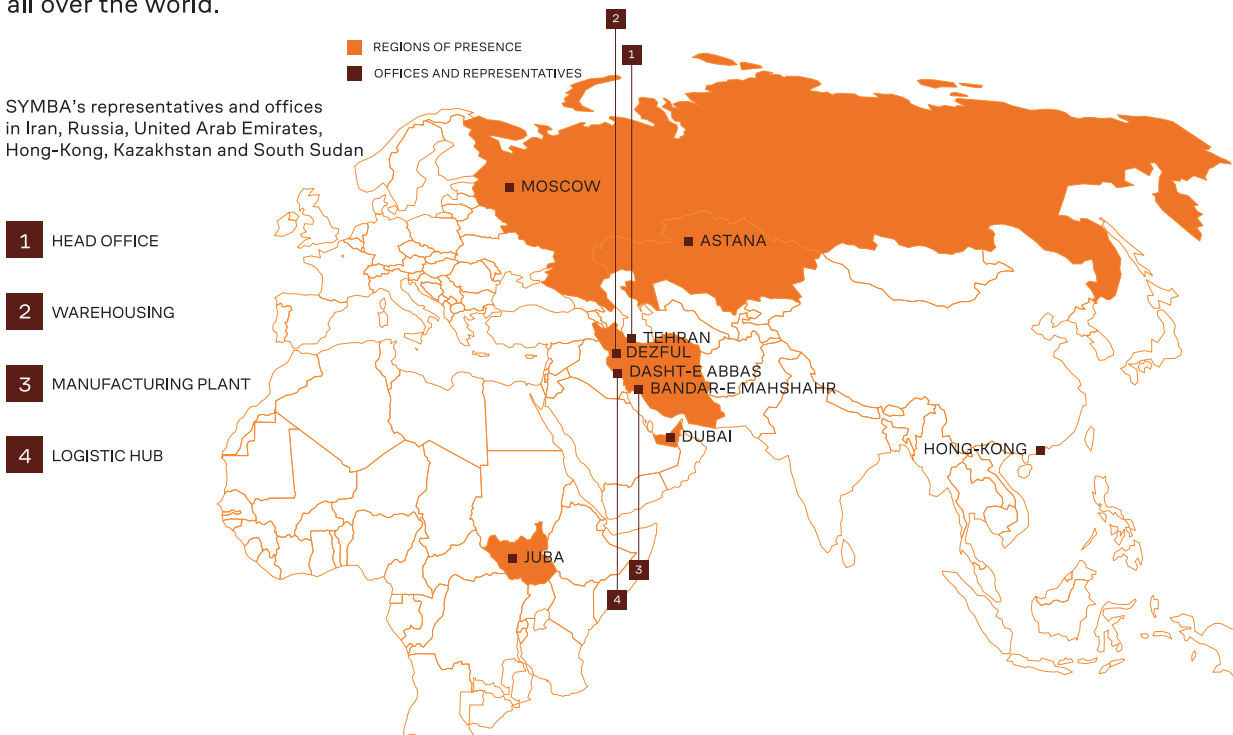
SYMBA

About the company

Systemhaye Mohandessi Barus Oxin (SYMBA) company is today one of the Iranian's leading companies specializing in submersible pump technologies (Electrical Centrifugal Submersible Pumps-ESP and Sucker Rod Pumps-SRP) and services for the oil & gas industry and has carried out work in the following services:

- Design and supply of ESPs, surface equipment, X-mas trees, Horizontal Pump Stations, tubing and casing;
- ESP Design & Local production & Testing on the own full circle production facility, located in Mahshahr, Iran, and using the most modern technologies in artificial lift solutions;
- Installation of ESP in wells with subsequent monitoring and operation, including modern telemetry system for distance operation;
- Responsible storage of equipment;
- DIFA and repair services on the SYMBA's production plant;
- Renting of ESPs and dewatering equipment.

SYMBA is also an exclusive representative in Iran of one of the largest ESP manufacturers in the world with more than 45 years of experience in artificial lift solutions and producing more than 7500 ESPs per year. SYMBA's partners are largest Russian companies who are famous for the quality of their products all over the world.



SYMBA'S FULL CIRCLE PRODUCTION PLANT FACT SHEET:

- SYMBA is one of the 4 local ESPs manufacturers in Iran;
- Full localization of service, assembly and testing of equipment;
- Total area 5600 m2, including production area 1800 m2;
- Capacity of 40 premium quality ESPs per month;
- Power supply capacity –up to 750 kW;
- World-class specialists and local trained stuff.

The main advantage of SYMBA as manufacturer is localizing High End technologies in the artificial lift and best world practice solutions in Iran with an adjustable cost approach.

Yours faithfully,
SYMBA

SYMBA PRODUCTION PLANT'S CERTIFICATES



تاریخ: ۱۴۰۲/۰۱/۱۸

شماره: ن/ت/ ۱۴۱۷۸

پیوست:



جمهوری اسلامی ایران

وزارت نفت

معاونت مهندسی، پژوهش و فناوری

اداره کل نظام تأمین و تجارتی سازی فناوری

بهش آید به شرکت مردم

بهشتی

گواهی نامه عضویت سازندگان داخلی

در فهرست بلند منابع واحد دستگاه مرکزی وزارت نفت

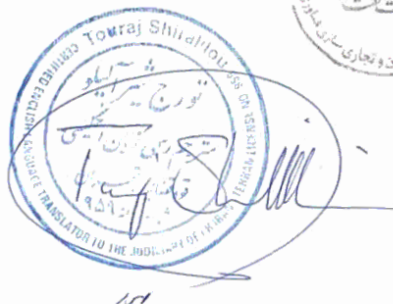
بدینوسیله گواهی می شود، شرکت سیستم های مهندسی باروس اکسین با شناسه ملی ۱۴۰۱۰۸۲۹۵۱۰، از تاریخ ۱۴۰۲/۱۲/۲۶ تا پایان اعتبار نسخه سوم فهرست بلند منابع واحد دستگاه مرکزی وزارت نفت به تاریخ ۱۴۰۳/۰۸/۳۰، عضو این فهرست می باشد.

ضروری است، همواره آخرین وضعیت اعتبار گواهی نامه و فهرست محصولات مورد تأیید آن شرکت، در زمان برگزاری معاملات، از طریق شرکت های کارفرمایی متبوع وزارت نفت و با استفاده از پورتال سامانه تأمین الکترونیکی کالای صنعت نفت، به آدرس ep.mop.ir، استعلام گردد.

غلامرضا خوانساری

مدیر کل و

رئیس کمیته های فنی بازرگانی دستگاه مرکزی



This is a true copy
of the original document.
کپی برابر اصل است

آدرس: تهران، خیابان کریم خان زند، خیابان حافظ، ابتدای پل حافظ، پلاک ۵۲۳، ساختمان مرکزی ششم وزارت نفت
تلفن ۶۱۶۲۷۸۹۴ فاکس ۸۸۹۲۵۰۰۵



شماره ۷۲۲۷۵۲

ردیف دفتر ثبت



تورج شیرالیلو
Official English Translator to the Judiciary

License No. 959

Touraj Shiralilou



To verify the authenticity of the translation, please scan the QR Code

[Official Translation from Persian]

Emblem

Islamic Republic of Iran

Ministry of Petroleum

Engineering, Research and Technology Deputy

Directorate General of Technology Supply and Commercialization System

Address: 6th Central Bld. of Ministry of Petroleum, No. 523, Hafez Overpass, Hafez St., Karim Khan Zand St., Tehran
Tel. 61627894, Fax 88925005

Date: 06/04/2024

No. 12178/NTT

Enclosure: [Blank]

In His Name, The Almighty
"Production Leap with People's Participation"

**Certificate of Membership of Local Manufacturers in the Long List of Resources (AVL)
of the Central Organization of the Ministry of Petroleum**

This is to certify that the **Systemhaye Mohandessi Barus Oxin Company**, holder of National ID 14010829510, is a member of the Third Edition of Local Manufacturers in the Long List of Resources (AVL) of the Central Organization of the Ministry of Petroleum from 16/03/2024 up to its expiration on 20/11/2024.

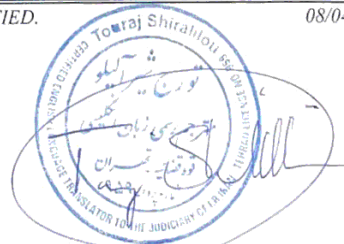
It is required to enquire at all times the latest status of validity of the certificate and its approved list of products of the company at the time of entering into transactions from the respective employer companies of the Ministry of Petroleum by visiting the website of Electronic Supply of Petroleum Products (EP) at www.ep.mop.ir.

Signed and Sealed by:

- Gholamreza Khansari, Director General and Chairman of Technical and Commercial Committees of the Central Organization
- Directorate General of Technology Supply and Commercialization System, Engineering, Research and Technology Deputy, Ministry of Petroleum

ONLY TRUE TRANSLATION FROM ATTACHED DOCUMENT IS CERTIFIED.

08/04/2024



نام صاحب سند: شرکت مهندسی باروس اکسین - هزینه ترجمه و خدمات دفتری: 1297500 ریال بابت ترجمه سایر گواهی ها (سایز A4)

آدرس: خیابان آذریباجان - روبروی قصرالدشت - پلاک 957 - طبقه 4 - واحد 4
Address: 4th Floor, No. 957, Azarbaijan St., Azadi St., Tehran Tel/Fax: (+98-21) 66863824 - 66849075
Email: shiralilou@hotmail.com Mobile: (+98) 9128144650 Tel: (+98) 021 44650515

SYMBA PRODUCTION PLANT



SYMBA PRODUCTION PLANT



SYMBA ESP SERVICES ON THE OILFIELDS IN IRAN



SYMBA ESP SERVICES ON THE OILFIELDS IN IRAN



ELECTRIC SUBMERSIBLE PUMPS

Submersible centrifugal pumps are used for pumping formation fluid from oil wells, as well as in reservoir pressure maintenance systems.

Flowrate/production boosting

- Wells with a high content of solids;
- Wells with a high GOR;
- Wells with high corrosiveness of formation fluid;
- Wells with high temperature of formation fluid;
- Wells after hydraulic fracturing;
- Wells after drilling, including horizontal, with sidetracks, exploratory and crooked borehole wells;
- Traditional wells.

FEATURES AND BENEFITS:

- Corrosion-resistant, corrosion-wear-resistant, and increased corrosion resistance pumps with stage material hardness of up to 240 HB;
- Corrosion-wear-resistant design of the pump housing, corrosion-wear-resistant coating of the housing or stainless steel housing;
- Floating, compression and packet design pumps;
- Simplified installation of compression design pumps. The shafts in pump sections can contact each other by means of an adjustment bolt, which is fixed by the sleeve to prevent unscrewing. A special device is used for the bolt adjustment procedure during installation, while the process does not involve any measuring tools;
- Optimal distribution of radial bearings through pump section; center bearings in pumps with a capacity of more than 1900 barrels/day (300 m³/day) at 60 Hz are built into the stage;
- Shafts are made of high-strength stainless steel;
- Involute spline connection of shafts;
- Symba produces standard and high-speed pumps with floating stages or compression-assembled pumps with a capacity of 76 to 11,725 barrels/day (12 – 1,864 m³/day) at 60 Hz with a speed control range of 2,400 – 6,000 rpm.

Floater design pumps: the impellers on the shaft inside the diffusers can move in axial directions within the permissible gap. The axial load of the shaft is transmitted to the motor protector bearing, while the axial load of the impellers is transmitted to the diffusers.

Compression design pumps: The impellers are fixed to the shaft and move up and down with it. The axial load the shaft and the impellers is transmitted to the motor protector bearing. Thrust bearing of the motor protector has a low coefficient of friction and is not subject to abrasion wear and the adverse effect of formation fluid.



EXAMPLE

ESP-A 406-950 84STG C UT 5M STD CR1 HSN ELECTRIC SUBMERSIBLE PUMPS

ESP-	A	406-	950	HS	CCW	84STG	C	UT	5M	STD	CR1	HSN
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Electric Submersible Pump (ESP)											
2	Symba design											
3	ESP series											
4	ESP flow rate, bpd @ Best Efficiency Point (BEP) at 60 Hz (at 6,000 rpm for HS pump)											
5	Speed classification Blank – standard HS – high speed											
6	Rotation direction: Blank – clockwise CCW – counter-clockwise											
7	Number of stages											
8	Pump design C – compression F – floater P – packet											
9	Pump configuration: UT – upper tandem CT – central tandem LT – lower tandem											
10	Housing length, m											
11	Shaft rating STD – Standard strength shaft HSS – High strength shaft USS – Ultrahigh strength shaft											
12	Corrosion resistance design: CR0 – carbon steel head, base and housing, carbon steel fasteners CR1 – stainless steel head and base, carbon steel housing with anti-corrosion coating (super stainless flame coating), monel fasteners CR2 – stainless steel head, base and housing, monel fasteners											
13	Elastomers material: HSN – highly saturated nitrile AFL – high temperature fluoroelastomer											



ELECTRIC SUBMERSIBLE PUMPS SUMMARY

Pump	Stage Type	Housing Diameter, in. (mm)	60 Hz - 3,500 rpm		50 Hz - 2,917 rpm	
			Recommended Operating Range		Recommended Operating Range	
			bpd	rpm	m ³ /d	rpm
ESP-A 362-130	radial	3.62 (92.0)	76 – 170	3,500	10 – 23	2,917
ESP-A 362-170	radial		113 – 197		15 – 26	
ESP-A 362-200	radial		136 – 287		18 – 38	
ESP-A 362-270	radial		189 – 340		25 – 45	
ESP-A 362-400	radial		227 – 530		30 – 70	
ESP-A 362-410	radial		303 – 567		40 – 75	
ESP-A 362-600	radial		454 – 756		60 – 100	
ESP-A 362-750	radial		605 – 946		80 – 125	
ESP-A 362-950	radial		605 – 1,210		80 – 160	
ESP-A 362-1200	radial		908 – 1,513		120 – 200	
ESP-A 362-1400	radial		983 – 1,740		130 – 230	
ESP-A 362-2100	mixed flow		1,589 – 2,648		210 – 350	
ESP-A 406-270	radial	4.06 (103.0)	189 – 340	3,500	25 – 45	2,917
ESP-A 406-400	radial		189 – 605		25 – 80	
ESP-A 406-450	radial		303 – 605		40 – 80	
ESP-A 406-600	radial		454 – 756		60 – 100	
ESP-A 406-700	radial		530 – 983		70 – 130	
ESP-A 406-900	radial		567 – 1,324		75 – 175	
ESP-A 406-1250	radial		908 – 1,513		120 – 200	
ESP-A 406-1500	radial		946 – 1,891		125 – 250	
ESP-A 406-1900	radial		1,362 – 2,269		180 – 300	
ESP-A 406-1950	mixed flow		1,437 – 2,572		190 – 340	
ESP-A 406-2400	mixed flow		1,815 – 2,874		240 – 380	
ESP-A 406-3100	mixed flow		2,269 – 3,782		300 – 500	
ESP-A 406-3700	mixed flow		2,837 – 4,917		375 – 650	
ESP-A 406-5500	mixed flow		4,841 – 7,262		640 – 960	
ESP-A 449-5700	mixed flow	4.49 (114.0)	4,539 – 7,564	3,500	600 – 1,000	2,917
ESP-A 449-9400	mixed flow		7,186 – 11,725		950 – 1,550	
ESP-A 535-2500	mixed flow	5.35 (136.0)	1,600 – 3,200	3,500	212 – 423	2,917
ESP-A 535-3500	mixed flow		2,400 – 4,600		318 – 610	
ESP-A 535-4700	mixed flow		2,800 – 5,900		371 – 782	
ESP-A 535-7000	mixed flow		4,000 – 7,700		530 – 1,020	
ESP-A 535-7500	mixed flow		4,700 – 9,000		623 – 1,193	
ESP-A 535-10000	mixed flow		5,000 – 11,900		663 – 1,577	



GAS-HANDLING SYSTEMS

Gas-handling systems (Gas separators, gas handlers, gas separator-handlers and multiphase gas handler) are designed to ensure the stable operation of submersible pumps in wells with a high content of gas.

APPLICATION

- Wells with high GOR;
- Wells with unstable inflow;
- Shale wells.

FEATURES & BENEFITS

- Gas-handling systems have a corrosion-wear-resistant design;
- The liner of the separation chamber is made of thick-walled chromium-nickel stainless steel;
- The rotor is stabilized by wear-resistant radial bearings;
- The radial bearings are made of hard alloy;
- Head, base and liner are made of stainless steel;
- Internal components are made of corrosion-resistant steel and/or of Ni-resist cast iron Type 1;
- Gas separator ensures separation and removal of gas from the fluid into the annulus;
- Gas-handler and Multiphase gas-handler reduce bubble size, put gas back into solution and homogenize the mixture;
- Gas-handling systems with inlets are installed instead of an intake or as the lower section of a tandem gas-handling system. Gas-handling systems with no inlets are installed above the device with inlets.

RECOMMENDED GAS-HANDLING SYSTEM

Free gas at pump intake (after separation), %	Gas-handling system
0 to 10	Radial/mixed flow stage
10 to 25	Mixed flow stage
25 to 55	Gas-handler
55 to 75	Multiphase gas-handler

To increase the efficiency of ESP operation in wells with a particularly high content of gas, gas-handling systems are installed according to the following arrangements:

- At the top: multiphase gas handler/gas handling device;
- At the bottom: gas separator and gas handling device.

GAS SEPARATORS

EXAMPLE

GS-A V 338-950 CT STD CR1 AFL

GS-	A	V	338-	950	CT	STD	CR1	HSN
1	2	3	4	5	6	7	8	9
1	Gas separator							
2	Symba design							
3	Gas Separator type V – vortex R – rotary							
4	Gas separator series							
5	Maximum capacity, bpd@60Hz							
6	Gas separator configuration CT – central tandem LT – lower tandem (can be used as single)							
7	Shaft rating STD – standard strength shaft HSS – high strength shaft USS – Ultrahigh strength shaft							
8	Corrosion resistance design: CR0 – carbon steel head, base and housing, carbon steel fasteners CR1 – stainless steel head and base, carbon steel housing with anti-corrosion coating (super stainless flame coating), monel fasteners CR2 – stainless steel head, base and housing, monel fasteners							
9	Elastomers material: HSN – highly saturated nitrile AFL – high temperature fluoroelastomer							

ROTARY GAS SEPARATORS

The principle of operation of a rotary gas separator is based on the centrifugal force arising in the separation chamber to remove free gas into the annulus, thereby ensuring stable operation of the pump and increasing MTBF.

APPLICATION

- Wells with increased fluid viscosity;
- Wells with low and medium solids content;

FEATURES & BENEFITS

- The liner of the separation chamber is made of thick-walled chromium-nickel stainless steel;
- The rotor is stabilized by wear-resistant radial bearings;
- The base of the gas separator is made of stainless steel.

A rotary gas separator with intake holes is installed instead of an intake section or as the lower section of a tandem rotary gas separator/gas-handling system.

A rotary gas separator without intake holes is installed above the device with intake holes or as the upper section of a tandem rotary gas separator.



Recommended	Operating Range		Housing diameter		Shaft		Length		Weight	
Description	bpd @ 60 Hz	m3/d @ 50 Hz	in.	mm	in.	mm	ft	m	lb	kg
GS-A R 338-1500 CT	151 – 1,509	20 – 200	3.39	86	0.67	17	2.2	0.7	46	21
GS-A R 338-1500 LT	151 – 1,509	20 – 200	3.39	86	0.67	17	2.6	0.8	53	24
GS-A R 362-500 CT	60 – 453	8 – 60	3.62	92	0.787	20	2.4	0.7	60	27
GS-A R 362-500 LT	60 – 453	8 – 60	3.62	92	0.787	20	2.8	0.9	64	29
GS-A R 362-1300 CT	377 – 1,283	50 – 170	3.62	92	0.787	20	2.4	0.7	60	27
GS-A R 362-1300 LT	377 – 1,283	50 – 170	3.62	92	0.787	20	2.8	0.9	64	29
GS-A R 362-2100 CT	113 – 2,113	15 – 280	3.62	92	0.787	20	2.4	0.7	60	27
GS-A R 362-2100 LT	113 – 2,113	15 – 280	3.62	92	0.787	20	2.8	0.9	64	29
GS-A R 406-4500 CT	189 – 4,528	25 – 600	4.06	103	0.866	22	3.2	1.0	78	36
GS-A R 406-4500 LT	189 – 4,528	25 – 600	4.06	103	0.866	22	3.6	1.1	87	39

VORTEX GAS SEPARATORS

The principle of operation of the vortex gas separator is based on the effect of a free vortex arising in the vortex chamber and providing phase separation under the action of centrifugal forces. The vortex gas separator is less susceptible to cyclic circular wear of the liner by solids due to the absence of separation drums. It is used in wells with a high content of solids.

APPLICATION

- Wells with a high GOR;
- Wells with a high content of solids.

FEATURES AND BENEFITS:

- The Liner of the separation chamber is made of thick-walled chromium-nickel stainless steel;
- The rotor is stabilized by wear-resistant radial bearings;
- End pieces are made of stainless steel;
- A vortex gas separator with intake holes is installed instead of an intake section or as the lower section of a tandem vortex gas separator/gas-handling system.
- A vortex gas separator without intake holes is installed above the device with intake holes or as the upper section of a tandem vortex gas separator.



Description	Recommended Operating Range		Housing diameter		Shaft		Length		Weight	
	bpd @ 60 Hz	m3/d @ 50 Hz	in.	mm	in.	mm	ft	m	lb	kg
GS-A V 362-500 CT	60 – 453	8 – 60	3.62	92	0.787	20	2.4	0.7	55	25
GS-A V 362-500 LT	60 – 453	8 – 60	3.62	92	0.787	20	2.8	0.9	60	27
GS-A V 362-2100 CT	113 – 2,113	15 – 280	3.62	92	0.787	20	2.4	0.7	55	25
GS-A V 362-2100 LT	113 – 2,113	15 – 280	3.62	92	0.787	20	2.8	0.9	60	27
GS-A V 362-1300 CT	377 – 1,283	50 – 170	3.62	92	0.787	20	2.4	0.7	55	25
GS-A V 362-1300 LT	377 – 1,283	50 – 170	3.62	92	0.787	20	2.4	0.7	55	25
GS-A V 406-2100 CT	113 – 2,114	15 – 280	4.06	103	0.984	25	3.36	1.0	80	37
GS-A V 406-2100 LT	113 – 2,114	15 – 280	4.06	103	0.984	25	2.94	0.9	69	32
GS-A V 406-7200 CT	189 – 7,173	25 – 950	4.06	103	0.984	25	3.36	1.0	80	37
GS-A V 406-7200 LT	189 – 7,173	25 – 950	4.06	103	0.984	25	3.36	1.0	80	37

VORTEX GAS SEPARATORS

The principle of operation of the vortex gas separator is based on the effect of a free vortex arising in the vortex chamber and providing phase separation under the action of centrifugal forces. The vortex gas separator is less susceptible to cyclic circular wear of the liner by solids due to the absence of separation drums. It is used in wells with a high content of solids.

APPLICATION

- Wells with a high GOR;
- Wells with a high content of solids.

FEATURES AND BENEFITS:

- The Liner of the separation chamber is made of thick-walled chromium-nickel stainless steel;
- The rotor is stabilized by wear-resistant radial bearings;
- End pieces are made of stainless steel;
- A vortex gas separator with intake holes is installed instead of an intake section or as the lower section of a tandem vortex gas separator /gas-handling system.
- A vortex gas separator without intake holes is installed above the device with intake holes or as the upper section of a tandem vortex gas separator.



Description	Recommended Operating Range		Housing diameter		Shaft		Length		Weight	
	bpd @ 60 Hz	m3/d @ 50 Hz	in.	mm	in.	mm	ft	m	lb	kg
GS-A V 362-500 CT	60 – 453	8 – 60	3.62	92	0.787	20	2.4	0.7	55	25
GS-A V 362-500 LT	60 – 453	8 – 60	3.62	92	0.787	20	2.8	0.9	60	27
GS-A V 362-2100 CT	113 – 2,113	15 – 280	3.62	92	0.787	20	2.4	0.7	55	25
GS-A V 362-2100 LT	113 – 2,113	15 – 280	3.62	92	0.787	20	2.8	0.9	60	27
GS-A V 362-1300 CT	377 – 1,283	50 – 170	3.62	92	0.787	20	2.4	0.7	55	25
GS-A V 362-1300 LT	377 – 1,283	50 – 170	3.62	92	0.787	20	2.4	0.7	55	25
GS-A V 406-2100 CT	113 – 2,114	15 – 280	4.06	103	0.984	25	3.36	1.0	80	37
GS-A V 406-2100 LT	113 – 2,114	15 – 280	4.06	103	0.984	25	2.94	0.9	69	32
GS-A V 406-7200 CT	189 – 7,173	25 – 950	4.06	103	0.984	25	3.36	1.0	80	37
GS-A V 406-7200 LT	189 – 7,173	25 – 950	4.06	103	0.984	25	3.36	1.0	80	37



Description	Recommended Operating Range		Housing diameter		Shaft		Length		Weight	
	bpd @ 60 Hz	m ³ /d @ 50 Hz	in.	mm	in.	mm	ft	m	lb	kg
AGH-A 362-2100 CT	- 2,113	- 280	3.62	92	0.787	20	2.2	0.7	53	24
AGH-A 362-2100 LT	- 2,113	- 280	3.62	92	0.787	20	2.6	0.8	57	26
AGH-A 406-4500 CT	- 4,528	- 600	4.06	103	0.866	22	2.2	0.7	44	20
AGH-A 406-4500 LT	- 4,528	- 600	4.06	103	0.866	22	2.6	0.8	51	23

GAS SEPARATOR-HANDLER

A rotary gas separator and handler are installed in tandem at the pump intake in wells with a particularly high GOR where neither a gas separator nor a gas handler can ensure stable operation of a submersible centrifugal pump.

A rotary gas separator-handler is a system in which a gas separator is installed at the bottom, while the gas handler is installed on the top.

FEATURES AND BENEFITS:

- The one-piece liner of the separation chamber is made of thick-walled chromium-nickel stainless steel;
- The dispersing chamber contains a special designed inducer and stages for mixing dissolved gas in the formation fluid, preparing a homogeneous gas-liquid mixture;
- An additional liner is pressed inside the gas separator-handler housing;
- The supercavitating wheel has additional housing protection against solids;
- The rotor is stabilized by wear-resistant radial bearings;
- The base of the gas separator-handler is made of stainless steel.
- A gas separator-handler with intake holes is installed instead of an intake section or as the lower section of a tandem gas-handling system.
- A gas separator-handler without intake holes is installed above the device with intake holes or as the upper section of a tandem gas-handling system.



EXAMPLE

GSH-A 362-1300 LT STD CR1 HSN

GSH-	A	362-	1300	LT	STD	CR1	HSN
1	2	3	4	5	6	7	8
1	Gas Separator-Handler (GSH)						
2	Symba design						
3	GSH series						
4	Maximum flow rate@60Hz, bpd						
5	Gas separator configuration CT – Cental tandem LT – Lower tandem (can be used as single)						
6	Shaft rating STD – Standard strength shaft HSS – High strength shaft USS – Ultrahigh strength shaft						
7	Corrosion resistance design: CRO – carbon steel head, base and housing, carbon steel fasteners CR1 – stainless steel head and base, carbon steel housing with anti-corrosion coating (super stainless flame coating), monel fasteners CR2 – stainless steel head, base and housing, monel fasteners						
8	Elastomers material: HSN – highly saturated nitrile AFL – high temperature fluoroelastomer						



Description	Recommended Operating Range		Housing diameter		Shaft		Length		Weight	
	bpd @ 60 Hz	m ³ /d @ 50 Hz	in.	mm	in.	mm	ft	m	lb	kg
GSH-A 338-1500 CT	- 1,509	- 200	3.39	86	0.669	17	3.0	0.9	64	29
GSH-A 338-1500 LT	- 1,509	- 200	3.39	86	0.669	17	3.4	1.0	71	32
GSH-A 362-2100 CT	- 2,113	- 280	3.62	92	0.787	20	4.1	1.3	93	42
GSH-A 362-2100 LT	- 2,113	- 280	3.62	92	0.787	20	4.3	1.3	95	43
GSH-A 406-7200 CT	- 7,170	- 950	4.06	103	0.984	25	4.9	1.5	106	48
GSH-A 406-7200 LT	- 7,170	- 950	4.06	103	0.984	25	4.4	1.3	88	40
GSH-A 449-11700 CT	- 11,698	- 1,550	4.49	114	1.102	28	5.3	1.6	154	70
GSH-A 449-11700 LT	- 11,698	- 1,550	4.49	114	1.102	28	5.3	1.6	154	70

MULTIPHASE GAS-HANDLER

Multiphase gas-handler (MGH), as well as the gas handler, is designed to prepare a homogeneous gas-liquid mixture.

MGH working parts are designed on the basis of serial radial stages with a cut lower impeller disk (multiphase stages) intended for dispersion, compression, and dissolution of free gas in the pumped fluid.

FEATURES AND BENEFITS:

- The gas lift effect increases the efficiency of well operation;
- Stabilized characteristics of the pump and prevented gas lock;
- Reduced pulsation and vibration of the fluid flow in the tubing with a high gas content at the inlet;
- Prevented gas accumulation in the annulus;
- Working stages are designed on the basis of serial stages.

MGH with intake holes is installed instead of intake or as the lower section of a tandem MGH.

MGH without intake holes is installed above the device with intake holes or as the upper section of a tandem MGH/gas-handling system.



EXAMPLE

MGH-A 406-1900 LT HSS CR1 AFL

MGH-	A	406-	1900	LT	HSS	CR1	AFL
1	2	3	4	5	6	7	8
1	Multiphase Gas-Handler						
2	Symba design						
3	MGH series						
4	Maximum flow rate@60Hz, bpd						
5	AGH configuration CT – central tandem LT – lower tandem						
6	Shaft rating STD – Standard strength shaft HSS – High strength shaft USS – Ultrahigh strength shaft						
7	Corrosion resistance design CR0 – carbon steel head, base and housing, carbon steel fasteners CR1 – stainless steel head and base, carbon steel housing with anti-corrosion coating (super stainless flame coating), monel fasteners CR2 – stainless steel head, base and housing, monel fasteners						
8	Elastomers material: HSN – Highly saturated nitrile AFL – high temperature fluoroelastomer						



Description	Recommended Operating Range		Housing diameter		Shaft		Length		Weight	
	bpd @ 60 Hz	m ³ /d @ 50 Hz	in.	mm	in.	mm	ft	m	lb	kg
MGH-A 272-1200 CT	- 1,164	- 185	2.72	69	0.55	14	2.8	0.9	44	20
MGH-A 319-800 CT	- 755	- 100	3.19	81	0.55	14	2.5	0.8	51	23
MGH-A 319-800 LT	- 755	- 100	3.19	81	0.55	14	3.0	0.9	77	35
MGH-A 362-600 CT	- 604	- 80	3.62	92	0.669	17	2.6	0.8	55	25
MGH-A 362-600 LT	- 604	- 80	3.62	92	0.669	17	3.0	0.9	62	28
MGH-A 362-1500 CT	- 1,509	- 200	3.62	92	0.787	20	2.6	0.8	55	25
MGH-A 362-1500 LT	- 1,509	- 200	3.62	92	0.787	20	3.0	0.9	62	28
MGH-A 406-1900 CT	- 1,887	- 250	4.06	103	0.87	22	2.6	0.8	55	25
MGH-A 406-1900 LT	- 1,887	- 250	4.06	103	0.87	22	3.0	0.9	62	28

INTAKE

The intake is designed to receive the formation fluid coming to the ESP.

The intake consists of a one-piece housing with holes for receiving formation fluid, with radial bearings pressed into the housing, inside which the shaft rotates. Outside, a suction strainer is installed on the intake to protect it from solids. The inner surface of the module is protected by liner made of stainless steel.

With a low gas content at the intake (less than 25% of gas), the intake is installed between the pump lower section and protector.

With a high gas content, the intake is installed between the gas-handling system without intake holes and the protector.



EXAMPLE

INT-A 406 HSS SS

INT-	A	406	HSS	SS
1	2	3	4	5
1	Intake			
2	Symba design			
3	Intake series			
4	Shaft rating STD – Standard strength shaft HSS – High strength shaft USS – Ultrahigh strength shaft			
5	Corrosion resistance design: CS – carbon steel with carbon steel fasteners SS – stainless steel with monel fasteners			

Description	Recommended Operating Range		Housing diameter		Shaft		Length		Weight	
	bpd @ 60 Hz	m3/d @ 50 Hz	in.	mm	in.	mm	ft	m	lb	kg
INT-A 272	0 – 1,163	0 – 185	2.72	69	0.551	14	0.9	0.265	13.5	6.1
INT-A 319	0 – 528	0 – 70	3.19	81	0.551	14	1.0	0.302	20.9	9.5
INT-A 338	0 – 755	0 – 100	3.78	96	0.669	17	1.0	0.302	23.2	10.5
INT-A 362	0 – 2,113	0 – 280	4.06	103	0.787	20	1.0	0.302	28.2	12.8
INT-A 406	0 – 6,038	0 – 800	4.25	108	0.984	25	1.0	0.302	31.1	14.1
INT-A 449	0 – 9,434	0 – 1,250	4.84	123	1.102	28	0.9	0.287	33.1	15.0

MOTOR PROTECTORS

Motor protectors are designed to protect the submersible motor from the ingress of formation fluid and to compensate for the thermal expansion of oil during operation in wells with a temperature of formation fluid up to 356°F (180°C).

FEATURES AND BENEFITS:

- ☒ Using mechanical shaft seals in motor protector with a wear-resistant friction pair with a working temperature of up to 428°F (220°C);
- ☒ Lower thrust bearing with self-alignment segments is used in manufacturing of high-load motor protectors. The thrust bearing segments are coated with the PEEK polymer antifriction material;
- ☒ A cooler filter provides for oil filtration and cooling in the area of the protector thrust bearing assembly;
- ☒ Bypass check valves or a bag elastic strap ensure relief of excess internal pressure and gas removal from the motor oil cavity during the operation of the ESP;
- ☒ Protector shafts are made of high strength stainless steel.

Protector developed by Symba has configurations with two- or three chambers. The tandem Motor protector consist of an upper and lower protectors of the tandem type.

Motor protector is a combination of labyrinth and bag chambers.

The labyrinth chamber consists of an oil-filled hollow chamber with two tubes directed up and down, which create a barrier for formation fluid entering the electric motor. The labyrinth section pushes oil into the annulus if the temperature of the motor increases.

The bag chamber consists of an oil-filled diaphragm. The diaphragm compensates for temperature changes in the volume of oil in the electric motor.

Protector is installed between the electric motor and the pump intake. (intake module, slot filter or gas-handling system with intake holes).





EXAMPLE

MPR-A 406 LSBPB HS HL /512 S HSS CR1 T1

MPR-	A	406	LSBPB	HS	HL	/512	S	HSS	CR1	T1
1	2	3	4	5	6	7	8	9	10	11
1	Motor Protector									
2	Symba design									
3	Protector series									
4	Chambers configuration: L – labyrinth B – bag S – series connection P – parallel connection									
5	Speed classification Blank – standard HS – high speed									
6	Thrust bearing: Blank – standard HL – High load bi-directional thrust bearing									
7	Protector Head/Base for particular intake/motor series connection /512 – Base for 512 series motor connection									
8	Configuration: S – single CT – central tandem LT – lower tandem T – tandem (2 or 3 sectioned complete protector)									
9	Shaft rating STD – Standard strength shaft HSS – High strength shaft USS – Ultrahigh strength shaft									
10	Corrosion resistance design: CR0 – carbon steel head, base and housing, carbon steel fasteners CR1 – stainless steel head and base, carbon steel housing with anti-corrosion coating (super stainless flame coating), monel fasteners CR2 – stainless steel head, base and housing, monel fasteners									
11	Ambient temperature rating T – for 248°F (120°C) T1 – for 302°F (150°C) T2 – for 356°F (180°C)									



Pump			Motor			Recommended Motor Protector			
Pump series	Max.load		Motor series	Max.power		Description	Max. fluid temperature, °F (°C)	Oil volume	
	lbf @ 60 Hz	kgf @ 50 Hz		hp @ 60 Hz	kW @ 50 Hz			gal	l
272	1,720	650	319	101	63	MPR-A 272 LSBSB HS HL S	302 (150)	0.5	1.9
	1,720	650	319	201	125	MPR-A 272 LSBPB HS HL S	302 (150)	1	3.8
319	7,144	2,700	319	201	125	MPR-A 319 LSBSB HS HL S	302 (150)	0.45	1.7
338	1,852	700	378	113	70	MPR-A 338 LSBPB S	302 (150)	1.19	4.5
	7,065	2,670				MPR-A 338 LSBPB HL S		1.19	4.5
362, 406, 449	1,985	750	406, 461	201	125	MPR-A 362 LSB S	302 (150)	0.98	3.7
						MPR-A 362 LSBSB S		1.59	6
				290	180	MPR-A 362 LSBPB S		1.59	6
	2,117	800	461	258	160	MPR-A 406 LSB S	302 (150)	1.29	4.9
						MPR-A 406 LSBSB S		2.11	8
	9,261	3,500	406, 461	201	125	MPR-A 362 LSB HL S	302 (150)	0.98	3.7
						MPR-A 362 LSBSB HL S		1.59	6
				290	180	MPR-A 362 LSBPB HL S		1.59	6
			461	258	160	MPR-A 406 LSBSB HL S	302 (150)	2.11	8
406, 449	2,117	800	461	580	360	MPR-A 406 LSBPB S	302 (150)	2.11	8
	2,381	900	512	580	360	MPR-A 449 LSB S	302 (150)	1.48	5.6
						MPR-A 449 LSBSB S		2.38	9
	9,261	3,500	461	580	360	MPR-A 406 LSBPB HL S	302 (150)	2.11	8
	9,261	3,500	406, 461	201	125	MPR-A 362 LSBSB HL T	356 (180)	3.17	12
				290	180	MPR-A 362 LSBPB HL T		3.17	12
			461	403	250	MPR-A 406 LSBSB HL T	356 (180)	3.96	15
				580	360	MPR-A 406 LSBPB HL T		3.96	15
			512	403	250	MPR-A 406 LSBSB HL T /512	356 (180)	3.96	15
				580	360	MPR-A 406 LSBPB HL T /512		3.96	15
	21,591	8,160	512	580	360	MPR-A 449 LSBPB HL T	356 (180)	2.38	9
449, 626	2,381	900	512	886	550	MPR-A 449 LSBPB S	302 (150)	2.38	9
	5,292	2,000	709	1208	750	MPR-A 626 BSB S		5.28	20
						MPR-A 626 LSBSB S		6.61	25
	21,591	8,160	512	886	550	MPR-A 449 LSBPB HL S		2.38	9

* S – Single; T – Tandem (Protector + Protector)

MOTOR PROTECTORS TECHNICAL DATA

Protector series	Description	HP required				Housing diameter		Shaft		Length		Weight	
		No load		Max. load									
		Hp @ 60 Hz	kW @ 50 Hz	Hp @ 60 Hz	kW @ 50 Hz	in.	mm	in.	mm	ft	m	lb	kg
272	MPR-A 272 LSBSB HS HL S	0.6	0.4	2.4	1.5	2.72	69	0.551	14	6.3	1.9	66	30
272	MPR-A 272 LSBPB HS HL S	0.6	0.4	2.4	1.5	2.72	69	0.551	14	7.2	2.2	77	35
319	MPR-A 319 LSBSB HS HL S	0.6	0.4	2.4	1.5	3.17	80.5	0.787	20	9	2.8	132	60
338	MPR-A 338 LSBPB S	0.6	0.4	2.1	1.3	3.39	86	0.984	25	9	2.7	187	85
338	MPR-A 338 LSBPB HL S	0.6	0.4	2.6	1.6	3.39	86	0.984	25	9	2.7	187	85
362	MPR-A 362 LSB S	0.6	0.35	2.3	1.4s	3.62	92	0.984	25	7.1	2.2	143	65
362	MPR-A 362 LSBSB S	0.7	0.45	2.3	1.4	3.62	92	0.984	25	10.2	3.1	198	90
362	MPR-A 362 LSBPB S	0.7	0.45	2.3	1.4	3.62	92	0.984	25	10.2	3.1	198	90
406	MPR-A 406 LSB S	1	0.6	2.6	1.6	4.06	103	1.102	28	7.2	2.2	185	84
406	MPR-A 406 LSBSB S	1	0.6	2.6	1.6	4.06	103	1.102	28	10.3	3.1	243	110
362	MPR-A 362 LSB HL S	0.7	0.45	2.9	1.8	3.62	92	0.984	25	7.1	2.2	143	65
362	MPR-A 362 LSBSB HL S	0.7	0.45	2.9	1.8	3.62	92	0.984	25	10.2	3.1	198	90
362	MPR-A 362 LSBPB HL S	0.7	0.45	2.9	1.8	3.62	92	0.984	25	10.2	3.1	198	90
406	MPR-A 406 LSBSB HL S	1	0.6	3.2	2	4.06	103	1.102	28	10.3	3.1	243	110
406	MPR-A 406 LSBPB S	1	0.6	2.6	1.6	4.06	103	1.102	28	10.3	3.1	243	110
449	MPR-A 449 LSB S	1.3	0.8	2.9	1.8	4.49	114	1.378	35	8.5	2.6	265	120
449	MPR-A 449 LSBSB S	1.3	0.8	2.9	1.8	4.49	114	1.378	35	11.7	3.6	353	160
406	MPR-A 406 LSBPB HL S	1	0.6	3.2	2	4.06	103	1.102	28	10.3	3.1	243	110
362	MPR-A 362 LSBSB HL T	0.7	0.45	2.9	1.8	3.62	92	0.984	25	20.3	6.2	243	110
362	MPR-A 362 LSBPB HL T	0.7	0.45	2.9	1.8	3.62	92	0.984	25	20.3	6.2	243	110
406	MPR-A 406 LSBSB HL T	1	0.6	3.2	2	4.06	103	0.984	25	20.5	6.3	485	220
406	MPR-A 406 LSBPB HL T	1	0.6	3.2	2	4.06	103	0.984	25	20.5	6.3	485	220
406	MPR-A 406 LSBSB HL T /512	1	0.6	3.2	2	4.06	103	0.984	25	20.5	6.3	485	220
406	MPR-A 406 LSBPB HL T /512	1	0.6	3.2	2	4.06	103	0.984	25	20.5	6.3	485	220
449	MPR-A 449 LSBPB HL T	1.3	0.8	3.9	2.4	4.49	114	1.378	35	11.7	3.6	353	160
449	MPR-A 449 LSBPB S	1.3	0.8	2.9	1.8	4.49	114	1.378	35	11.7	3.6	353	160
626	MPR-A 626 BSB S	2.4	1.5	4	2.5	6.26	159	1.654	42	8.4	2.5	441	200
626	MPR-A 626 LSBSB S	2.4	1.5	4	2.5	6.26	159	1.654	42	10.4	3.2	551	250
449	MPR-A 449 LSBPB HL S	1.3	0.8	3.9	2.4	4.49	114	1.378	35	11.7	3.6	353	160

ELECTRIC MOTORS

INDUCTION MOTORS

Submersible induction motors are used as a drive of submersible pumps for pumping formation fluid from oil, water and geothermal wells.

Symba manufactures standard and high-voltage induction motors, Series 378 to 709, having a power range from 14 to 1,208 hp (at 60 Hz) with a speed control range of 2,100 - 4,200 rpm.

High voltage motors are electric motors with high voltage supply, which have smaller cross-section wires of the stator winding in comparison with a standard electric motor. Low operating current saves energy by reducing heat loss and voltage drop in the power cable line.

APPLICATION

- ☒ Wells with a high content of solids;
- ☒ Wells with a high gas content at the pump intake;
- ☒ Wells with high level of corrosiveness of formation fluid;
- ☒ Wells with high temperature of formation fluid;
- ☒ Traditional wells.

FEATURES AND BENEFITS:

- ☒ Manufacturing of stators using PPI-U (M) winding with insulation made of Kapton, Apikal polyamide-fluoroplastic film with a heat resistance up to 392°F (200°C);
- ☒ Vacuum method of stator impregnation with the VS-346 high-temperature varnish or the ELPLAST-180.220 compound;
- ☒ ENMAFLON fluoroplastic tubes as the stator slot insulation;
- ☒ Axial thrust bearings made of silicon carbide or coated with the PEEK material;
- ☒ Locking devices are used to prevent the rotation of radial bearings in the housing;
- ☒ When assembling the body parts of electric motors, the Fixator-2.3 sealant is used on all threaded connections to prevent unscrewing;
- ☒ High-temperature design of pot-head elements:
 - from the PPS-A4 material with an operating temperature of up to 482°F (250°C);
 - from the PEEK material with an operating temperature of up to 572°F (300°C).
- ☒ Heat-resistant rubber products that resistant to synthetic oils:
 - RS-3. Ter-10, up to 428°F (220°C);
 - AF-15, up to 482°F (250°C).

An induction motor is a bipolar oil-filled three-phase squirrel-cage motor. A wide range of motors of various power configuration allows to choose the optimal electric motor to ensure well operation at maximum efficiency.

The motor manufacturing technology ensures the high quality and reliability of submersible electric motors manufactured by Symba LLC.

All motors are assembled on special benches, where the quality of individual assemblies is controlled. After motors are tested on a test bench under conditions close to the real ones, including heating to operating temperatures. After testing, all motors are partially disassembled and the working components are carefully checked. Then they are finally assembled and tested.

Special electrotechnical materials usage makes possible to operate the motors of standard design in the wells with formation fluid temperatures up to 248°F (120°C), and up to 302°F (150°C) – for the high temperature design motors.





EXAMPLE

IM-A 461-200 1620V 76A UT CR1 T1

IM-	A	461-	200	HV	1620V	76A	UT	CR1	T1
1	2	3	4	5	6	7	8	9	10
1	IM – Induction motor								
2	Sympa design								
3	Motor series								
4	Motor power @ 60Hz, hp								
5	Voltage classification: Blank – standard LV – low voltage HV – high voltage								
6	Voltage, V								
7	Current, A								
8	Configuration S – single UT – upper tandem CT – central tandem LT – lower tandem T – tandem (2 or 3 sectioned complete motor)								
9	Corrosion resistance design: CR0 – carbon steel head, base and housing, carbon steel fasteners CR1 – stainless steel head and base, carbon steel housing with anti-corrosion coating (super stainless flame coating), monel fasteners CR2 – stainless steel head, base and housing, monel fasteners								
10	Ambient temperature rating T – for 248°F (120°C) T1 – for 302°F (150°C) T2 – for 338°F (170°C)								

378 SERIES STANDARD INDUCTION MOTORS

CONTROL RANGE: 2,100-4,200 RPM

60 Hz		50 Hz		Amperage	Type (Nº of sections)	Le	Length	Weight	
Power	Voltage	Power	Voltage						
hp	V	kW	V	A		ft	m	lb	kg
25.7	600	16.0	500	30	S	11.0	3.4	375	170
35.4	774	22.0	645	31.5	S	13.2	4.0	454	206
45.1	948	28.0	790	32.6	S	15.5	4.7	540	245
51.5	900	32.0	750	38	S	16.6	5.1	591	268
57.9	1,200	36.0	1,000	33	S	18.8	5.7	664	301
64.4	1,380	40.0	1,150	32.5	S	21.1	6.4	739	335
90.2	1,872	56.0	1,560	33.5	T(2)	34.8	10.6	1,241	563
45.1	936	28.0	780	33.5	UT	17.4	5.3	624	283
45.1	936	28.0	780	33.5	LT	17.4	5.3	617	280
101.4	1,800	63.0	1,500	37	T(2)	32.8	10.0	1,102	500
50.7	900	31.5	750	37	UT	16.4	5.0	551	250
50.7	900	31.5	750	37	LT	16.4	5.0	551	250
112.6	2,304	70.0	1,920	34	T(2)	41.6	12.6	1,479	671
56.3	1152	35.0	960	34	UT	20.8	6.3	743	337
56.3	1152	35.0	960	34	LT	20.8	6.3	736	334

*S-Single, T-Tandem motor, UT-Upper Tandem, CT-Central Tandem, LT-Lower Tandem

TECHNICAL DATA

Housing outer diameter	3.78 in.	96 mm
Maximum internal temperature	392°F	200°C
Involute spline type	1 in.	25 mm

406 SERIES STANDARD INDUCTION MOTORS

CONTROL RANGE: 2,100-4,200 RPM

60 Hz		50 Hz		Amperage	Type (Nº of sections)	Length		Weight	Weight
Power	Voltage	Power	Voltage						
hp	V	kW	V	A		ft	m	lb	kg
25.7	636	16	530	25.6	S	9.9	3.0	353	160
35.4	840	22	700	27.5	S	12.1	3.7	441	200
45.1	1,080	28	900	27	S	14.3	4.4	529	240
51.5	1,200	32	1,000	27.5	S	15.4	4.7	573	260
57.9	1,200	36	1,000	33	S	17.7	5.4	661	300
64.4	1,440	40	1,200	30	S	17.7	5.4	661	300
72.4	1,560	45	1,300	31.2	S	19.9	6.1	747	339
80.5	1,680	50	1,400	32	S	19.9	6.1	747	339
90.1	1,920	56	1,600	32	S	21.0	6.4	789	358
101.4	2,100	63	1,750	32	S	22.1	6.7	831	377
112.6	2,280	70	1,900	30.2	S	23.2	7.1	877	398
128.7	2,460	80	2,050	36	S	26.7	8.1	893	405
144.8	2,376	90.0	1,980	40	T(2)	36.7	11.2	1,456	660
72.4	1,188	45.0	990	40	UT	18.0	5.5	728	330
72.4	1,188	45.0	990	40	LT	18.7	5.7	728	330
161.0	2,544	100.0	2,120	42	T(2)	39.0	11.8	1,500	680
80.5	1,272	50.0	1,060	42	UT	19.5	5.9	750	340
80.5	1,272	50.0	1,060	42	LT	19.5	5.9	750	340
177.0	2,472	110.0	2,060	49	T(2)	43.4	13.2	1,544	700
88.5	1,236	55.0	1,030	49	UT	21.7	6.6	772	350
88.5	1,236	55.0	1,030	49	LT	21.7	6.6	772	350
201.2	3,072	125.0	2,560	44	T(2)	45.6	14.0	1,610	730
100.6	1,536	62.5	1,280	44	UT	22.8	6.9	838	380
100.6	1,536	62.5	1,280	44	LT	22.8	7.1	772	350
225.2	3,000	140.0	2,500	51	T(2)	50.0	15.2	1,753	795
112.6	1,500	70.0	1,250	51	UT	25.0	7.5	882	400
112.6	1,500	70.0	1,250	51	LT	25.0	7.7	871	395
289.8	3,780	180.0	3,150	52	T(3)	64.3	19.6	2,338	1,060
96.6	1,260	60.0	1,050	52	UT	21.3	6.5	794	360
96.6	1,260	60.0	1,050	52	CT	21.0	6.4	772	350
96.6	1,260	60.0	1,050	52	LT	22.0	6.7	772	350

*S-Single, T-Tandem motor, UT-Upper Tandem, CT-Central Tandem, LT-Lower Tandem

TECHNICAL DATA

Housing outer diameter	4.06 in.	103 mm
Maximum internal temperature	392°F	200°C
Involute spline type	1 in.	25 mm



406 SERIES HIGH-VOLTAGE INDUCTION MOTORS

CONTROL RANGE: 2,100-4,200 RPM

60 Hz		50 Hz		Amperage	Type (Nº of sections)	Length		Weight	Weight
Power	Voltage	Power	Voltage						
hp	V	kW	V	A		ft	m	lb	kg
25.7	2,220	16.0	1,850	8.2	S	10.7	3.3	459	208
32.2	2,700	20.0	2,250	8.5	S	11.8	3.6	483	219
35.4	2,820	22.0	2,350	9	S	11.8	3.6	483	219
38.6	3,120	24.0	2,600	8.5	S	12.9	3.9	498	226
45.1	2,520	28.0	2,100	12.5	S	14.1	4.3	520	236
51.5	2,820	32.0	2,350	12.5	S	15.2	4.6	562	255
57.9	3,060	36.0	2,550	13	S	16.3	5.0	597	271
64.4	2,520	40.0	2,100	17.5	S	17.4	5.3	659	299
72.4	2,880	45.0	2,400	17	S	19.6	6.0	741	336
80.5	3,120	50.0	2,600	17.5	S	20.8	6.3	776	352
90.1	3,300	56.0	2,750	19	S	20.8	6.3	776	352
101.4	3,000	63.0	2,500	24	S	24.1	7.3	919	417
112.6	3,096	70.0	2,580	25.5	S	26.3	8.0	994	451
128.7	3,120	80.0	2,600	28	S	28.6	8.7	1,089	494
144.8	3,480	90.0	2,900	28	T(2)	39.0	11.9	1,479	671
72.4	1,740	45.0	1,450	28	UT	19.3	5.9	745	338
72.4	1,740	45.0	1,450	28	LT	19.7	6.0	734	333
161.0	3,840	100.0	3,200	29	T(2)	41.0	12.5	1,589	721
80.5	1,920	50.0	1,600	29	UT	20.3	6.2	800	363
80.5	1,920	50.0	1,600	29	LT	20.7	6.3	789	358
177.0	4,080	110.0	3,400	29.5	T(2)	43.0	13.1	1,625	371
88.5	2,040	55.0	1,700	29.5	UT	21.3	6.5	818	371
88.5	2,040	55.0	1,700	29.5	LT	21.7	6.6	807	366
201.2	4,032	125.0	3,360	34.5	T(2)	45.3	13.8	1,674	737
100.6	2,016	62.5	1,680	34.5	UT	22.3	6.8	840	381
100.6	2,016	62.5	1,680	34.5	LT	23.0	7.0	831	377
225.2	4,380	140.0	3,650	36	T(2)	49.9	15.2	1,717	779
112.6	2,190	70.0	1,825	36	UT	24.6	7.5	864	392
112.6	2,190	70.0	1,825	36	LT	25.3	7.7	853	387
241.4	4,584	150.0	3,820	36	T(2)	49.9	15.2	1,753	795
120.7	2,292	75.0	1,910	36	UT	24.6	7.5	882	400
120.7	2,292	75.0	1,910	36	LT	25.3	7.7	871	395

*S-Single, T-Tandem motor, UT-Upper Tandem, CT-Central Tandem, LT-Lower Tandem

TECHNICAL DATA

Housing outer diameter	4.06 in.	103 mm
Maximum internal temperature	392°F	200°C
Involute spline type	1 in.	25 mm



461 SERIES STANDARD INDUCTION MOTORS

CONTROL RANGE: 2,100-4,200 RPM

60 Hz		50 Hz		Amperage	Type (Nº of sections)	Le	ngth	Weight	
Power	Voltage	Power	Voltage						
hp	V	kW	V	A		ft	m	lb	kg
19.3	456	12.0	380	26	S	7.0	2.1	291	132
25.7	900	16.0	750	18	S	8.2	2.5	357	162
32.2	756	20.0	630	27	S	9.4	2.9	419	190
35.4	900	22.0	750	24	S	10.7	3.3	503	228
38.6	960	24.0	800	25	S	10.7	3.3	481	218
45.1	1,080	28.0	900	26	S	11.9	3.6	542	246
51.5	1,200	32.0	1,000	26	S	13.2	4.0	604	274
57.9	1,440	36.0	1,200	25	S	14.4	4.4	666	302
64.4	1,440	40.0	1,200	27	S	15.6	4.8	728	330
64.4	1,536	40.0	1,280	26	S	15.6	4.8	728	330
72.4	1,680	45.0	1,400	26	S	16.9	5.2	789	358
80.5	1,680	50.0	1,400	28	S	18.2	5.5	858	389
90.1	1,680	56.0	1,400	32	S	19.4	5.9	922	418
101.4	2,202	63.0	1,835	28.7	S	20.5	6.3	974	442
101.4	2,400	63.0	2,000	25	S	20.5	6.3	974	442
112.6	2,280	70.0	1,900	30	S	23.2	7.1	1,098	498
112.6	2,460	70.0	2,050	28	S	23.2	7.1	1,098	498
128.7	2,220	80.0	1,850	36.5	S	24.4	7.4	1,160	526
144.8	2,280	90.0	1,900	39	S	25.6	7.8	1,221	554
160.9	2,520	100.0	2,100	40	S	26.9	8.2	1,259	571
177.0	2,760	110.0	2,300	40	S	26.9	8.2	1,259	571
177.0	2,760	110.0	2,300	40	T(2)	31.7	9.7	1,515	687
88.5	1,380	55.0	1,150	40	UT	16.0	4.9	761	345
88.5	1,380	55.0	1,150	40	LT	15.7	4.8	754	342
201.2	2,880	125.0	2,400	44	S	26.9	8.2	1,259	571
201.2	2,400	125.0	2,000	51.5	T(2)	42.8	13.0	2,004	909
100.6	1,200	62.5	1,000	51.5	UT	21.4	6.6	1,008	457
100.6	1,200	62.5	1,000	51.5	LT	21.4	6.4	996	452
225.2	3,120	140.0	2,600	45.5	T(2)	39.4	12.0	1,885	855
112.6	1,560	70.0	1,300	45.5	UT	19.7	6.0	946	429
112.6	1,560	70.0	1,300	45.5	LT	19.7	6.0	939	426
257.4	2,760	160.0	2,300	61	T(2)	44.4	13.6	2,132	967
128.7	1,380	80.0	1,150	61	UT	22.2	6.8	1,069	485
128.7	1,380	80.0	1,150	61	LT	22.2	6.8	1,063	482
289.6	2,760	180.0	2,300	65	T(2)	47.0	14.4	2,255	1,023
144.8	1,380	90.0	1,150	65	UT	23.5	7.2	1,131	513
144.8	1,380	90.0	1,150	65	LT	23.5	7.2	1,124	510



461 SERIES STANDARD INDUCTION MOTORS

60 Hz		50 Hz		Amperage	Type (Nº of sections)	Le	ngth	Weight	
Power	Voltage	Power	Voltage						
hp	V	kW	V	A		ft	m	lb	kg
321.8	3,000	200.0	2,500	66.5	T(2)	52.0	15.8	2,502	1,135
160.9	1,500	100.0	1,250	66.5	UT	26.0	7.9	1,254	569
160.9	1,500	100.0	1,250	66.5	LT	26.0	7.9	1,248	566
354.0	3,240	220.0	2,700	68	T(2)	54.4	16.6	2,626	1,191
177.0	1,620	110.0	1,350	68	UT	27.2	8.3	1,316	597
177.0	1,620	110.0	1,350	68	LT	27.2	8.3	1,310	594
402.4	3,360	250.0	2,800	75	T(2)	56.8	17.3	2,615	1,186
201.2	1,680	125.0	1,400	75	UT	28.9	8.8	1,303	591
201.2	1,680	125.0	1,400	75	LT	27.9	8.5	1,312	595
482.7	3,600	300.0	3,000	85	T(3)	74.8	22.8	3,609	1,637
160.9	1,200	100.0	1,000	85	UT	24.9	7.6	1,195	542
160.9	1,200	100.0	1,000	85	CT	24.6	7.5	1,195	542
160.9	1,200	100.0	1,000	85	LT	25.3	7.7	1,219	553
579.3	4,428	360.0	3,690	87	T(3)	82.7	25.2	3,943	1,789
193.1	1,476	120.0	1,230	87	UT	27.6	8.4	1,318	598
193.1	1,476	120.0	1,230	87	CT	27.2	8.3	1,318	598
193.1	1,476	120.0	1,230	87	LT	27.9	8.5	1,307	593

TECHNICAL DATA

Housing outer diameter	4.61 in.	117 mm
Maximum internal temperature	392°F	200°C
Involute spline type	1.1 in.	28 mm

461 SERIES HIGH-VOLTAGE INDUCTION MOTORS

CONTROL RANGE: 2,100-4,200 RPM

60 Hz		50 Hz		Amperage	Type (Nº of sections)	Le	ngth	We	ight
Power	Voltage	Power	Voltage						
hp	V	kW	V	A		ft	m	lb	kg
25.7	2,220	16.0	1,850	7.2	S	8.2	2.5	368	167
32.2	2,760	20.0	2,300	7.5	S	9.1	2.8	465	211
35.4	3,120	22.0	2,600	7	S	10.7	3.3	465	211
38.6	3,240	24.0	2,700	7.5	S	10.3	3.2	474	215
45.1	2,280	28.0	1,900	12	S	11.9	3.6	553	251
51.5	2,652	32.0	2,210	12	S	13.2	4.0	626	284
57.9	2,724	36.0	2,270	13.5	S	14.1	4.3	672	305
64.4	2,460	40.0	2,050	16.5	S	15.6	4.8	752	341
72.4	2,700	45.0	2,250	16.5	S	16.9	5.2	811	368
80.5	3,000	50.0	2,500	17	S	18.1	5.5	820	372
90.1	3,276	56.0	2,730	17	S	19.4	5.9	902	409
101.4	3,240	63.0	2,700	19.5	S	21.9	6.7	1025	465
112.6	3,240	70.0	2,700	21.5	S	23.1	7.1	1089	494
128.7	3,276	80.0	2,730	25	S	24.4	7.4	1153	523
144.8	3,588	90.0	2,990	25	S	25.6	7.8	1206	547
160.9	3,192	100.0	2,660	31.5	S	26.9	8.2	1270	576
177.0	3,324	110.0	2,770	34	S	26.9	8.2	1270	576
201.2	3,900	125.0	3,250	31.5	S	27.8	8.5	1338	607
225.2	4,080	140.0	3,400	34	T(2)	39.0	11.9	1,937	876
112.6	2,040	70.0	1,700	34	UT	19.7	6.0	974	442
112.6	2,040	70.0	1,700	34	LT	19.3	5.9	957	434

*S-Single, T-Tandem motor, UT-Upper Tandem, CT-Central Tandem, LT-Lower Tandem

TECHNICAL DATA

Housing outer diameter	4.61 in.	117 mm
Maximum internal temperature	392°F	200°C
Involute spline type	1.1 in.	28 mm



512 SERIES STANDARD INDUCTION MOTORS

CONTROL RANGE: 2,100-4,200 RPM

60 Hz		50 Hz		Amperage	Type (Nº of sections)	Length		Weight	
Power	Voltage	Power	Voltage			ft	m	lb	kg
hp	V	kW	V	A					
35.4	960	22.0	800	23	S	6.6	2.0	357	162
51.5	1,440	32.0	1,200	22	S	8.2	2.5	421	191
64.4	1,560	40.0	1,300	26	S	8.2	2.5	421	191
120.7	1,800	75.0	1,500	40	S	13.1	4.0	833	378
144.8	1,920	90.0	1,600	46	S	14.7	4.5	814	369
201.2	2,160	125.0	1,800	56	S	21.2	6.5	1,369	621
241.4	3,240	150.0	2,700	45	S	24.4	7.4	1,409	639
257.4	2,640	160.0	2,200	62	T(2)	35.0	10.6	1,909	866
128.7	1,320	80.0	1,100	62	UT	17.5	5.3	970	440
128.7	1,320	80.0	1,100	62	LT	17.5	5.3	939	426
289.6	3,240	180.0	2,700	62	T(2)	38.4	11.6	2,325	1,055
144.8	1,620	90.0	1,350	62	UT	19.2	5.8	1,168	530
144.8	1,620	90.0	1,350	62	LT	19.2	5.8	1,157	525
321.8	2,640	200.0	2,200	76	T(2)	41.6	12.6	2,525	1,145
160.9	1,320	100.0	1,100	76	UT	20.8	6.3	1,268	575
160.9	1,320	100.0	1,100	76	LT	20.8	6.3	1,257	570
354.0	2,880	220.0	2,400	80	T(2)	41.6	12.6	2,525	1,145
177.0	1,440	110.0	1,200	80	UT	20.8	6.3	1,268	575
177.0	1,440	110.0	1,200	80	LT	20.8	6.3	1,257	570
370.2	3,000	230.0	2,500	73	T(2)	35.0	10.6	2,085	946
185.1	1,500	115.0	1,250	73	UT	17.5	5.3	1,058	480
185.1	1,500	115.0	1,250	73	LT	17.5	5.3	1,027	466
402.4	3,360	250.0	2,800	72	T(2)	38.2	11.6	2,262	1,026
201.2	1,680	125.0	1,400	72	UT	19.1	5.8	1,146	520
201.2	1,680	125.0	1,400	72	LT	19.1	5.8	1,116	506
482.8	3,600	300.0	3,000	85.7	T(2)	51.4	15.6	3,119	1,415
241.4	1,800	150.0	1,500	85.7	UT	25.7	7.8	1,565	710
241.4	1,800	150.0	1,500	85.7	LT	25.7	7.8	1,554	705
515.0	3,360	320.0	2,800	95	T(2)	48.2	14.8	2,888	1,310
257.5	1,680	160.0	1,400	95	UT	24.1	7.4	1,455	660
257.5	1,680	160.0	1,400	95	LT	24.1	7.4	1,433	650
579.4	3,600	360.0	3,000	99	T(2)	51.4	15.6	3,064	1,390
289.7	1,800	180.0	1,500	99	UT	25.7	7.8	1,543	700
289.7	1,800	180.0	1,500	99	LT	25.7	7.8	1,521	690
740.1	3,840	460.0	3,200	115	T(3)	72.0	21.9	4,258	1,931
246.7	1,280	153.3	1,066.7	115	UT	24.0	7.3	1,462	663
246.7	1,280	153.3	1,066.7	115	CT	24.0	7.3	1,453	659
246.7	1,280	153.3	1,066.7	115	LT	24.0	7.3	1,343	609

60 Hz		50 Hz		Amperage	Type (Nº of sections)	Le	ngth	Weight	
Power	Voltage	Power	Voltage						
hp	V	kW	V	A		ft	m	lb	kg
804.6	4,320	500.0	3,600	120	T(3)	76.7	23.3	4,532	2,056
268.2	1,440	166.7	1,200	120	UT	25.3	7.7	1,554	705
268.2	1,440	166.7	1,200	120	CT	25.7	7.8	1,543	700
268.2	1,440	166.7	1,200	120	LT	25.7	7.8	1,435	651
885.0	5,400	550.0	4,500	100	T(3)	76.5	23.3	4,273	1,938
295.0	1,800	183.3	1,500	100	UT	25.3	7.7	1,473	668
295.0	1,800	183.3	1,500	100	CT	25.3	7.7	1,433	650
295.0	1,800	183.3	1,500	100	LT	25.9	7.9	1,367	620

*S-Single, T-Tandem motor, UT-Upper Tandem, CT-Central Tandem, LT-Lower Tandem.

TECHNICAL DATA

Housing outer diameter	5.12 in.	130 mm
Maximum internal temperature	392°F	200°C
Involute spline type	1.49 in.	38 mm

709 SERIES STANDARD INDUCTION MOTORS

CONTROL RANGE: 2,100-4,200 RPM

60 Hz		50 Hz		Amperage	Type (Nº of sections)	Le	ngth	Weight	
Power	Voltage	Power	Voltage						
hp	V	kW	V	A		ft	m	lb	kg
201.2	2,760	125.0	2,300	41	S	11.8	3.6	1,433	650
402.4	2,760	250.0	2,300	80	S	20.0	6.1	2,403	1,090
804.6	3,000	500.0	2,500	145	T(2)	41.0	12.5	4,762	2,160
402.3	1,500	250.0	1,100	145	UT	20.7	6.3	2,403	1,090
402.3	1,500	250.0	1,100	145	LT	20.3	6.2	2,359	1,070
1,142.0	3,840	700.0	3,200	171	T(2)	44.6	13.6	5,180	2,350
571.0	1,920	350.0	1,350	145	UT	22.3	6.8	2,600	1,180
571.0	1,920	350.0	1,350	171	LT	22.3	6.8	2,580	1,170

*S-Single, T-Tandem motor, UT-Upper Tandem, CT-Central Tandem, LT-Lower Tandem.

TECHNICAL DATA

Housing outer diameter	7.09 in.	180 mm
Maximum internal temperature	392°F	200°C
Involute spline type	1.89 in.	48 mm

PERMANENT MAGNET MOTORS

Submersible PMM motors are used as an energy-efficient drive of centrifugal pumps for pumping formation fluid from oil, water and geothermal wells.

Symba produces high-speed PM motors, Series 319, with a power range of 43 to 170 hp (at 6,000 rpm) having a speed control range of 4,000 - 6,000 rpm.

Series 319 motors are used for Series 319 high-speed electric submersible pumps.

APPLICATION

- Exploratory wells;
- Wells with sidetracks;
- Wells that under workover with a production string having a reduced internal diameter;
- Highly crooked and horizontal wells;
- Traditional wells.

FEATURES AND BENEFITS:

- High energy efficiency, no electric losses in a rotor, low values of no-load currents and operating currents;
- Reduce power consumption;
- A significant dependence of operating current on motor load;
- Makes it possible to accurately measure the load on the drive and optimize its operation mode;
- Low dependence of torque on rotational speed;
- Allows using the PMM in wells with harsh conditions, a high temperature of formation fluid and in wells with unstable inflow;
- Low motor heating;
- Increases service life, allowing the motor to work in conditions with a significant overload;
- High torque overload capacity and motor speed control;
- Ensure quick ESP rump up;
- Minimum weight and dimensions;
- Make it possible to apply the electric centrifugal pumps in highly deviated.

The PMM is a synchronous four-pole oil-filled three-phase motor whose rotor packs are made of permanent magnets.

PMM with permanent magnets do not consume power for energy transfer to the rotor and have no corresponding losses typical for induction electric motors. Therefore, the efficiency of PMMs is higher than the efficiency of induction motors, while the values of operating currents and no-load currents are lower.

The high efficiency and low values of PMMs operating currents, combined with the ability to control the rotational speed, reduce energy consumption by 10-35% during ESP operation.

Under equal operating conditions, an ESP with the PMM has a higher MTBF than an ESP with an induction motor due to lower motor overheating, the possibility to control its speed and soft start-up modes.

Using special purpose electrical engineering materials makes it possible to operate the motors in wells with formation fluid temperatures up to 338°F (170°C) in the high temperature design, and up to 248°F (120°C) in the standard version.



EXAMPLE

PMM-A 319-80-6 2910V 18.5A S CR1 T1

PMM-	A	461-	72.4	3600	1764V	21A	S	CR1	T1
1	2	3	4	5	6	7	8	9	10
1	PMM – Permanent magnet motor								
2	Alnas design								
3	Motor series								
4	Motor power, hp								
5	Motor nameplate nominal frequency: Blank – at 3600 RPM 6 – at 6000 RPM								
6	Voltage, V								
7	Current, A								
8	S – single								
9	Corrosion resistance design: CR0 – carbon steel head, base and housing, carbon steel fasteners CR1 – stainless steel head and base, carbon steel housing with anti-corrosion coating (super stainless flame coating), monel fasteners CR2 – stainless steel head, base and housing, monel fasteners								
10	Ambient temperature rating T – for 248°F (120°C) T1 – for 302°F (150°C) T2 – for 338°F (170°C)								

319 SERIES PERMANENT MAGNET MOTORS

CONTROL RANGE: 4,000-6,000 RPM

6,000 RPM			Amperage	Type (Nº of sections)	Length			Weight	
Power		Voltage							
hp	kW	V	A		ft		m	lb	kg
43.5	32	1,200	23	S	12.4		3.8	366	166
54.4	40	1,350	23	S	13.6		4.1	401	182
67.0	50	1,700	23	S	17.7		5.4	467	212
85.6	63	2,200	23	S	25.6		7.8	569	258
122.4	90	2,950	21	S	27.5		8.4	736	334
170.0	125	2,550	34	S	36.4		11.0	864	392

*S-Single

TECHNICAL DATA

Housing outer diameter	3.19 in.	81 mm
Maximum internal temperature	392°F	200°C
Involute spline type	0.79 in.	20 mm



461 SERIES PERMANENT MAGNET MOTORS

CONTROL RANGE: 2,100-4,200 RPM

3,600 RPM		3,000 RPM		Amperage	Type (Nº of sections)	Length		Weight	
Power	Voltage	Power	Voltage						
hp	V	kW	V	A		ft	m	lb	kg
38.6	924	24	770	21.5	S	6.4	1.9	295	134
45.1	1,146	28	955	20	S	7.2	2.2	335	152
51.5	1,236	32	1,030	21	S	7.4	2.3	348	158
64.4	1,584	40	1,320	21	S	8.6	2.6	403	183
72.4	1,764	45	1,470	21	S	9.3	2.8	434	197
80.5	2,076	50	1,730	20	S	10.3	3.1	485	220
90.1	2,292	56	1,910	20	S	11.0	3.3	516	234
101.4	2,556	63	2,130	20	S	11.9	3.6	560	254
112.6	2,814	70	2,345	20.5	S	12.8	3.9	604	274
128.7	3,174	80	2,645	20.5	S	14.0	4.3	659	299
144.8	3,432	90	2,860	21.5	S	14.9	4.5	703	319
160.9	3,666	100	3,055	22	S	15.8	4.8	739	335
177.0	4,014	110	3,345	22.5	S	16.9	5.1	787	357
201.2	3,534	125	2,945	29	S	18.3	5.6	866	393
225.2	3,876	140	3,230	29	S	20.0	6.1	946	429
289.6	3,240	180	2,700	45.9	S	22.3	6.8	1,047	475
321.8	3,000	200	2,500	56.2	S	24.0	7.3	1,080	490
402.4	3,720	250	3,100	57	S	26.9	8.2	1,213	550

*S-Single

TECHNICAL DATA

Housing outer diameter	4.16 in.	117 mm
Maximum internal temperature	392°F	200°C
Involute spline type	1.1 in.	28 mm

AUXILIARY EQUIPMENT

BOLT-ON DISCHARGE HEAD

The BODH is attached to the head of the pump section and is designed to connect the ESP to the tubing.

EXAMPLE

BODH-A 362 2.875 8RD EUE SS

BODH-	A	362	2.875	8RD EUE	SS
1	2	3	4	5	6
1	Bolt-on discharge head				
2	Alnas design				
3	For pump series				
4	For tubing size				
5	Thread type 10RD NUE – 10 threads per inch, non-ups 8RD EUE – 8 threads per inch, external u				
6	BODH metallurgy material CS – carbon steel SS – stainless steel				

BOLT-ON DISCHARGE HEAD BLEEDER VALVE

Pump Series	Thread	Housing diameter		Length		Weight	
		In.	mm	ft	m	lb	kg
BODH-A 272	1.875 10RD NUE	2.72	69	0.39	0.120	5.1	2.3
BODH-A 319	BODH integrated in UT pump section						
BODH-A 338	2.375 10RD NUE	3.39	86	0.77	0.235	14.3	6.5
BODH-A 362	2.375 8RD EUE	3.62	92	0.48	0.146	9.7	4.4
	2.875 10RD NUE	3.62	92	0.48	0.146	8.8	4.0
	2.875 8RD EUE	3.62	92	0.48	0.146	8.2	3.7
BODH-A 406	2.375 8RD EUE	3.62	92	0.48	0.146	9.7	4.4
	2.875 10RD NUE	3.62	92	0.48	0.146	8.8	4.0
	2.875 8RD EUE	3.62	92	0.48	0.146	8.2	3.7
	3.500 10RD NUE	4.29	109	0.48	0.146	9.9	4.5
	3.500 8RD EUE	4.29	109	0.48	0.146	9.9	4.5
BODH-A 449	3.500 10RD NUE	4.49	114	0.85	0.258	29.1	13.2
	3.500 8RD EUE	4.49	114	0.85	0.258	29.1	13.2
BODH-A 535	3.500 10RD NUE	5.35	136	0.85	0.258	29.1	13.2
	3.500 8RD EUE	5.35	136	0.85	0.258	29.1	13.2
	4.500 10RD NUE	5.35	136	0.85	0.258	29.1	15.2
	4.500 8RD EUE	5.35	136	0.85	0.258	29.1	15.2

VALVES

EXAMPLE

CVB-A 3.500 8RD EUE SS

CVB-	A	3.500	8RD EUE	SS
1	2	3	4	5
1	Valve type BV – bleeder valve CVB – check valve ball type CVP – check valve plate type CVBS – check valve ball type spring-loaded			
2	Alnas design			
3	Tubing and thread size			
4	Thread type 10RD NUE – 10 threads per inch, non-upset end 8RD EUE – 8 threads per inch, external upset end			
5	Valve metallurgy material CS – carbon steel SS – stainless steel			

BLEEDER VALVE

The bleeder valve is designed to drain formation fluid from the tubing when lifting the ESP from the well. The valve is mounted above the sludge trap/check valve.



Pump Series	Recommended Operating Range		Housing diameter		Length		Weight	
	bpd @ 60 Hz	m3/d @ 50 Hz	in.	mm	ft	m	lb	kg
BV-A 1.875 10RD NUE	0 – 1,887	0 – 300	2.36	60	0.49	0.15	3.75	1.70
BV-A 2.375 10RD NUE	0 – 2,792	0 – 370	2.99	76	0.52	0.16	5.51	2.50
BV-A 2.875 10RD NUE	0 – 9,811	0 – 1,300	3.50	89	0.59	0.18	7.92	3.59
BV-A 2.875 8RD EUE	0 – 9,811	0 – 1,300	3.70	94	0.59	0.18	9.68	4.39
BV-A 3.500 10RD NUE	0 – 13,585	0 – 1,800	4.25	108	0.59	0.18	8.80	3.99
BV-A 3.500 8RD EUE	0 – 13,585	0 – 1,800	4.50	114.3	0.59	0.18	12.55	5.69

CHECK VALVE

The check valve is designed to prevent back spin of the pump under the influence of a fluid column in the tubing (when the pump is shut down) and to make easier the subsequent start-up of the pump. The valve is used for hydraulic testing of the tubing string integrity after the esp is run in hole. The check valve also protects the ESP upper section from a small amount of solids precipitating in the tubing string when the pump is shut down. In case of a significant amount of solids, it is recommended to complete the pump unit with a sludge trap. The valve is installed between the upper module section of the pump and the bleeder valve.



BALL TYPE, BALL TYPE SPRING LOADED

Pump Series	Recommended Operating Range		Housing diameter		Length		Weight	
	bpd @ 60 Hz	m3/d @ 50 Hz	in.	mm	ft	m	lb	kg
CVB-A 1.875 10RD NUE	0 – 1,887	0 – 300	2.68	68.00	0.49	0.15	5.51	2.50
CVB-A 2.375 10RD NUE	0 – 2,792	0 – 370	2.87	73.00	0.62	0.19	8.16	3.70
CVB-A 2.875 10RD NUE	0 – 9,811	0 – 1,300	3.50	89.00	0.66	0.20	11.91	5.40
CVB-A 2.875 8RD EUE	0 – 9,811	0 – 1,300	3.67	93.20	0.66	0.20	12.13	5.50
CVB-A 3.500 10RD NUE	0 – 9,811	0 – 1,300	4.25	108.00	0.66	0.20	17.64	8.00
CVB-A 3.500 10RD NUE	0 – 13,585	0 – 1,800	4.25	108.00	0.66	0.20	17.64	8.00
CVB-A 3.500 8RD EUE	0 – 13,585	0 – 1,800	4.50	114.30	0.66	0.20	17.86	8.10
CVBS-A 2.875 10RD NUE	0 – 9,811	0 – 1,300	3.50	89.00	0.72	0.22	14.33	6.50
CVBS-A 3.500 10RD NUE	0 – 9,811	0 – 1,300	4.25	108.00	0.75	0.23	19.85	9.00

PLATE TYPE

Pump Series	Recommended Operating Range		Housing diameter		Length		Weight	
	bpd @ 60 Hz	m3/d @ 50 Hz	in.	mm	ft	m	lb	kg
CVP-A 2.875 10RD NUE	0 – 6,038	0 – 800	3.50	89.00	1.09	0.33	10.80	4.90
CVP-A 2.875 8RD EUE	0 – 6,038	0 – 800	3.70	94.00	0.67	0.20	13.41	6.08



SHROUDS FOR A SUBMERSIBLE ELECTRIC MOTOR

Shroud is a cylinder fitted around the motor, protector and intake. It is designed to reduce the annular area between the ESP and the casing, which allows to increase the velocity of fluid by the motor.

APPLICATION

- ☒ Wells with a large inner diameter of the casing string;
- ☒ Wells operated below or in the casing perforation area;
- ☒ Wells with high temperature of formation fluid;
- ☒ Wells with low or unstable inflow.

The shroud consists of a hanger, pipe or pipes with threaded couplings installed between the pipes, and a tip. The shroud is equipped with a centralizer installed in the base of the electric motor during assembly to ensure uniform cooling of the motor during operation. At the bottom of the shroud, there is a tip with the 2 7/8" thread for attaching load (research instruments) weighing no more than 551 lbs (250 kg).

The shroud for Series 406 electric motor is mounted on a special ESP intake module using special threaded screws.

The shroud for Series 461 or 512 electric motor is attached to the base of the gas separator without intake holes or to the base of the Series 362, 406 or 449 ESP lower section, using a special hanger.

The length of the shroud is selected depending on the total length of the ESP components: protector, motor, downhole gauge, and centralizer. The useful length of the shroud shall be greater than the total length of the ESP components inside the shroud.

The length of the shroud is determined by the amount of the installed lengths of all shroud components.

SHROUDS

Pump Series	Motor series	Minimum casing ID		Recommended shroud				
				Shroud	Shroud OD		Shroud ID	
		in.	mm	kW	in.	mm	in.	mm
362	406	5.12	130	Shroud, A406 124	4.88	124	4.53	115
362, 406	461	5.83	148	Shroud, A461 140	5.51	140	4.96	126
406, 449	512	6.30	160	Shroud, A512 159	6.26	159	5.87	149

FEATURES OF SHROUD COMPONENTS

Shroud type	Shroud component	Useful length *		Installed length		Weight	
		ft	m	ft	m	lb	kg
Shroud, A406 124	Special purpose intake module	-	-	0.92	0.279	29	13.2
	shroud pipe	9.84	3.0	9.84	3.0	88	40
		13.12	4.0	13.12	4.0	117	53
		16.41	5.0	16.41	5.0	148	67
		19.69	6.0	19.69	6.0	176	80
		22.97	7.0	22.97	7.0	205	93
	threaded sleeve	0.23	0.07	0.23	0.07	9	4.0
	tip	-	-	0.54	0.164	16	7.4
Shroud, A461 140	hanger: 362 series pump 406 series pump	-	-	0.36	0.110	21 20	9.3 9.2
	shroud pipe	13.12	4.0	13.12	4.0	185	83.8
		16.41	5.0	16.41	5.0	222	100.5
		19.69	6.0	19.69	6.0	259	117.5
		22.97	7.0	22.97	7.0	295	134.0
	threaded sleeve	0.23	0.07	0.23	0.07	3	1.3
	tip	-	-	0.44	0.135	20	9
Shroud, A512 159	hanger: 406 series pump 449 series pump	-	-	0.38 0.38	0.115 0.115	31 24	13.9 11.1
	shroud pipe	13.12	4.0	13.12	4.0	166	75.2
		16.41	5.0	16.41	5.0	208	94.2
		19.69	6.0	19.69	6.0	250	113.2
		22.97	7.0	22.97	7.0	292	132.2
	threaded sleeve	0.26	0.08	0.26	0.08	12	5.5
	tip	-	-	0.58	0.177	24	10.9



SLUDGE TRAP

The sludge trap is designed to protect ESP from the solids in the tubing string when the pump is shut down. The sludge trap is installed above the check valve (under the bleeder valve).

EXAMPLE

ST-A 3.500 8RD EUE 6M SS

ST-	A	3.500	8RD EUE	6M	SS
1	2	3	4	5	6
1	Sludge trap				
2	Alnas design				
3	For tubing size				
4	Thread type 10RD NUE – 10 threads per inch, non-upset end 8RD EUE – 8 threads per inch, external upset end				
5	Length, m (from 1 up to 13 m)				
6	SC metallurgy material CS – carbon steel SS – stainless steel				

SLUDGE TRAPS

Pump Series	Recommended Operating Range		Housing diameter		Le	ngth	We	ight
	bpd @ 60 Hz	m3/d @ 50 Hz	in.	mm	ft	m	lb	kg
ST-A 1.875 10RD NUE	0 – 1,887	0 – 300	2.4	60	19.8	6.035	41	18.5
ST-A 2.375 10RD NUE	0 – 2,792	0 – 370	3.0	76	5.1	1.549	15	6.75
ST-A 2.875 10RD NUE	0 – 6,038	0 – 800	3.5	89	16.5	5.042	49	22.19
ST-A 2.875 8RD EUE	0 – 6,038	0 – 800	3.6	92	2.7	0.831	13	6.0
ST-A 3.500 10RD NUE	0 – 13,585	0 – 1,800	4.3	108	5.1	1.550	18	8.2
ST-A 3.500 8RD EUE	0 – 13,585	0 – 1,800	4.5	114.3	5.1	1.540	18	8.2

The length of the ST is defined by request.

VARIABLE SPEED DRIVE (VSD)

The VSD-A is designed to control and protect a submersible induction or PM motor of an electric submersible pump with a voltage of up to 5000 V and up to 70°C.

BENEFITS

- ☒ **Control** - a large graphic LCD and keyboard on the VSD controller can be used to receive information or configure the VSD.
- ☒ **Servicing** - the modular design of the VSD makes it possible to service and repair the VSD at the place of operation.
- ☒ **Downhole monitoring equipment and electricity metering** - supports DME and electricity meters of various manufacturers.
- ☒ **Easy-to-read data** - remote control and monitoring systems, including GPRS and Ethernet; manual reading of the VSD operation archive using a standard USB flash drive.
- ☒ **Upgrading** - the possibility of upgrading and expanding the scope of functional parameters by reprogramming the VSD controller in the field.



The elements energized when the cabinet door is open are covered with safety insulating shields. The VSD features an alarm activating when the power compartment door opens.

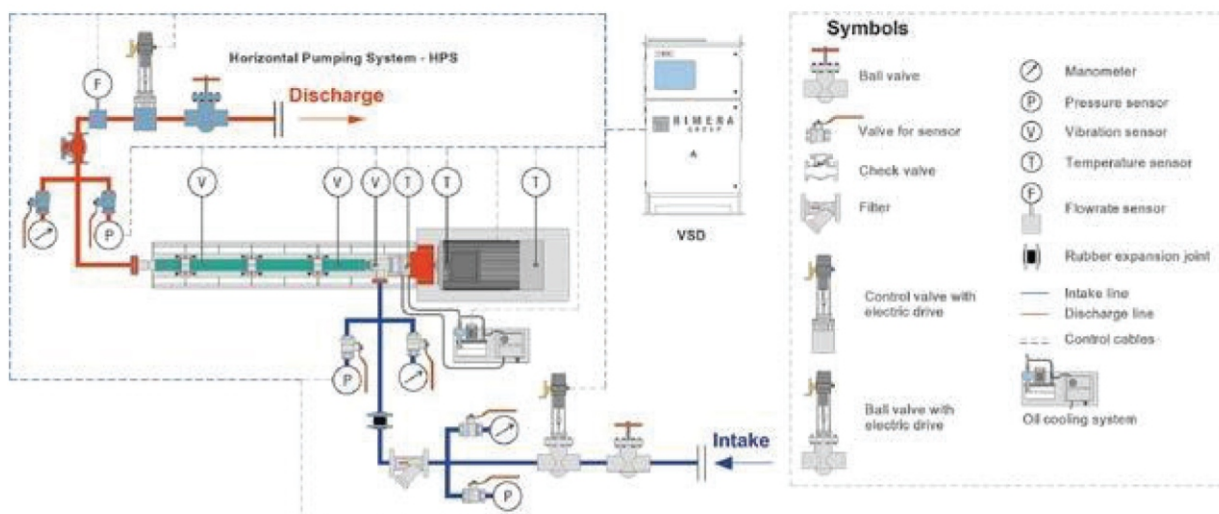
More information on request.

HORIZONTAL PUMPING SYSTEM

Horizontal Pumping System are commonly used to pump surface fluids through a pipeline. They can be used as single or in tandem to increase pressure and flow of fluid from one location to another.

BENEFITS

- ☒ Low suction pressure – work with pressure 2 psi at intake
- ☒ High temperature – work with temperature of fluid up to 300 °F (150 °C)
- ☒ Automation – fully automated and remote system control (pump frequency, control operation flowrate, etc.)
- ☒ Modular design – quickly replace components while upgrade or conducting corrective maintenance
- ☒ Flexibility – easily upgrade the system without changing the design
- ☒ Durability – reduce vibration and wear with high skid rigidity



More information on request.

POWER CABLE AND MOTOR LEAD EXTENTION

The cable line is designed to supply voltage to the ESP submersible motor. Power cable and MLE share materials with highly reliable insulation and armor. They can be supplied in various versions, sizes and made from various materials, from insulation to armor. The basic configuration of the main components covers a very wide range of applications and can be used in various downhole conditions.



Parameter	Description
Conductor size, #AWG	1, 2, 3, 4, 5, 6
Profile	Flat, round
Voltage, kV	3, 4, 5
Temperature rating, °C (°F)	Up to 232 (450)
Insulation	EPDM (ethylene propylene diene methylene) Polypropylene copolymer Polyethylene PEEK
Barrier	Lead Polyimide braid
Jacket	EPDM Oil-resistant nitrile rubber compound Polypropylene copolymer
Aarmor	Galvanized Stainless steel Monel

The design of the submersible cable and MLE vary significantly depending on the downhole conditions. For harsh downhole conditions, cable lines with individually selected components are provided.

WELLHEAD PENETRATORS

Rimera can always supply ESP related wellhead feedthrough systems to the Oil and Gas industry including electrical feedthru connectors, wellhead penetrators and feedthru systems, wellhead surface connectors. Rimera provides a wide range of products manufactured by different industry recognized companies.

MAIN FUNCTIONS OF FEEDTHRU SYSTEMS:

- Safety barrier for operation in explosive environment;
- Durable connection between surface and downhole cables;
- Sealing of surface cable in a wellhead;
- Withstand a broad spectrum of downhole conditions including high temperature, H₂S and CO₂;
- Isolation of liquid and gas at wellhead.

Parameter	Value
Type	Vertical, Side-entry, split-phase
Voltage rating	Up to 8 kVAC
Current rating	Up to 250 A
Rated temperature	Up to 260°C (500°F)
Working pressure	Up to 5000 psi
Assembly type	Factory, wellsite
Cable profile	Flat, round

STEP-UP TRANSFORMERS



Step-up transformer (SUT) converts VSD/FSD low voltage to high voltage required for submersible ESP motor. SUT has a wide range of output voltages to meet nominal voltage of motor with maximum accuracy so the motor can operate with maximum efficiency. Ambient temperature up to 60°C.

More information on request.

EQUIPMENT FOR REMOTE MONITORING OF WELLS

This equipment is designed for remote data collection and control of intelligent devices: control stations for electric submersible pumps, electricity meters, etc. The MSU.16 saves the data collected from the devices and stores it in non-volatile memory. The data storage depth is determined during parameterisation.

Equipment for remote monitoring of wells	
Type of equipment	Main parameters
Controller	Link: GSM\GPRS; Protocols: HTTP, HTTPS, telnet, ssh, modbus rtu, modbus tcp, ntp, udp, tcp; Error control and correction: CRC, Hamming codes; Power consumption, not more than: 15 Wt
Router	Frequency bands: 850/900/1800/1900/2100/2600 MHz; Communication standard: LTE, HSUPA, HSDPA, EDGE, GPRS, GSM, SMS; Supply voltage from 8 to 30 V
Antenna	Narrow-beam antenna GSM 900-1800 MHz

SOFTWARE FOR REMOTE MONITORING OF WELLS

Remote control software for Electric Submersible Pump (ESP) systems provides an efficient solution for remotely monitoring and controlling ESP equipment. With this software, operators can conveniently manage ESP operations, optimize performance, and troubleshoot issues from a centralized location. By enabling remote control capabilities, the software enhances efficiency, minimizes downtime, and improves the overall productivity of ESP systems. This software also provides an intuitive interface for tracking, controlling, and storing important operating characteristics of ESP systems.



