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**HOUSTON OILFIELD EQUIPMENT, INC.**  
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(281) 200-1400 • 1-800-882-3737

Operational & Maintenance Manual HH2 5M/10M CWP  
with Biffi Actuator ICON 3000 Electric

Your HH2 adjustable choke assembly 5M /10M CWP with 2” max orifice flanged end uses a needle & seat principle to provide fully adjustable flow. The assembly uses a pressure balanced stem which greatly reduces the amount of torque required to open and close the choke. Chokes, by design are not to be used as shut-off valves but rather to regulate the flow.

When assembled to the Biffi Icon electric actuator it allows the user to operate the choke assembly in a remote fashion.

The Biffi Icon 3000 electric multi-turn actuator is a “smart actuator” with its six selective languages and many other features make it both reliable and operator friendly.

### Installation

Install your choke so that the flow enters the inlet side of the body making a 90 degree turn and then exits through the outlet end.

The choke may be mounted in any orientation without affecting its performance as long as the flow enters the inlet and exits thru the outlet. The actuator, once installed, may be rotated and oriented in any position that is desired by the operator.

### Maintenance

Inspect your choke and actuator regularly for excessive wear and to ensure that all hardware is tight. Parts normally replaced at service

intervals are seat, lower stem, upper & lower stem packing, and bonnet O-ring.

## Disassembly of Adjustable Choke

Note: Please refer to bonnet assembly drawings 6529BNT - 6464BNT and general assembly drawing 5M & 10M CWP for numerical designation and identification of parts.

1. With choke in open position bleed all pressure from the system and body. Next loosen the ½" NPT hex plug on body and remove **only** when there is no pressure present in the choke body.

2. Loosen stem nut (14) so there is no contact with indicator bracket (12) Engage manual use of handwheel on actuator and turn in open (counterclockwise) direction until upper stem (11) disengages from lower stem (2). Next, remove yoke retainer nut (15) and separate choke assembly with bonnet and hammer nut from yoke (18).

3. Loosen bonnet hammer nut and verify that pressure is not present in the choke body. Once this is confirmed remove bonnet hammer nut and bonnet (1) from body. The lower stem (2) may now be removed from bonnet by grasping the tapered end w/ carbide tip and gently pulling it from pressure end of the bonnet (1). Inspect the threads, shaft & carbide tip for wear and replace as necessary.

**Caution: If an excessive amount of pressure escapes between the bonnet and the bonnet nut, stop disassembly procedure and ensure that the system pressure is off the choke.**

4. Lower packing seal (7) may now be removed by removing lower retainer ring (5) and lower junk ring (6).

To remove upper packing seal (8) first remove retaining ring (10) Then unscrew packing retainer nut (4) next remove B/U ring and upper packing seal (8) Your bonnet assembly is now disassembled and ready for inspection.

5. Remove indicator bracket (12) and indicator drum (17) from upper stem by loosening the set screw (19). Next inspect upper stem (11).

Note: Upper stem may now be removed from the actuator by simply unscrewing it from the drive nut extension (24). To remove turn in a clockwise rotation since the threads are left hand. You can now fully inspect the stem threads and replace if necessary.

## Assembly of Adjustable Choke

Prior to assembly lubricate all threads with a suitable anti-seize compound and ID of bonnet and packing glands with a light grease.

1. First install lower packing seal (7) in bonnet (1) and insert lower junk ring (6) on top of packing and install packing retainer ring (5). Then Install upper packing seal (8) and back-up ring. Lubricate packing retainer nut (4) and thread into top of bonnet. Follow up with installation of packing retainer ring (10). Install wiper (9) in packing retainer nut (4) with lips pointed outward.

Note: Retainer nut (4) must be properly tightened to allow retainer ring (10) to snap into groove.

2. Lubricate lower stem (2) and introduce into bonnet (1) from pressure end. Push in until it stops and gently rotate clockwise to thread into the upper packing and thru the wiper (9). Slowly move stem back and forth to ensure ease of movement. (Note –Take care not to pull stem completely out of bonnet as re-assembly must then be repeated.)

Install O-ring (3) to bonnet next. Ensure that both are lubricated & O-ring is properly seated in the groove.

3. Install choke seat in body and tighten 75-100 Ft Lbs. With stem pushed upwards to its maximum open position (towards top of bonnet) place the bonnet assembly onto choke body. (Exercise caution when lowering bonnet assembly to avoid damage to stem or seat.) Next install hammer union nut and tighten. Note: Choke assembly w/o actuator may now be pressure tested.

## Assembly of Actuator to Pressure Tested Choke Assembly

1. Using a compass wrench remove the solid construction drive coupling nut and brass drive coupling from the Biffi actuator and replace with HOE part 6255 extension nut (24). Pay special attention

to the assembly arrangement of thrust washers, thrust bearings, and quad ring of Biffi drive coupling and assemble them onto the part 6255SP extension nut in same order. Tighten the drive coupling nut with a compass wrench.

\*Note -- Refer to Biffi Icon 3000 instruction and operating manual for an illustration of this if necessary.

2. Using four M10 socket head caps crews w/ lock washers to attach the yoke (18) to actuator and tighten. Lubricate the upper stem threads and thread into the extension nut 6255 (24) confirming a fluid movement. Note again that the threads on upper stem are left hand direction.

3. Actuator with yoke and upper stem installed are now ready to attach to the tested choke body w/ bonnet assembly. Next support actuator securely in work area with open end of yoke (24) facing upwards. \*\* Note that lever for manual override must move freely and not support the weight of actuator assembly during or after assembly to body so be careful in not allowing weight of assembly to rest on the manual override lever.

Install drum wiper (16) onto indicator drum (17) with lips pointing outward. Slide indicator drum (17) onto upper stem with set screw hole closest toward actuator. Using the handwheel, back the stem up by turning the handwheel in a counter clockwise direction until it stops.

4. Thread the 9/16" stem nut (14) onto the threaded portion of lower stem (2) with small diameter of nut facing toward the actuator. With actuator secured slowly introduce top of lower stem (2) thru and into the opening in yoke (18). Assemble the two 1/4"-20 hex bolts and washers onto the SS indicator bracket (12). Loosely assemble the indicator bracket (12) and yoke retainer nut (15) onto the upper and lower stems. Install hammer nut over bonnet assembly and slide choke body toward actuator assembly until threads on upper and lower stem meet. Then rotate upper stem (11) in order to engage the threads. Continue to engage threads until there are 2-3 threads visible. It is necessary at this point that you line up the slot in indicator bracket (12) with machined raised bars on upper stem (11). Next fit the raised bars into the slot in indicator bracket. Then tighten stem nut (14) until flush with indicator bracket (12).

5. You are now ready to manually calibrate the assembly. Assemble the indicator tab (13) onto indicator bracket (12) with open end of tab pointed toward the actuator. Close choke by engaging handwheel and turning clockwise until you feel stem lightly contact the seat. Line up the slot on indicator tab with zero (0) marking on indicator and tighten set screw on indicator. Check calibration by opening choke to the increment marking of 128 on the indicator. (Note increment markings are in 64ths) Your assembly is now **manually** calibrated and ready for function testing with the actuator mounted to the choke assembly.

**Note:** Before function testing and calibration of the choke with actuator move the lower stem off the seat so that it is not making contact. Failure to do so may result in damage to the stem and or seat. This is done by turning handwheel on actuator counterclockwise in order to eliminate the “dead band” movement until you notice the stem suddenly engage and begin to move. Next, we recommend further opening the handwheel an additional 1/2-3/4 turns before setting the close limit on the actuator. Once completed, you may now set the open limit to any setting of your choice by using the increment marking on the indicator.



## **IX. DISCLAIMER**

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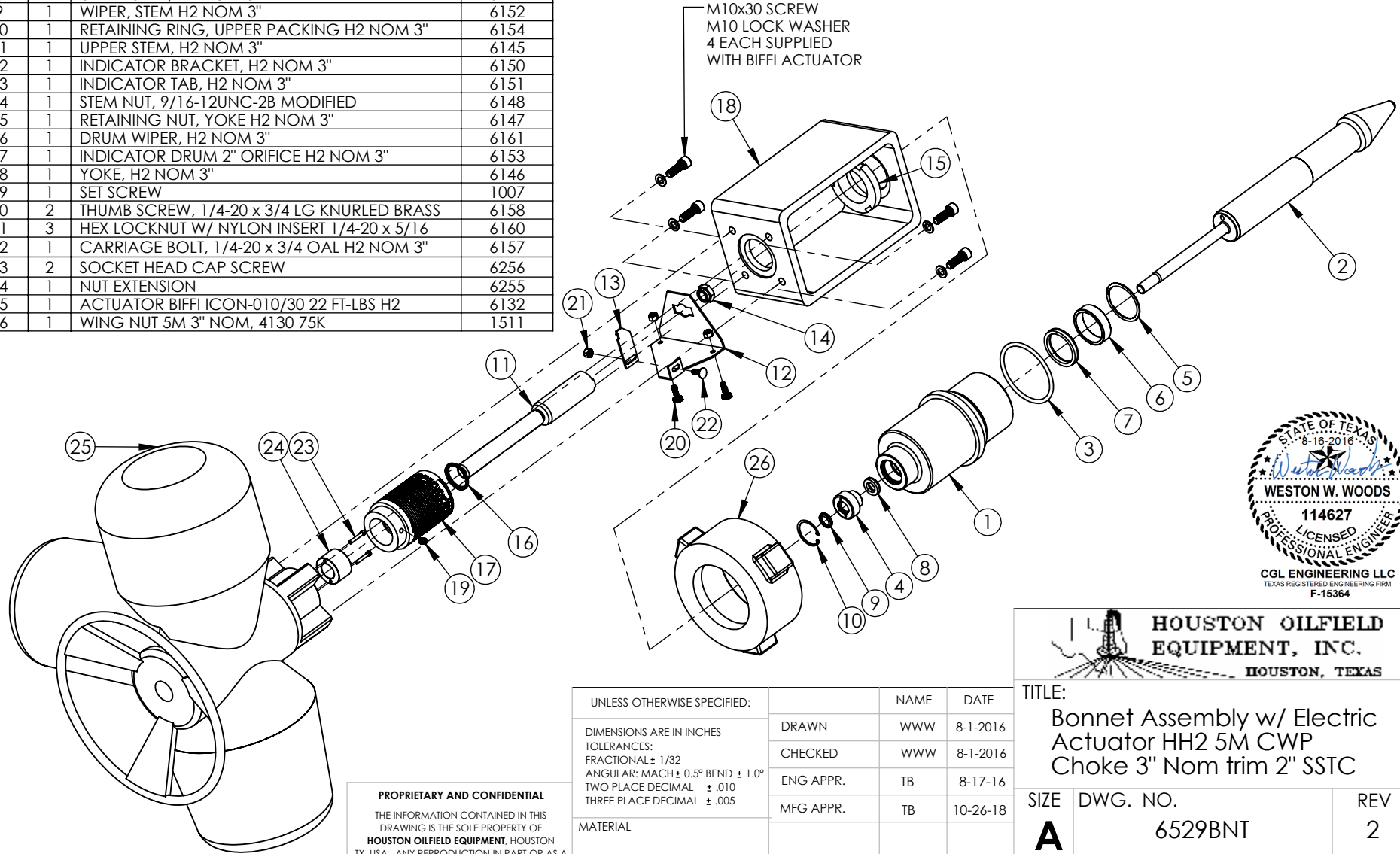
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PARTS LIST			
ITEM	QTY	PART NAME/DESCRIPTION	PART NO
1	1	BONNET, H2 NOM 3"	6140
2	1	STEM, LOWER 2" SSTC NOM 3"	6232
3	1	O-RING, BONNET H2 NOM 3"	1528
4	1	TOP RETAINING NUT, 1-1/2-12UN-2A	6149
5	1	LOWER RETAINING RING, INTERNAL	6135
6	1	JUNK RING	6134
7	1	LOWER SEAL, XSDA40-187-1.875-312T1025S	6133
8	1	UPPER SEAL, H2 NOM 3"	6141
9	1	WIPER, STEM H2 NOM 3"	6152
10	1	RETAINING RING, UPPER PACKING H2 NOM 3"	6154
11	1	UPPER STEM, H2 NOM 3"	6145
12	1	INDICATOR BRACKET, H2 NOM 3"	6150
13	1	INDICATOR TAB, H2 NOM 3"	6151
14	1	STEM NUT, 9/16-12UNC-2B MODIFIED	6148
15	1	RETAINING NUT, YOKE H2 NOM 3"	6147
16	1	DRUM WIPER, H2 NOM 3"	6161
17	1	INDICATOR DRUM 2" ORIFICE H2 NOM 3"	6153
18	1	YOKE, H2 NOM 3"	6146
19	1	SET SCREW	1007
20	2	THUMB SCREW, 1/4-20 x 3/4 LG KNURLED BRASS	6158
21	3	HEX LOCKNUT W/ NYLON INSERT 1/4-20 x 5/16	6160
22	1	CARRIAGE BOLT, 1/4-20 x 3/4 OAL H2 NOM 3"	6157
23	2	SOCKET HEAD CAP SCREW	6256
24	1	NUT EXTENSION	6255
25	1	ACTUATOR BIFFI ICON-010/30 22 FT-LBS H2	6132
26	1	WING NUT 5M 3" NOM, 4130 75K	1511

REVISIONS					
REV	ECN NO.	DESCRIPTION	CREATED BY	APPR BY	DATE
2		ADDED ITEM 26. ADJ EXP VIEW	WWW	TB	5-10-22

B

B



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A

**HOUSTON OILFIELD EQUIPMENT, INC.**  
HOUSTON, TEXAS

TITLE:  
Bonnet Assembly w/ Electric Actuator HH2 5M CWP  
Choke 3" Nom trim 2" SSTC

SIZE	DWG. NO.	REV
<b>A</b>	6529BNT	2

JOB 671      WEIGHT:

UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES	DRAWN	WWW 8-1-2016
TOLERANCES:	CHECKED	WWW 8-1-2016
FRACTIONAL ± 1/32	ENG APPR.	TB 8-17-16
ANGULAR: MACH ± 0.5° BEND ± 1.0°	MFG APPR.	TB 10-26-18
TWO PLACE DECIMAL ± .010		
THREE PLACE DECIMAL ± .005		
MATERIAL		
DO NOT SCALE DRAWING	SHEET 1 OF 2	

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2

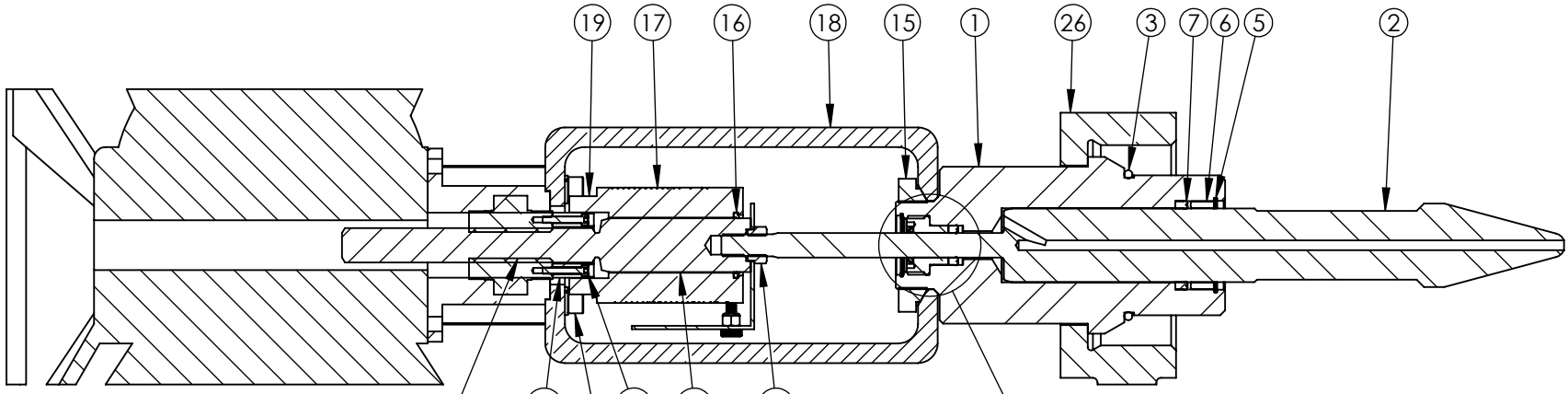
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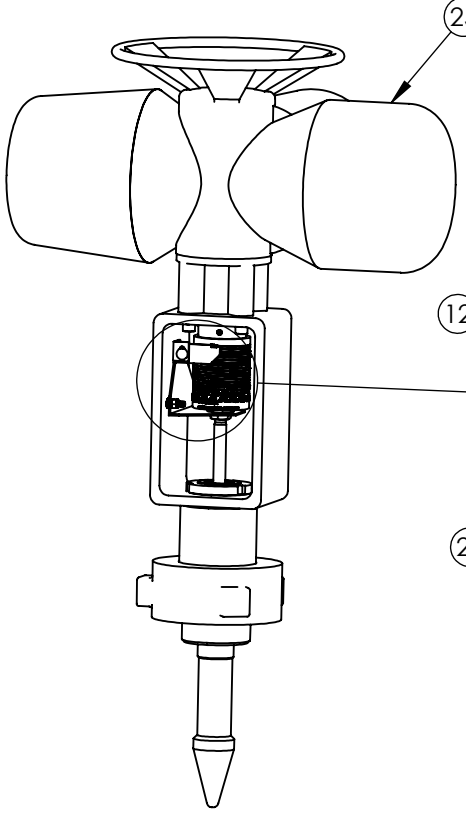
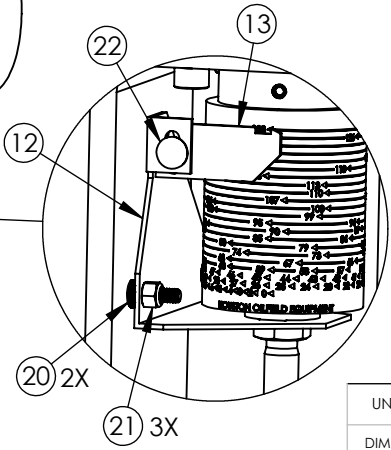
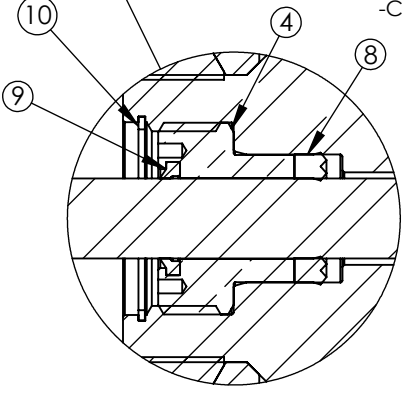
REVISIONS					
REV	ECN NO.	DESCRIPTION	CREATED BY	APPR BY	DATE
2		ADDED ITEM 26. ADJ EXP VIEW	WWW	TB	5-10-22



OVERALL DIMENSIONS BONNET ASSY W/ACTUATOR

-OPEN POSITION - 36.50"  
-CLOSED POSITION - 33.50"

APPLY GREASE TO THREAD  
-M10x30 SCREW  
-M10 LOCK WASHER  
-4 EACH SUPPLIED WITH BIFFI ACTUATOR



TITLE:  
Bonnet Assembly w/ Electric Actuator HH2 5M CWP  
Choke 3" Nom trim 2" SSTC

SIZE	DWG. NO.	REV
<b>A</b>	6529BNT	2

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THREE PLACE DECIMAL ± .005		
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DO NOT SCALE DRAWING

JOB 671 WEIGHT:

SHEET 2 OF 2

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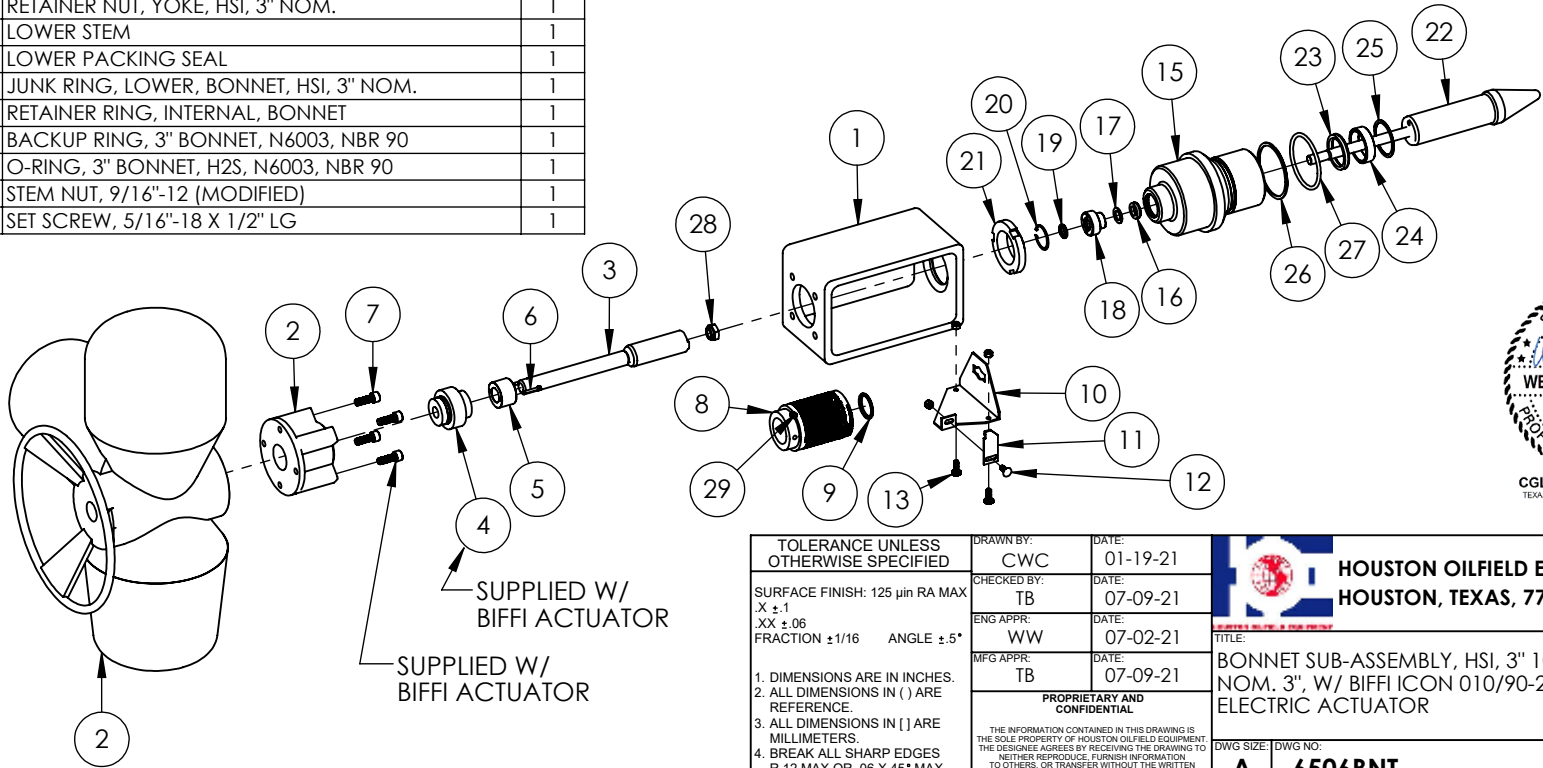
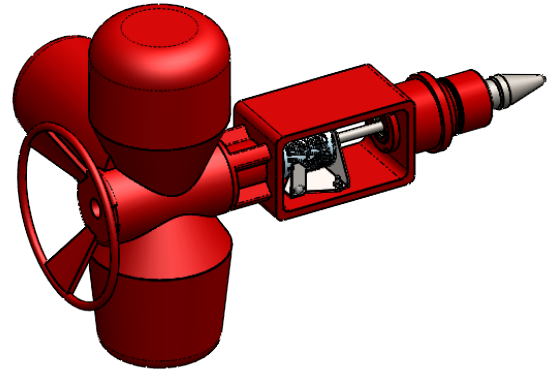
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1

PARTS LIST			
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	6146	YOKE, HSI, 3" NOM.	1
2	6486	BIFFI ICON 010/90-22 ELECTRIC ACTUATOR	1
3	6507	UPPER STEM	1
4	*	DRIVE NUT	1
5	6255	EXTENSION NUT	1
6	6256	SHCS, NO. 8 X 1" LG	2
7	*	SHCS, M10 X 30 LG & LOCK WASHER, M10 (SUPPLIED W/ BIFFI ACTUATOR)	4 EA
8	6153	INDICATOR DRUM, 2" ORIFICE	1
9	6161	DRUM WIPER, HSI, 3" NOM.	1
10	6150	INDICATOR BRACKET, HSI, 3" NOM.	1
11	6151	INDICATOR TAB, HSI, 3" NOM.	1
12	6157	CARRIAGE BOLT, 1/4"-20 X 3/4" LG	1
13	6158	THUMB SCREW, 1/4"-20 X 3/4" LG	2
14	6160	HEX LOCKNUT W/ NYLON INSERT, 1/4"-20	3
15	6508	BONNET, HSI, 5M & 10M	1
16	6141	UPPER PACKING SEAL	1
17	6487	UPPER BACKUP RING	1
18	6149	PACKING RETAINER NUT, HSI, 3" NOM.	1
19	6152	WIPER F/ PACKING RETAINER NUT, HSI, 3" NOM.	1
20	6154	PACKING RETAINER RING, HSI, 3" NOM.	1
21	6147	RETAINER NUT, YOKE, HSI, 3" NOM.	1
22	6232	LOWER STEM	1
23	6133	LOWER PACKING SEAL	1
24	6134	JUNK RING, LOWER, BONNET, HSI, 3" NOM.	1
25	6135	RETAINER RING, INTERNAL, BONNET	1
26	6437	BACKUP RING, 3" BONNET, N6003, NBR 90	1
27	6438	O-RING, 3" BONNET, H2S, N6003, NBR 90	1
28	6148	STEM NUT, 9/16"-12 (MODIFIED)	1
29	1007	SET SCREW, 5/16"-18 X 1/2" LG	1

\* = THESE ITEMS SUPPLIED W/ BIFFI ELECTRIC ACTUATOR



TOLERANCE UNLESS OTHERWISE SPECIFIED	DRAWN BY: CWC	DATE: 01-19-21	 <b>HOUSTON OILFIELD EQUIPMENT, INC.</b> HOUSTON, TEXAS, 77095
SURFACE FINISH: 125 µm RA MAX X ±.1	CHECKED BY: TB	DATE: 07-09-21	
XX ±.06	ENG APPR: WW	DATE: 07-02-21	
FRACTION ±1/16 ANGLE ±5°	MFG APPR: TB	DATE: 07-09-21	
1. DIMENSIONS ARE IN INCHES. 2. ALL DIMENSIONS IN ( ) ARE REFERENCE. 3. ALL DIMENSIONS IN [ ] ARE MILLIMETERS. 4. BREAK ALL SHARP EDGES R.12 MAX OR .06 X 45° MAX. 5. REMOVE ALL BURRS. 6. DO NOT SCALE THIS DRAWING	PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF HOUSTON OILFIELD EQUIPMENT. THE DESIGNER AGREES BY RECEIVING THE DRAWING TO NEITHER REPRODUCE, FURNISH INFORMATION TO OTHERS, OR TRANSFER WITHOUT THE WRITTEN PERMISSION OF H.O.E.		
TITLE: <b>BONNET SUB-ASSEMBLY, HSI, 3" 10M NOM. 3", W/ BIFFI ICON 010/90-22 ELECTRIC ACTUATOR</b>			
DWG SIZE: <b>A</b>		DWG NO.: <b>6506BNT</b>	REV: <b>B</b>
MATERIAL: <b>SEE BOM ROUTER</b>		JOB: <b>656</b>	SHEET: <b>SHEET 1 of 2</b>



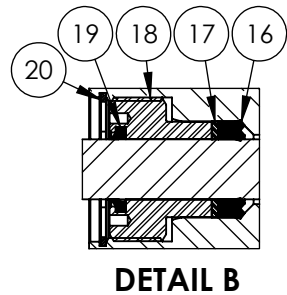
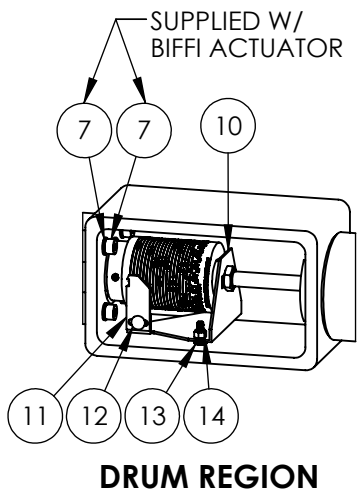
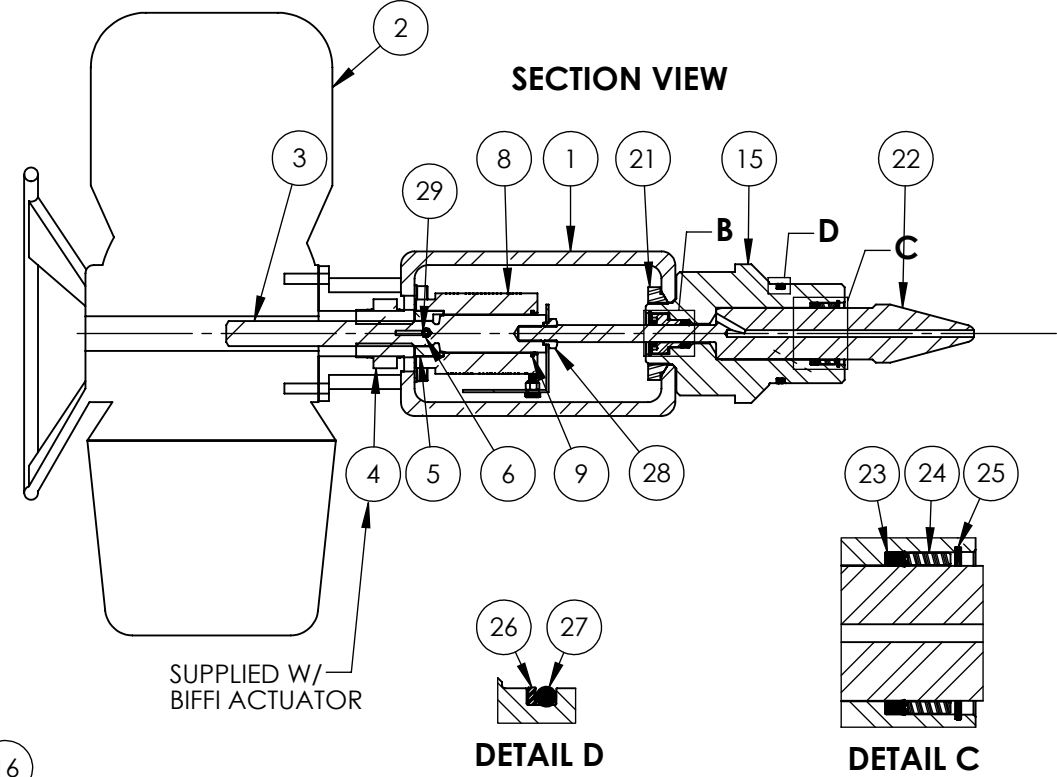
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ITEM NO.	PART NO.	DESCRIPTION	QTY.
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2	6486	BIFFI ICON 010/90-22 ELECTRIC ACTUATOR	1
3	6507	UPPER STEM	1
4	*	DRIVE NUT	1
5	6255	EXTENSION NUT	1
6	6256	SHCS, NO. 8 X 1" LG	2
7	*	SHCS, M10 X 30 LG & LOCK WASHER, M10 (SUPPLIED W/ BIFFI ACTUATOR)	4 EA
8	6153	INDICATOR DRUM, 2" ORIFICE	1
9	6161	DRUM WIPER, HSI, 3" NOM.	1
10	6150	INDICATOR BRACKET, HSI, 3" NOM.	1
11	6151	INDICATOR TAB, HSI, 3" NOM.	1
12	6157	CARRIAGE BOLT, 1/4"-20 X 3/4" LG	1
13	6158	THUMB SCREW, 1/4"-20 X 3/4" LG	2
14	6160	HEX LOCKNUT W/ NYLON INSERT, 1/4"-20	3
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20	6154	PACKING RETAINER RING, HSI, 3" NOM.	1
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\* = THESE ITEMS SUPPLIED W/ BIFFI ELECTRIC ACTUATOR

REVISIONS					
REV	ECN NO	DESCRIPTION	CREATED BY	APPR BY	DATE
B		REMOVED WEIGHT		TB	7-9-21

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TOLERANCE UNLESS OTHERWISE SPECIFIED	DRAWN BY: CWC	DATE: 01-19-21	<b>HOUSTON OILFIELD EQUIPMENT, INC.</b> HOUSTON, TEXAS, 77095
SURFACE FINISH: 125 µin RA MAX X ±.1 XX ±.06 FRACTION ±1/16 ANGLE ±5°	CHECKED BY: TB	DATE: 07-09-21	
1. DIMENSIONS ARE IN INCHES. 2. ALL DIMENSIONS IN ( ) ARE REFERENCE. 3. ALL DIMENSIONS IN [ ] ARE MILLIMETERS. 4. BREAK ALL SHARP EDGES R.12 MAX OR .06 X 45° MAX. 5. REMOVE ALL BURRS. 6. DO NOT SCALE THIS DRAWING	ENG APPR: WW	DATE: 07-02-21	<b>TITLE:</b> BONNET SUB-ASSEMBLY, HSI, 3" 10M NOM. 3", W/ BIFFI ICON 010/90-22 ELECTRIC ACTUATOR
	MFG APPR: TB	DATE: 07-09-21	<b>DWG SIZE:</b> DWG NO: <b>A 6506BNT</b>
	MATERIAL: SEE BOM ROUTER	JOB: 656	WEIGHT:
			SHEET: SHEET 2 of 2