

RELIABLE, CONFIGURABLE PRE-ENGINEERED DOWNHOLE MOTORS

Moog DH Series motors help reduce non-productive time (NPT) service costs



PRE-ENGINEERED DOWNHOLE BRUSHLESS SERVO MOTORS

Reduce your new downhole tool development time, shorten time to market and increase productivity

Pre-engineered DH Series Motors allow each customer to develop their highly reliable tooling to stand up to high pressures (2,410 bar/35,000 PSI) and high temperatures (220° C/ 425° F). Shock and vibration resistant. Available with optional HPHT stator encapsulation which provides increased motor operating life in downhole applications which are known to have significant contamination.

Six pre-engineered motor sizes save you time and engineering costs while providing the flexibility to optimize for your application

The Moog modular downhole motor design reduces engineering time and eliminates the associated costs while still providing a configurable product optimized for your application. Each of the six motor sizes is available in multiple stack lengths with windings configured for your input power and output requirements.

Motor Size	10	16	19	20	23	28
Outside Diameter mm (in)	26 (1.02)	42 (1.65)	49 (1.93)	52 (2.05)	60 (2.36)	73 (2.88)
Continuous Output Power Watts	up to 200	up to 1,620	up to 3,550	up to 4,330	up to 5,180	up to 10,400

Use our Pre-engineered Downhole Motors

- Pre-engineered brushless motors capable of operating in severe duty HPHT downhole service tool environments including temperature, shock, vibration, pressure, fluid filled environments, and more
- Proven downhole brushless motor technologies with Moog downhole application knowledge, experience and support
- Faster return on investment (ROI) on your projects with proven and tested designs



Build your own pre-engineered downhole brushless servo motor:



www.moogoilandgas.com/motors

Follow a quick and simple self-guided web tool and configure your pre-engineered downhole motor.

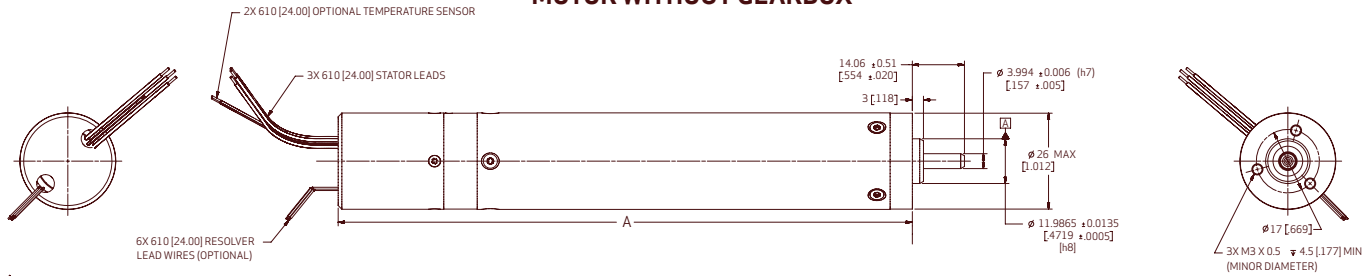
- Continuous Output Torque
- BUS Voltage
- Max. Ambient Operating Temperature
- Feedback Options
- Temperature Sensor Options

SIZE 10

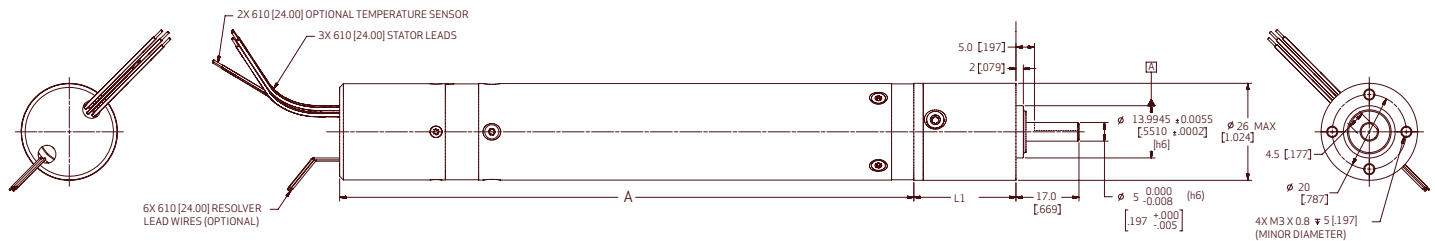
Outside Diameter: 26 mm (1.02 in)

Continuous Output Power: up to 200 watts

MOTOR WITHOUT GEARBOX



MOTOR WITH GEARBOX



mm (in)

PDF drawings and performance curves of each motor configuration can also be downloaded from www.moogoilandgas.com/motors

MOTOR STACK LENGTH DIMENSIONS IN RELATION TO MOTOR PERFORMANCE OPTIONS		
STACK LENGTH	A WITHOUT RESOLVER	A WITH RESOLVER
1	73.6 (2.898)	105.6 (4.157)
2	99 (3.898)	131 (5.157)
3	124.4 (4.898)	156.4 (6.157)

GEARBOX WITH DIMENSIONS AND PERFORMANCE DATA			
STAGE	L1	CONTINUOUS RATED TORQUE (NM)	GEAR RATIO
1	28 (1.102)	0.6	3.5, 4.330
2	36 (1.417)	2	12.25, 18.78, 26, 33.22
3	44 (1.732)	3	81.37, 112.67, 143.97, 199.33

RESOLVER ELECTRICAL DATA ELECTRICAL DATA - 25°C @ 3400 HZ	
INPUT VOLTAGE (NOMINAL)	4.0 VOLTS RMS
MAX. INPUT CURRENT	15 mA RMS
NOMINAL INPUT POWER	0.06 WATTS
IMPEDANCE Z _{so}	196 +j265
IMPEDANCE Z _{ro}	225 +j324
IMPEDANCE Z _{rs}	216 +j167
OUTPUT VOLTAGE	2.0 ±5% VOLTS RMS
DC ROTOR RESISTANCE	66.3 OHMS ±10%
DC STATOR RESISTANCE	86.2 OHMS ±10%
SENSITIVITY	35 ±10% MV/DEG
MAX. ERROR FROM E.Z.	±20.0 MINUTES
PHASE SHIFT (OPEN CIRCUIT)	23° ±5°
NULL VOLTAGE (MAX) RMS	15 MILLIVOLTS
TRANSFORMATION RATIO	.50 ±5%

Notes:

Operating Environment: Motor fully immersed in synthetic lubrication oil at 20,000 PSI (1,379 Bar) pressure and up to ambient temperature of 175°C (347°F).

All components inside the motor are designed to withstand the 220°C (428°F) maximum winding temperature.

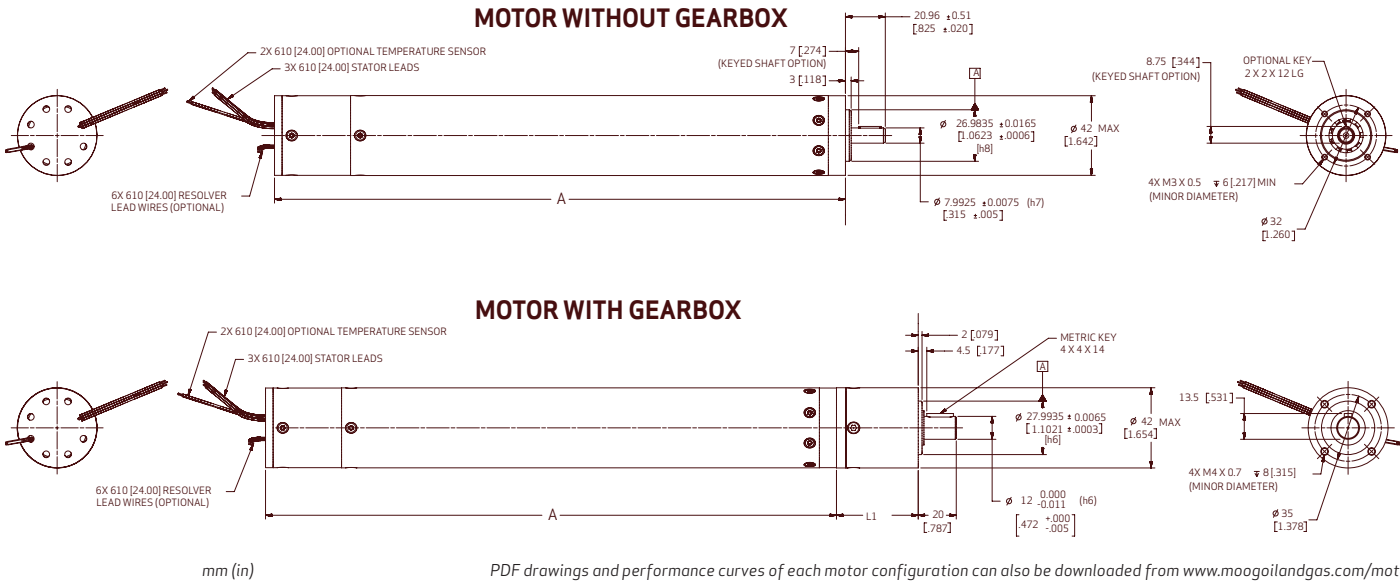
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SIZE 16

Outside Diameter: 42 mm (1.65 in)

Continuous Output Power: up to 1,620 watts



PDF drawings and performance curves of each motor configuration can also be downloaded from www.moogoilandgas.com/motors

MOTOR STACK LENGTH DIMENSIONS IN RELATION TO MOTOR PERFORMANCE OPTIONS		
STACK LENGTH	A WITHOUT RESOLVER	A WITH RESOLVER
1	85.5 (3.366)	121 (4.764)
2	110.9 (4.366)	146.4 (5.764)
3	136.3 (5.366)	171.8 (6.764)
4	161.7 (6.366)	197.2 (7.764)
5	187.1 (7.366)	222.6 (8.764)
6	212.5 (8.366)	248 (9.764)
7	237.9 (9.366)	273.4 (10.764)
8	263.3 (10.366)	298.8 (11.764)

RESOLVER ELECTRICAL DATA ELECTRICAL DATA - 25°C @ 3400 HZ	
INPUT VOLTAGE (NOMINAL)	4.0 VOLTS RMS
MAX. INPUT CURRENT	18.8 mA RMS
NOMINAL INPUT POWER	0.046 WATTS
IMPEDANCE Z _{so}	283 +j399
IMPEDANCE Z _{ro}	129 +j169
IMPEDANCE Z _{rs}	123 +j146
OUTPUT VOLTAGE	2.0 ±5% VOLTS RMS
DC ROTOR RESISTANCE	67 OHMS ±10%
DC STATOR RESISTANCE	159 OHMS ±10%
SENSITIVITY	35 ±10% MV/DEG
MAX. ERROR FROM E.Z.	±20.0 MINUTES
PHASE SHIFT (OPEN CIRCUIT)	125° ±3° MAX
NULL VOLTAGE (MAX) RMS	15 MILLIVOLTS
TRANSFORMATION RATIO	.50 ±5%

GEARBOX WITH DIMENSIONS AND PERFORMANCE DATA			
STAGE	L1	CONTINUOUS RATED TORQUE (NM)	GEAR RATIO
1	43 (1.692)	1.4	3.5, 4, 5
2	55.5 (2.185)	8	12, 25, 14, 16, 20, 24, 25, 30, 67, 38.33
3	68 (2.677)	15	49, 56, 64, 70, 80, 100, 120, 144, 184, 235, 111, 293.89

Notes:
Operating Environment: Motor fully immersed in synthetic lubrication oil at 20,000 PSI (1,379 Bar) pressure and up to ambient temperature of 175°C (347°F).
All components inside the motor are designed to withstand the 220° C (428° F) maximum winding temperature.

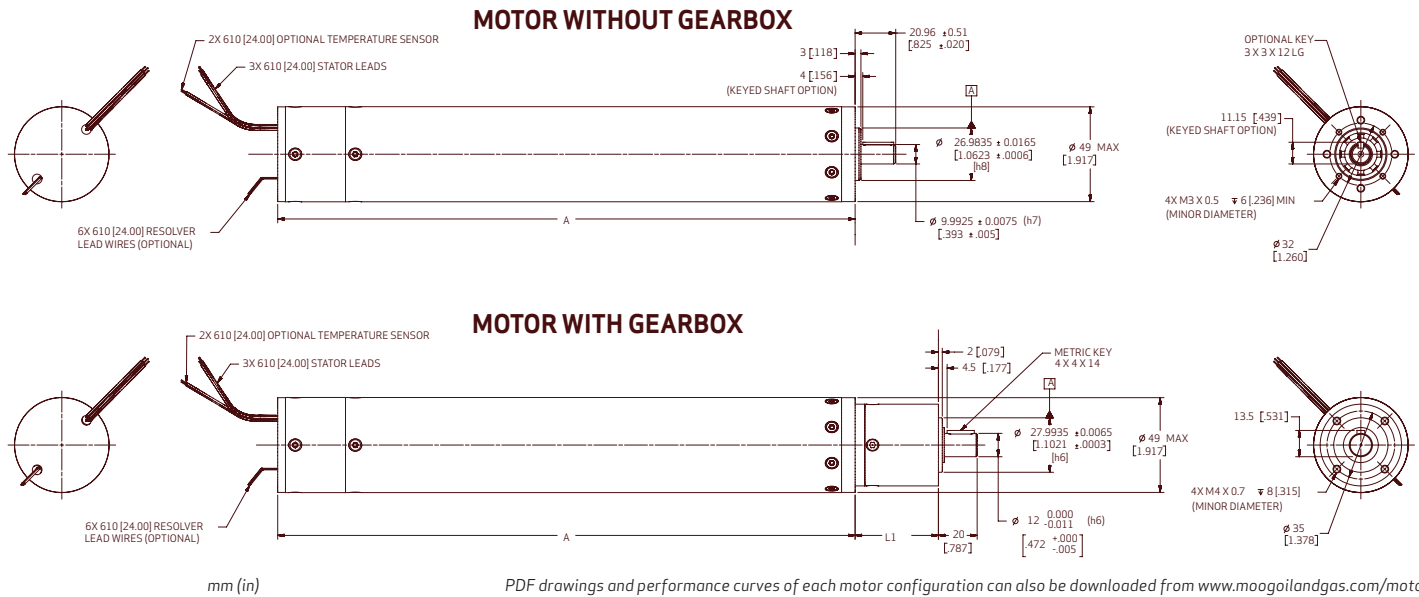
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Size 19

Outside Diameter: 49 mm (1.93 in)

Continuous Output Power: up to 3,550 watts



MOTOR STACK LENGTH DIMENSIONS IN RELATION TO MOTOR PERFORMANCE OPTIONS		
STACK LENGTH	A WITHOUT RESOLVER	A WITH RESOLVER
1	89.3 (3.515)	120.3 (4.736)
2	114.7 (4.515)	145.7 (5.736)
3	140.1 (5.515)	171.1 (6.736)
4	165.5 (6.515)	196.5 (7.736)
5	190.9 (7.515)	221.9 (8.736)
6	216.3 (8.515)	247.3 (9.736)
7	241.7 (9.515)	272.7 (10.736)
8	267.1 (10.515)	298.1 (11.736)

RESOLVER ELECTRICAL DATA ELECTRICAL DATA - 25°C @ 3400 HZ	
INPUT VOLTAGE (NOMINAL)	4.0 VOLTS RMS
MAX. INPUT CURRENT	18.8 mA RMS
NOMINAL INPUT POWER	0.046 WATTS
IMPEDANCE Z _{so}	283 +j399
IMPEDANCE Z _{ro}	129 +j169
IMPEDANCE Z _{rs}	123 +j146
OUTPUT VOLTAGE	2.0 ±5% VOLTS RMS
DC ROTOR RESISTANCE	67 OHMS ±10%
DC STATOR RESISTANCE	159 OHMS ±10%
SENSITIVITY	35 ±10% MV/DEG
MAX. ERROR FROM E.Z.	±20.0 MINUTES
PHASE SHIFT (OPEN CIRCUIT)	125° ±3° MAX
NULL VOLTAGE (MAX) RMS	15 MILLIVOLTS
TRANSFORMATION RATIO	.50 ±5%

GEARBOX WITH DIMENSIONS AND PERFORMANCE DATA			
STAGE	L1	CONTINUOUS RATED TORQUE (NM)	GEAR RATIO
1	43 (1.692)	1.4	3.5, 4, 5
2	55.5 (2.185)	8	12.25, 14, 16, 20, 24, 25, 30, 67, 38.33
3	68 (2.677)	15	49, 56, 64, 70, 80, 100, 120, 144, 184, 235, 11, 293.89

Notes:

Operating Environment: Motor fully immersed in synthetic lubrication oil at 20,000 PSI (1,379 Bar) pressure and up to ambient temperature of 175°C (347°F).

All components inside the motor are designed to withstand the 220° C (428° F) maximum winding temperature.

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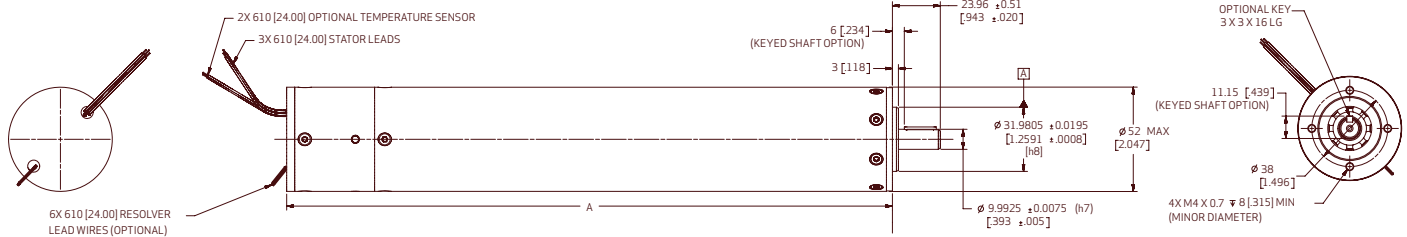
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Size 20

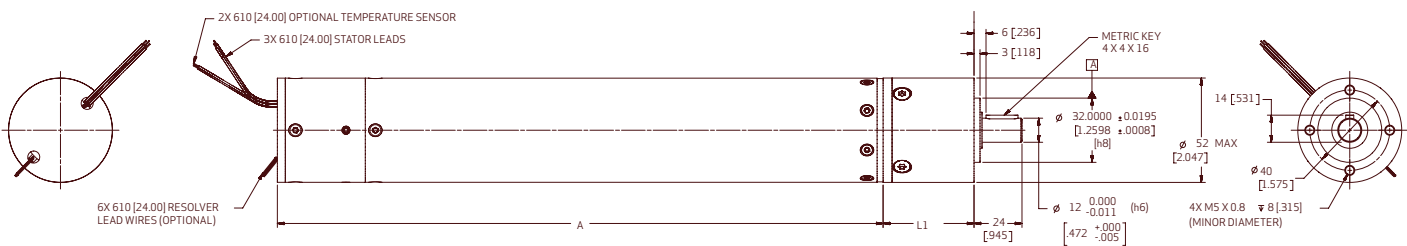
Outside Diameter: 53 mm (2.05 in)

Continuous Output Power: up to 4,330 watts

MOTOR WITHOUT GEARBOX



MOTOR WITH GEARBOX



mm (in)

PDF drawings and performance curves of each motor configuration can also be downloaded from www.moogoilandgas.com/motors

MOTOR STACK LENGTH DIMENSIONS IN RELATION TO MOTOR PERFORMANCE OPTIONS		
STACK LENGTH	A WITHOUT RESOLVER	A WITH RESOLVER
1	85.3 (3.358)	125.3 (4.933)
2	110.7 (4.358)	150.7 (5.933)
3	136.1 (5.358)	176.1 (6.933)
4	161.5 (6.358)	201.5 (7.933)
5	186.9 (7.358)	226.9 (8.933)
6	212.3 (8.358)	252.3 (9.933)
7	237.7 (9.358)	277.7 (10.933)
8	263.1 (10.358)	303.1 (11.933)

RESOLVER ELECTRICAL DATA ELECTRICAL DATA - 25°C @ 3400 HZ	
INPUT VOLTAGE (NOMINAL)	4.0 VOLTS RMS
MAX. INPUT CURRENT	75 mA RMS
NOMINAL INPUT POWER	0.013 WATTS
IMPEDANCE Z _{so}	283 +j34 OHMS
IMPEDANCE Z _{ro}	128 +j160 OHMS
IMPEDANCE Z _{rs}	25 +j134 OHMS
OUTPUT VOLTAGE	2.0 ±5% VOLTS RMS
DC ROTOR RESISTANCE	5.6 OHMS ±10%
DC STATOR RESISTANCE	10.8 OHMS ±10%
SENSITIVITY	35 ±10% MV/DEG
MAX. ERROR FROM E.Z.	±20.0 MINUTES
PHASE SHIFT (OPEN CIRCUIT)	5° ±3° MAX NOM. DEGREES
NULL VOLTAGE (MAX) RMS	15 MILLIVOLTS
TRANSFORMATION RATIO	.50 ±5%

GEARBOX WITH DIMENSIONS AND PERFORMANCE DATA			
STAGE	L1	CONTINUOUS RATED TORQUE (NM)	GEAR RATIO
1	45.5 (1.791)	3	4,4,5,5,2
2	60 (2.362)	15	12,08,16,18,20,8,25, 29,32,36,41,6
3	74.5 (2.933)	30	64,72,81,100,130,144, 175,78,200,225,256,288,332,8

Notes:

Operating Environment: Motor fully immersed in synthetic lubrication oil at 20,000 PSI (1,379 Bar) pressure and up to ambient temperature of 175°C (347°F).

All components inside the motor are designed to withstand the 220° C (428° F) maximum winding temperature.

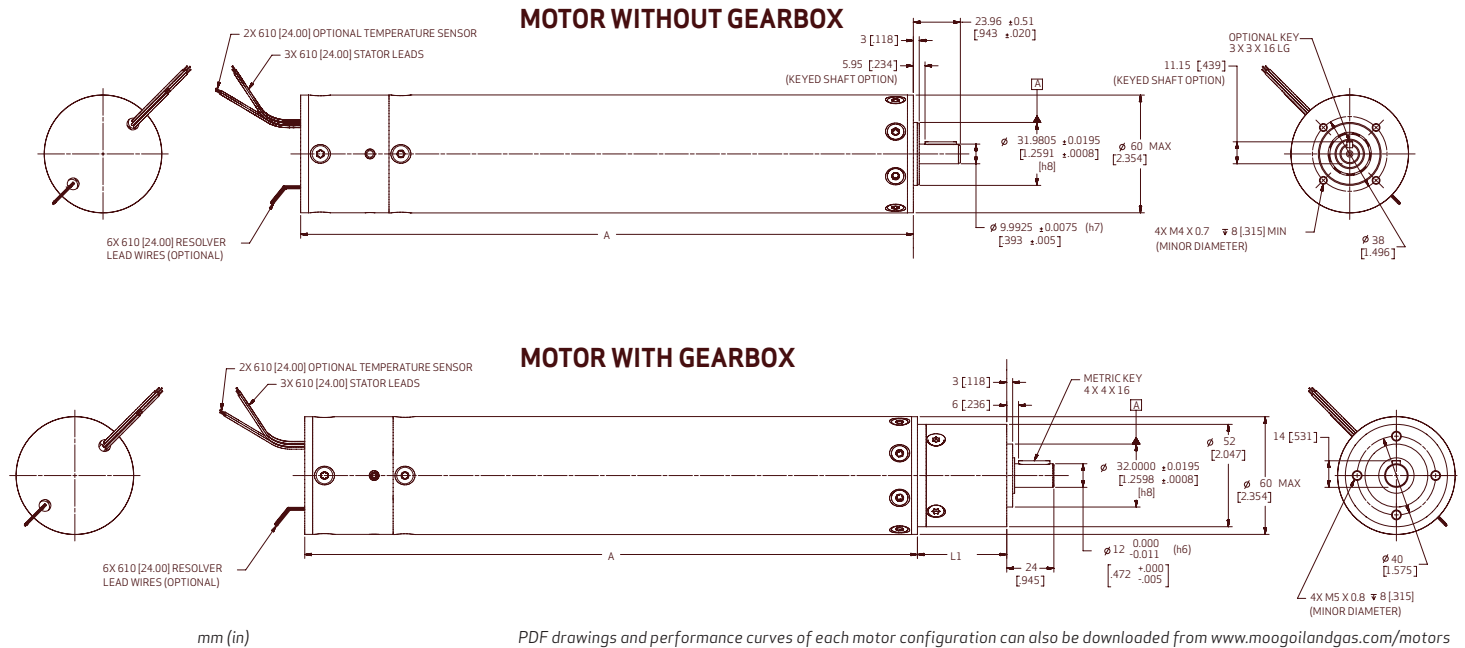
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Size 23

Outside Diameter: 60 mm (2.36 in)

Continuous Output Power: up to 5,180 watts



MOTOR STACK LENGTH DIMENSIONS IN RELATION TO MOTOR PERFORMANCE OPTIONS		
STACK LENGTH	A WITHOUT RESOLVER	A WITH RESOLVER
1	93.3 (3.673)	134.3 (5.287)
2	118.7 (4.673)	159.7 (6.287)
3	144.1 (5.673)	185.1 (7.287)
4	169.5 (6.673)	210.5 (8.287)
5	194.9 (7.673)	235.9 (9.287)
6	220.3 (8.673)	261.3 (10.287)
7	245.7 (9.673)	286.7 (11.287)
8	271.1 (10.673)	312.1 (12.287)
9	296.5 (11.673)	337.5 (13.287)
10	321.9 (12.673)	362.9 (14.287)

RESOLVER ELECTRICAL DATA ELECTRICAL DATA - 25°C @ 3400 HZ	
INPUT VOLTAGE (NOMINAL)	4.0 VOLTS RMS
MAX. INPUT CURRENT	75 mA RMS
NOMINAL INPUT POWER	0.013 WATTS
IMPEDANCE Z _{so}	23 +j34 OHMS
IMPEDANCE Z _{ro}	28 +j160 OHMS
IMPEDANCE Z _{rs}	25 +j134 OHMS
OUTPUT VOLTAGE	2.0 ±5% VOLTS RMS
DC ROTOR RESISTANCE	5.6 OHMS ±10%
DC STATOR RESISTANCE	10.8 OHMS ±10%
SENSITIVITY	35 ±10% MV/DEG
MAX. ERROR FROM E.Z.	±20.0 MINUTES
PHASE SHIFT (OPEN CIRCUIT)	5° ±3° MAX NOM. DEGREES
NULL VOLTAGE (MAX) RMS	15 MILLIVOLTS
TRANSFORMATION RATIO	.50 ±5%

GEARBOX WITH DIMENSIONS AND PERFORMANCE DATA			
STAGE	L1	CONTINUOUS RATED TORQUE (NM)	GEAR RATIO
1	45.5 (1.791)	3	4.4,5,5.2
2	60 (2.362)	15	12.08, 16, 18, 20.8, 25, 29, 32, 36, 41.6
3	74.5 (2.933)	30	64, 72, 81, 100, 130, 144, 175, 78, 200, 225, 256, 288, 332.8

Notes:

Operating Environment: Motor fully immersed in synthetic lubrication oil at 20,000 PSI (1,379 Bar) pressure and up to ambient temperature of 175°C (347°F).

All components inside the motor are designed to withstand the 220° C (428° F) maximum winding temperature.

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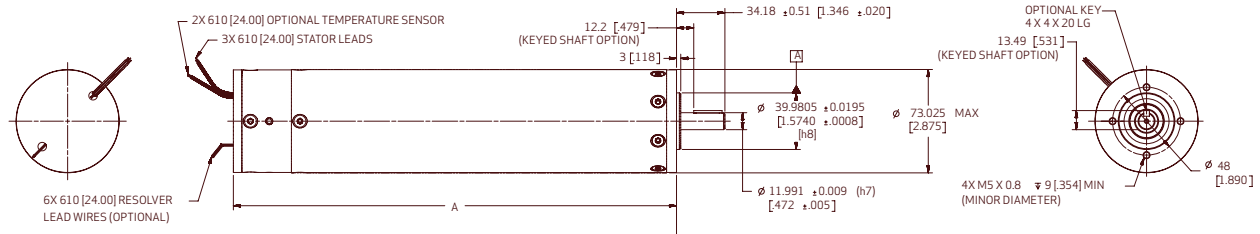
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Size 28

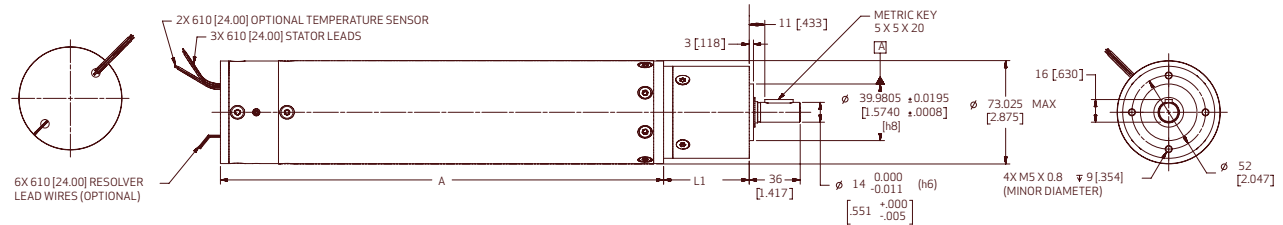
Outside Diameter: 73 mm (2.88 in)

Continuous Output Power: up to 10,400 watts

MOTOR WITHOUT GEARBOX



MOTOR WITH GEARBOX



mm (in)

PDF drawings and performance curves of each motor configuration can also be downloaded from www.moogoilandgas.com/motors

MOTOR STACK LENGTH DIMENSIONS IN RELATION TO MOTOR PERFORMANCE OPTIONS		
STACK LENGTH	A WITHOUT RESOLVER	A WITH RESOLVER
1	100.2 (3.944)	135.2 (5.322)
2	125.6 (4.944)	160.6 (6.322)
3	151 (5.944)	186 (7.322)
4	176.4 (6.944)	211.4 (8.322)
5	201.8 (7.944)	236.8 (9.322)
6	227.2 (8.944)	262.2 (10.322)
7	252.6 (9.944)	287.6 (11.322)
8	278 (10.944)	313 (12.322)
9	303.4 (11.944)	338.4 (13.322)
10	328.8 (12.944)	363.8 (14.322)

RESOLVER ELECTRICAL DATA ELECTRICAL DATA - 25°C @ 3400 HZ	
INPUT VOLTAGE (NOMINAL)	4.0 VOLTS RMS
MAX. INPUT CURRENT	75 mA RMS
NOMINAL INPUT POWER	0.013 WATTS
IMPEDANCE Z _{so}	23 +j34 OHMS
IMPEDANCE Z _{ro}	28 +j60 OHMS
IMPEDANCE Z _{rs}	25 +j34 OHMS
OUTPUT VOLTAGE	2.0 ±5% VOLTS RMS
DC ROTOR RESISTANCE	5.6 OHMS ±10%
DC STATOR RESISTANCE	10.8 OHMS ±10%
SENSITIVITY	35 ±10% MV/DEG
MAX. ERROR FROM E.Z.	±20.0 MINUTES
PHASE SHIFT (OPEN CIRCUIT)	5° ±3° MAX NOM. DEGREES
NULL VOLTAGE (MAX) RMS	15 MILLIVOLTS
TRANSFORMATION RATIO	.50 ±5%

GEARBOX WITH DIMENSIONS AND PERFORMANCE DATA			
STAGE	L1	CONTINUOUS RATED TORQUE (NM)	GEAR RATIO
1	60 (2.362)	6	3, 5, 4, 5
2	78 (3.070)	30	12, 25, 14, 16, 20, 24, 25, 30, 30.67, 38.33
3	96 (3.779)	38	49, 56, 64, 70, 80, 100, 120, 144, 184, 235.11, 293.89

Notes:

Operating Environment: Motor fully immersed in synthetic lubrication oil at 20,000 PSI (1,379 Bar) pressure and up to ambient temperature of 175°C (347°F).

All components inside the motor are designed to withstand the 220°C (428°F) maximum winding temperature.

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BUILD THE PRE-ENGINEERED DOWNHOLE BRUSHLESS SERVO MOTOR THAT WILL FIT YOUR APPLICATION

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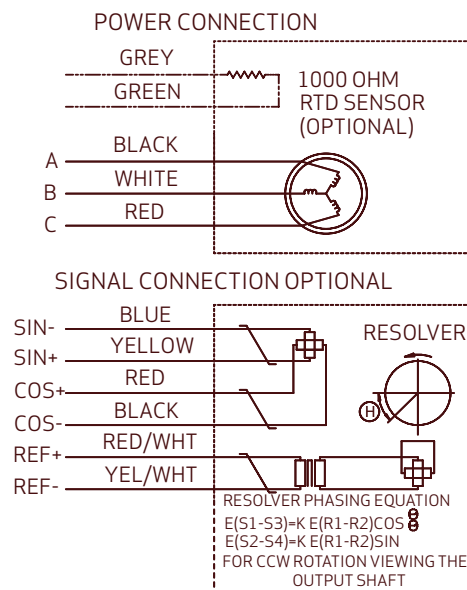


Brushless Servo Motors

OPTIONS

- Pre-engineered motors are based on a standard BUS voltage of 325 Vrms; other options available
- Feedback options:
 - Sensorless
 - 2-Pole Resolver
- Temperature Sensor options:
 - RTD 1000 Ω
 - None
- Encapsulation available to increase motor robustness in highly contaminated downhole tool environments
- Key downhole environmental capabilities include temperature, shock, vibration, pressure, fluid filled environments, stainless steel construction

WIRING DIAGRAM



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Pre-Engineered Downhole Brushless Servo Motors
TJW/Rev. - May 2016, Id. CDL47820-en

This technical data is based on current available information and is subject to change at any time by Moog. Specifications for specific systems or applications may vary.

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