



Excellent
Oil & Gas
Solutions



Sur-Drop® Ball Injector

Operating and Maintenance Instructions



SAFETY WARNING:

All personnel must be thoroughly trained about operation and maintenance requirements.

Improper use, operation, or disassembly under pressure can cause serious injury or death.

I. DESCRIPTION:

The SPM Sur-Drop® Ball Injector is a positive feed ball injector which has a maximum non-shock cold working pressure based on the type of body and union connections on the housing base. With the following union connections,

2" Figure 1502	-	15,000 psi NSCWP
2" Figure 1502 H2S	-	10,000 psi NSCWP
3" Figure 602	-	6,000 psi NSCWP
3" Figure 1002	-	10,000 psi NSCWP
3" Figure 1502	-	15,000 psi NSCWP
3" Figure 1502 H2S	-	10,000 psi NSCWP

The Sur-Drop® will handle perf balls from 5/8" to 1¼" by means of one of three interchangeable screw assembly cartridges. Each screw assembly is marked for easy identification. The manual Sur-Drop® comes equipped with an actuation handle which has a resettable counter that displays the total number of balls dropped. An optional Remote Control Assembly (see Fig. 1, Fig. 2, Fig. 3, and Fig. 4) is available for 12-volt remote operation from up to 150 feet away from the Sur-Drop® Ball Injector. Capacity of the Sur-Drop® is as follows:

Capacity of the Sur-Drop® is as follows:

Ball Size	Qty
5/8" & 3/4"	165
7/8" & 1"	130
1-1/8 & 1-1/4"	100

II. SETUP:

A.) Loading Manually (see Fig. 4):

Remove handle (16) and lid (2), or if the unit is rigged for remote operation (see 1A24334, item 1), remove the remote actuator by raising locking lever; turning the remote actuator slightly clockwise to disengage L slot and lifting. Then remove the lid (2) by releasing setscrews and turning counterclockwise. Insure that the correct size cartridge for the ball size to be run is installed. To change cartridge, remove inner housing assembly (30) and change screw (5) as desired. When replacing inner housing assembly (30), insure that the hole in the top ring of the assembly is fully engaged on the guide pin (27) in the ball injector housing (1).

Load the desired quantity of balls in the screw assembly cartridge by placing balls in each of the four open slots in the top of the cartridge. Using the manual handle (16), rotate the screw one complete turn and load four more; and so on until the desired quantity are loaded or until the maximum capacity is reached. Rotate the balls to the bottom insuring that balls are not dropped until actual operation is desired.

IMPORTANT:

From this point on, insure that the screw does not turn until Ball Injector is ready for operation.

III. MANUAL OPERATION:

Install lid (2). Make sure that screw does not turn while lid is being installed on housing (1). If necessary, use 3/8" open-end wrench to hold screw top shaft stationary.

Install manual handle (16). Reset counter to zero. Install locking pin in handle. Ball injector is ready for operation.

Remove locking pin, rotate handle clockwise to drop balls. Every complete rotation will drop four balls. The crank handle should always be locked when not in use.

IV. REMOTE OPERATION:

A.) Connecting Remote Actuator (see Fig. 2):

Install lid. Make sure that screw assembly does not turn while lid is being installed on housing. If necessary, use 3/8" open-end wrench to hold screw top shaft stationary.

Install remote actuator (1) onto ball injector. The coupling on the actuator shaft has a mating hex that will fit the top shaft of the screw. Fit is accomplished by moving the screw shaft slightly with the 3/8" open-end wrench. The actuator will then slide over the lid handles. Engage the actuator by turning slightly counterclockwise and engage restraining device (may be detent pin or locking lever depending on model).

Connect the control cable from the actuator (1) to the control panel (2). The externally wrapped cable on the reel connects to the actuator whereas the shorter cable end under the cover in the center of the reel connects to the control panel. The power cable is connected from the control panel (2) to a convenient 12V. D.C. power source (such as an automobile battery). Insure polarity of clips is as shown on the tags. Remote operation is now possible.

WARNING:

Connecting the clamps to the battery opposite to that shown on the tags will cause the actuator to run backwards which will result in malfunction of the equipment.

B.) Remote Operation (see Fig. 2 & Fig. 3):

To drop balls:

1. Turn power selector switch to ON.
 - a. The counter should power up (if not, check Fuse 1).
2. Set counter preset value.
3. Push the green START button.
 - a. The START button should light up.
4. Select the direction to run the motor.
 - a. Motor will start and run until counter is done when running in the forward direction (FWD).
5. To rotate in reverse direction (REV), select with toggle and then push the REV. JOG button.
 - a. Motor will only run while push button is pushed.
6. In the forward direction (FWD), once the counter is done, select the toggle switch to the OFF position and reset the counter.

The ball injector will drop the preset number of balls. Each time the switch is actuated to the 'FWD' position the ball injector will drop the preset number of balls until the supply is exhausted. During this time the green color bulb will be on. One line on the counter will dynamically display the number of "balls dropped", while the other line shows the "balls to drop".

If for some reason a ball does not drop, it may be necessary to reverse direction. For that, simply return the toggle switch to reverse position (REV) and then push the "Jog. Rev" button as many times as needed to loosen the ball jamming condition. Then return the toggle switch to the OFF position. When the toggle switch is turned back to the FWD position, the counter will not start re-counting until returning to the previous stopping point, thus avoiding double counting balls. The operation will then be resumed normally.

If during the course of dropping balls it is necessary to stop, simply return the toggle switch to the "OFF" position, and then the power switch to the "OFF" position. When the power switch is turned back to the "ON" position, it will be as if starting the operation over from the beginning. For instance, when the toggle switch is actuated to the FWD position, the injector will drop the preset number of balls, if they are loaded.

When the operation is completed, disconnect all cables, clean and wrap control cable onto reel. Re-install caps on all end connectors. The ball injector should always be flushed with clean water after each job.

WARNING:

Improper operation, use or disassembly under pressure can result in serious injury or death.

V. MAINTENANCE:

General Practice (see Fig. 4):

For maximum safe operation, all seals should be checked for nicks and cuts and proper sealing after each job.

To change seals, o-rings and back-up rings, removal of the appropriate components will be necessary. See the Troubleshooting Guide below.

Make sure all seal surfaces are smooth (32 RMS), and free of any nicks or burrs. Lightly coat seals and back-up rings and seal surfaces with petroleum jelly prior to installation. All threads should be clean, free of any foreign material, and coated with anti-seize or moly coat prior to assembly.

All ball injector parts should be thoroughly cleaned and inspected during routine maintenance. Do not use parts with badly worn, cracked or missing threads. Inspect the housing (1) and housing base (3) for excessive wear and replace, if necessary. Make sure the screw assembly cartridges rotate freely and inspect stop plate in the bottom of the housing (1) for wear.

TROUBLESHOOTING GUIDE

General Troubleshooting (see Fig. 4):

Always follow existing company procedure concerning identifying equipment for inspection, and removing equipment from service. The following is intended as a general guide in helping resolve most problems encountered in repairing clapper check valves. If problems are not covered here please contact Weir SPM for assistance at (817) 246-2461.

SYMPTOM	CAUSE	SOLUTION
1. Unit leaks around housing base (3), flange plate (4) or bottom of housing (1).	Bottom housing seal (18) has failed.	Replace seal (18) by removing the eight capscrews (17) holding flange plate (4) to base (3). Lift housing (1) out of base and replace seal (18). Reinstall housing (1) in base (3) and tighten capscrews (17) to 350 ft-lbs. torque.
2. Unit leaks around lower side of lid (2).	Top housing seal (14) and back-up (15) have failed.	Replace seal (14) and back-up (15) by removing lid (2). Replace seal (14) and back-up (15) and reinstall lid (2).
3. Unit leaks around top shaft of screw assembly cartridge (5) around threads of cap (12).	Seal (10) has failed.	Replace seal (10) by removing lid (2). Remove cap (12) using socket provided. Replace seal (10) and reinstall removed components.
4. Unable to install lid (2) completely.	Hole in the top ring of inner housing assembly (30) is not fully engaged on the guide pin (27) in the ball injector housing (1).	Reinstall screw assembly cartridge properly.
5. Screw assembly (5) will not turn.	Possible jamming issues (see item 6 below).	See item (6) below for remedies to jamming issues. Check drive stem and replace if broken or cracked.
6. Screw assembly (5) jams on operation.	Incorrect ball size used with a specific cartridge. Dirt or other foreign particles accumulated in screw cartridge.	Make sure the correct ball size is used with the appropriate cartridge. Clean screw cartridges as necessary after use to eliminate dirt and other foreign particles.

VII. REPLACEMENT PARTS

DESCRIPTION	PART #
UNIVERSAL BALL INJECTOR KIT	2A28494

CONTENTS OF BALL INJECTOR KIT

ITEM#	QTY	PART#	DESCRIPTION
10	1	P16636	Polypak seal
11	1	P14354	Bearing
14	1 each	P16637 and P101519*	O-ring
15	1 each	P16635 and P28365*	Back-up ring
18	1	P100230	Polypak Seal
21	1	P14378	Snap ring
26	1	2P27317	Drive stem

* O-ring and back-up ring will vary depending on ball injector model in question (original/new). The part numbers in bold italic represent the components required for the new style ball injector assembly. This assembly is easily identified by the "fully machined" helical screw (within the external housing). The "original" style ball injector is identified by the welded helical screw.

The service kit will include all necessary components for both the original and new style ball injector.

The following drawings represent the various configurations available for the ball injector. Contact Weir SPM Sales for available sizes and mode

- NOTE:
- SCALE FOR ACTUATORS 1:2
OTHER COMPONENTS ARE NOT TO SCALE
 - ASSEMBLY PART CONFORM TO
SPEC 4224378
 - NO TO DIMENSIONS FOLLOWING DATA
(a) PRINTING

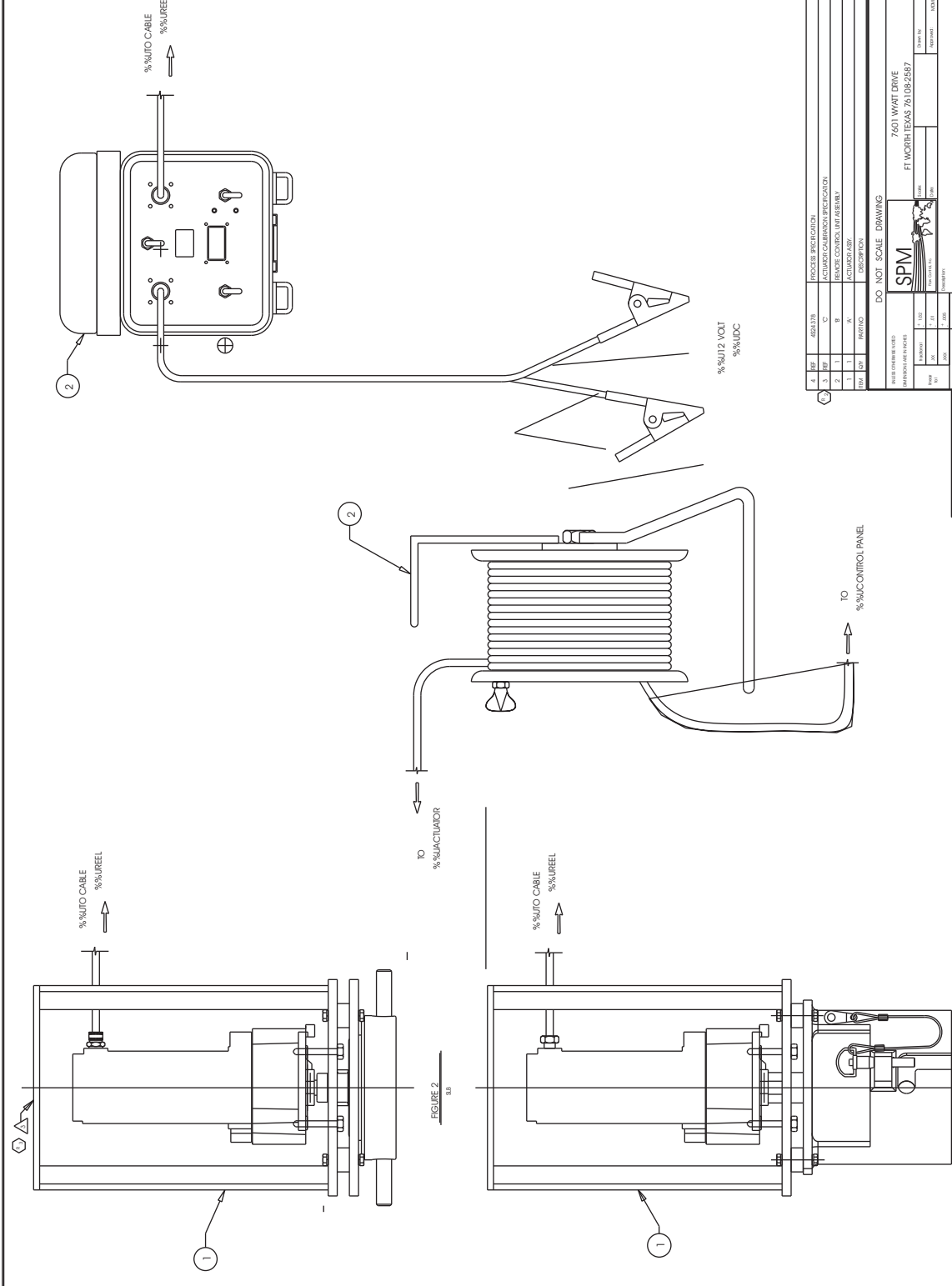


FIGURE 2
SB

FIGURE 1
SPM

SB	1424274	2424273	2424381	2424382	2
SPM	1424384	2424385	2424386	2424387	1
APPLICATION	ASSY NO.	A	B	C	FIGURE

REV	DATE	BY	CHKD	DESCRIPTION
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7601 WAT DRIVE
FT WORTH, TEXAS 76102-2587

SPM

DO NOT SCALE DRAWING

SCALE: 1:1

DATE: 11/11/00

BY: J. W. HARRIS

CHKD: J. W. HARRIS

APP: J. W. HARRIS

PROJ: 7601 WAT DRIVE

REV: 1

DATE: 11/11/00

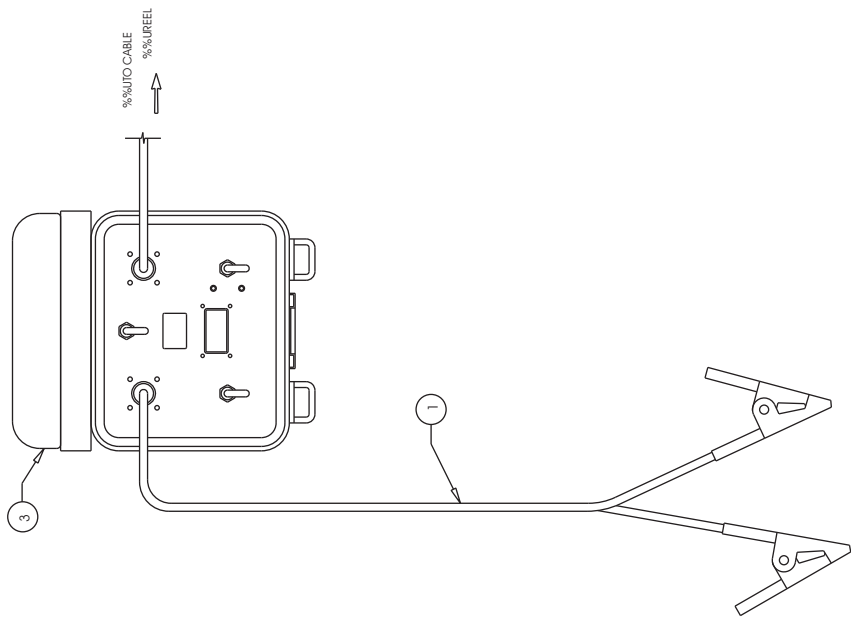
BY: J. W. HARRIS

CHKD: J. W. HARRIS

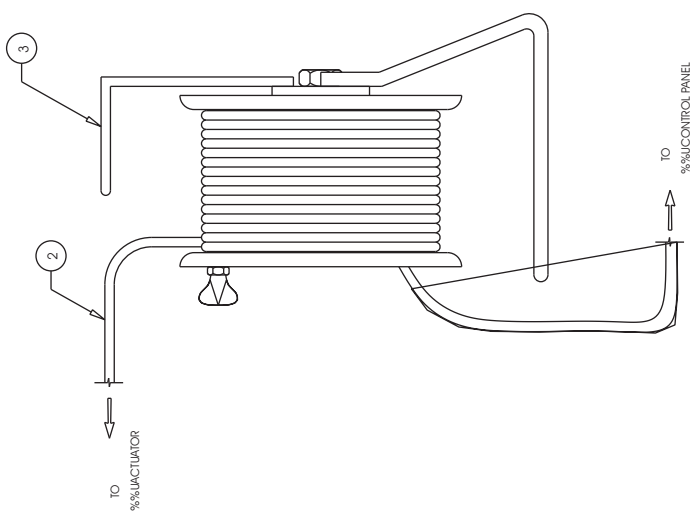
APP: J. W. HARRIS

PROJ: 7601 WAT DRIVE

NOTES:
 1. FOR ILLUSTRATION ONLY.
 ACTUAL PARTS MAY APPEAR DIFFERENT.



%%L12 VOLT
 %%LUDC



3	1	E'	REMOTE CONTROL & REEL MOUNT
2	1	C'	CONTROL CABLE
1	1	A'	POWER CABLE
ITEM	QTY	PART NO	DESCRIPTION

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
 DIMENSIONS ARE IN INCHES

Material	1102	Scale	
Hard	XX	Date	
Temp	XX	Drawn by:	MDM
Finish	XX	Approved	

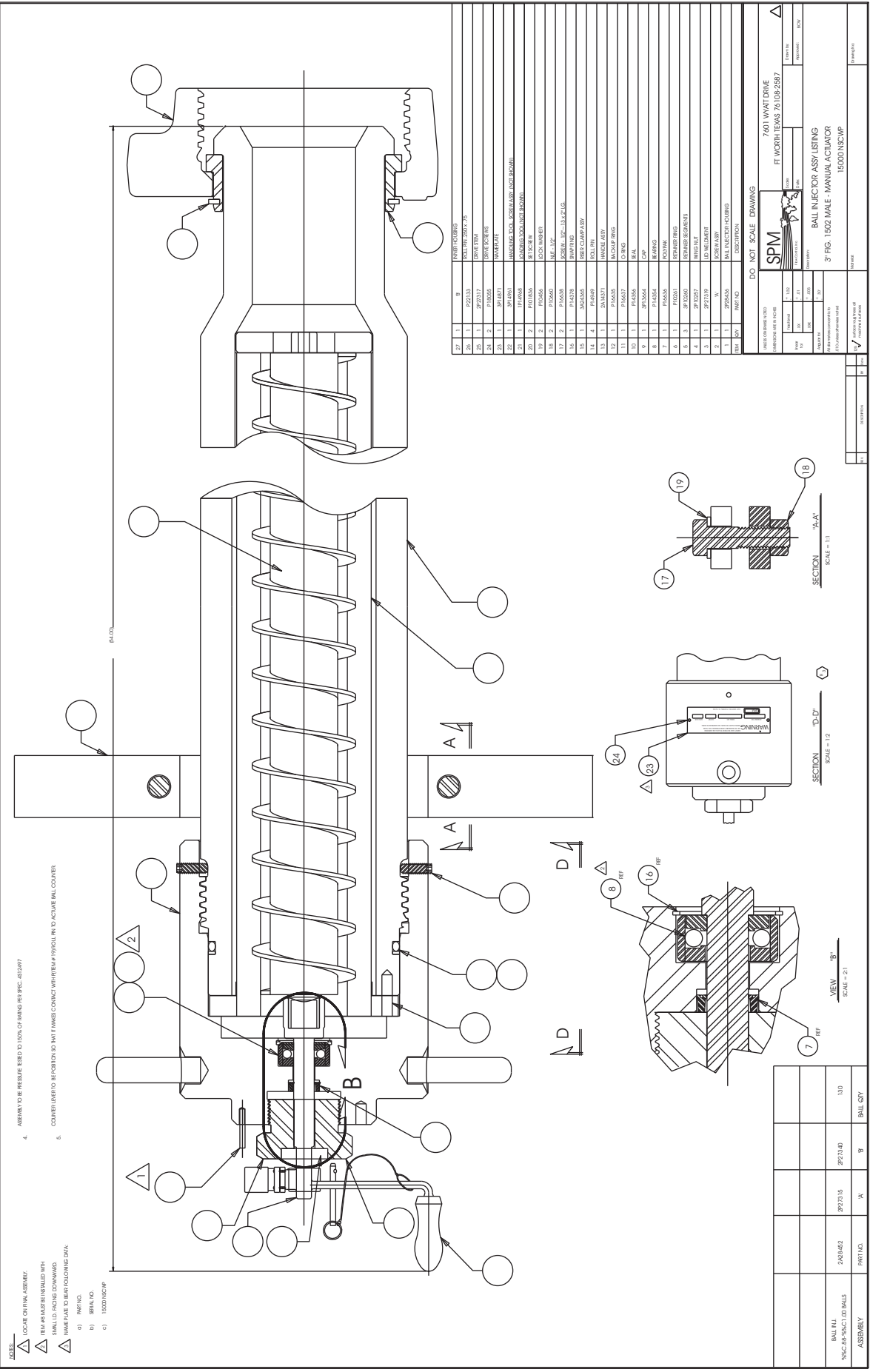
7601 WYAT DRIVE
 FT WORTH TEXAS 76108-2567

SPM
 (Manufacturer Logo)

7601 WYAT DRIVE
 FT WORTH TEXAS 76108-2567

7601 WYAT DRIVE
 FT WORTH TEXAS 76108-2567

2424881	3A16667	60'	A'	PWR CABLE	2424881
2424881	3A16667	20'	B'	CONTROL CABLE	2424881
ASSEMBLY			D'	LENGTH	
			E'	LENGTH	
				PART NO.	



- NOTES:
- 1. LOCATE ON DRAWING
 - 2. ITEM #S MUST BE INSTALLED WITH SMALL END FACING DOWNWARD.
 - 3. COUPLER LIMITED BE POSITION SO THAT MASS CONTACT WITH ITEM # 19 ONLY IN TO ACTUAL BALL CONTACT.
 - 4. ASSEMBLY TO BE RESURE BEREED TO 100% OF PARTING REF SPEC. 4512977
 - 5. PARTING LINE
 - 6. SERIAL NO.
 - 7. 15000 NSCW

NO.	QTY	DESCRIPTION	REF.
1	1	FLANGE	
2	1	FLANGE	
3	1	FLANGE	
4	1	FLANGE	
5	1	FLANGE	
6	1	FLANGE	
7	1	FLANGE	
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19	1	FLANGE	
20	1	FLANGE	
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22	1	FLANGE	
23	1	FLANGE	
24	1	FLANGE	

7401 WYAT DRIVE
 FT WORTH TEXAS 76108-2857

SPM

BALL INJECTOR ASSY LISTING
 3" FIG. 1502 MALE - MANUAL ACTUATOR
 15000 NSCW

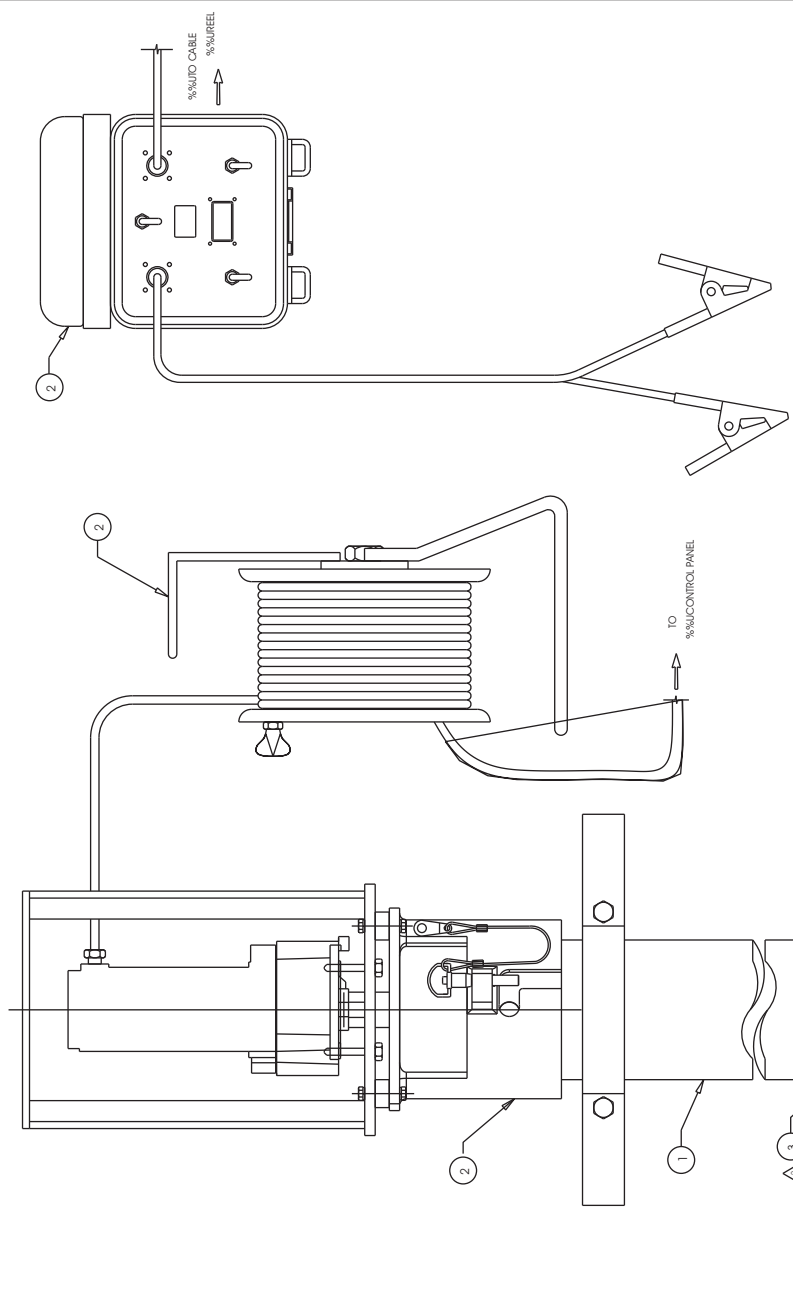
DO NOT SCALE DRAWING

DATE	REV	BY	APP

REV	DATE	DESCRIPTION	BY	APP

NOTE:
 1. SCALE FOR BALL INJECTOR ASSEMBLY & ACTUATOR IS 1:2
 OTHER COMPONENTS ARE NOT TO SCALE

- △ WHERE PART NUMBER FOLLOWING DIM.
 (A) PART NO.
 (B) SERIAL NO.
 (C) TOOLING NUMBER



4" FS: 150Z IMF - REMOVE

PARTS	QTY	DESCRIPTION	REF ID
1023334		IMF	B
2042846	130	150Z IMF	A
1023334		IMF	B

3" FS: 150Z IMF - REMOVE

PARTS	QTY	DESCRIPTION	REF ID
1023334		IMF	B
2042846	130	150Z IMF	A
1023334		IMF	B

12VDC
 12VDC

REV	DATE	BY	CHKD	DESCRIPTION
1				ISSUE FOR FAB
2				ISSUE FOR ASSEMBLY
3				ISSUE FOR TESTING
4				ISSUE FOR SHIP

DO NOT SCALE DRAWING

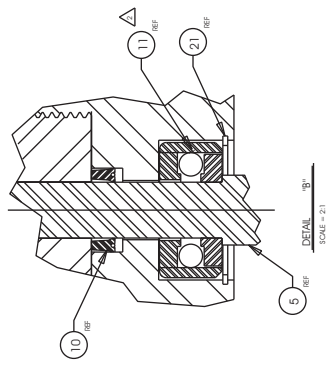
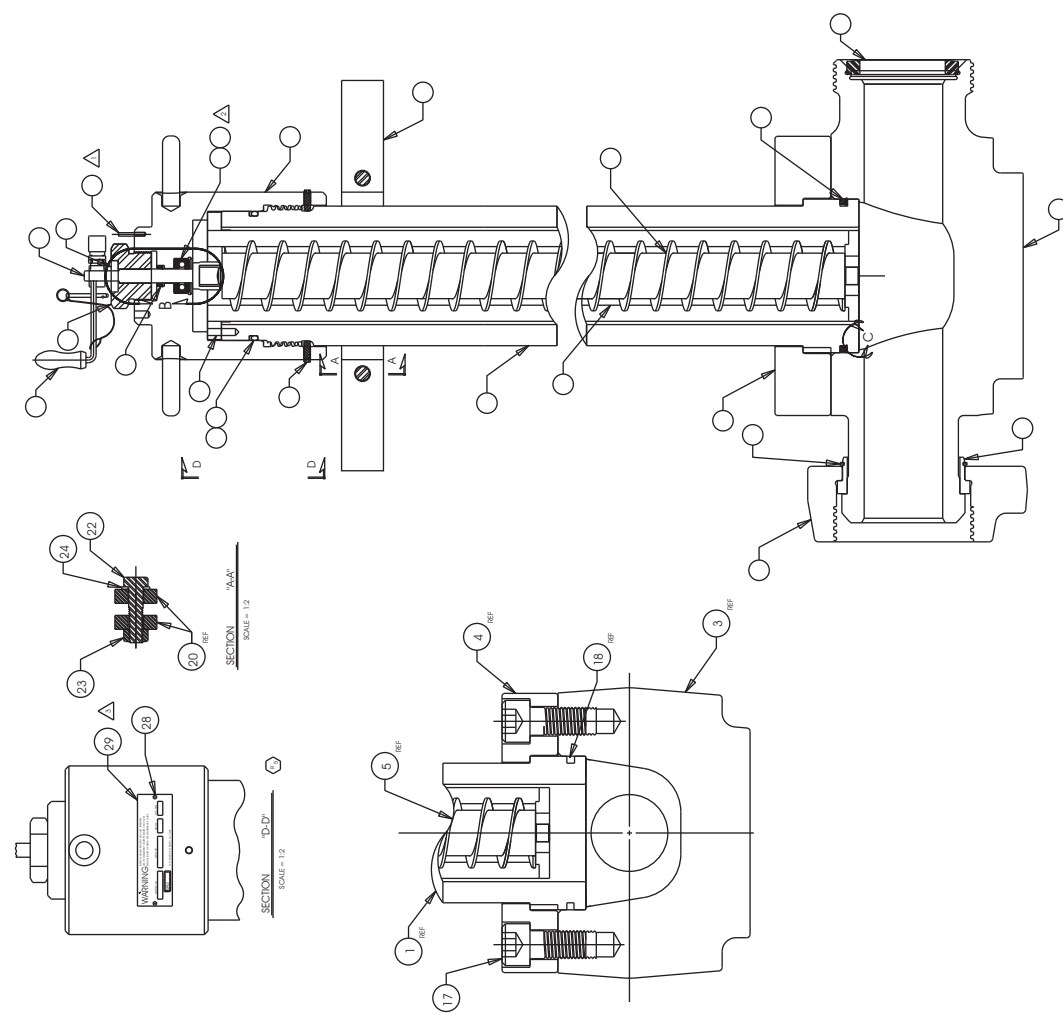
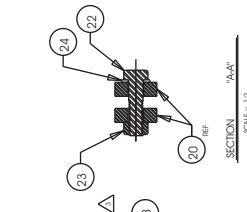
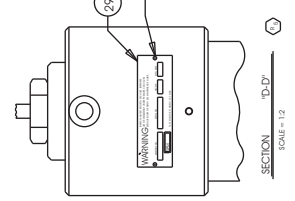
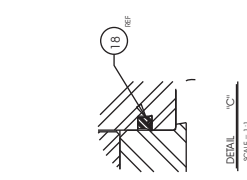
7601 HWY 28 W
 FT WORTH, TEXAS 76102-2887

SPM

ELECTRICAL ACTIVATION

NOTES:

- 1. LOCATE ON FINAL ASSEMBLY
- 2. FROM #11 MAKE BE INSTALLED WITH SMALL END FACING DOWNWARD
- 3. MAKE SURE TO BEAR FOLLOWING DATA:
- 4. PART NO.
- 5. SERIAL NO.
- 6. 150000 NSCWP
- 7. ASSEMBLY TO BE PRESSURE TESTED TO 100% OF RATING PER SPEC. 452687
- 8. COUNTER LINES TO BE POSITION AS TO MAKE CONTACT WITH REMA F19 (GOLD) IN TO ACTIVE BALL COUPLER.



REV	NO	DATE	DESCRIPTION
1	1		ISSUE FOR ENGINEERING
1	2		ISSUE FOR MANUFACTURING
1	3		ISSUE FOR TESTING
1	4		ISSUE FOR ASSEMBLY
1	5		ISSUE FOR SHIPPING
1	6		ISSUE FOR MAINTENANCE
1	7		ISSUE FOR REPAIR
1	8		ISSUE FOR REPLACEMENT
1	9		ISSUE FOR DISCONTINUED
1	10		ISSUE FOR OBSOLETE
1	11		ISSUE FOR REDESIGN
1	12		ISSUE FOR MODIFICATION
1	13		ISSUE FOR IMPROVEMENT
1	14		ISSUE FOR SAFETY
1	15		ISSUE FOR COMPLIANCE
1	16		ISSUE FOR LEGAL
1	17		ISSUE FOR FINANCIAL
1	18		ISSUE FOR OPERATIONAL
1	19		ISSUE FOR ENVIRONMENTAL
1	20		ISSUE FOR SOCIAL
1	21		ISSUE FOR ETHICAL
1	22		ISSUE FOR GOVERNANCE
1	23		ISSUE FOR INTELLECTUAL PROPERTY
1	24		ISSUE FOR REGULATORY
1	25		ISSUE FOR STANDARDS
1	26		ISSUE FOR BEST PRACTICES
1	27		ISSUE FOR INNOVATION
1	28		ISSUE FOR LEADERSHIP
1	29		ISSUE FOR CULTURE
1	30		ISSUE FOR TALENT
1	31		ISSUE FOR TECHNOLOGY
1	32		ISSUE FOR DATA
1	33		ISSUE FOR SECURITY
1	34		ISSUE FOR PRIVACY
1	35		ISSUE FOR ACCESSIBILITY
1	36		ISSUE FOR SUSTAINABILITY
1	37		ISSUE FOR RESILIENCE
1	38		ISSUE FOR AGILITY
1	39		ISSUE FOR CUSTOMER EXPERIENCE
1	40		ISSUE FOR PARTNERSHIPS
1	41		ISSUE FOR ECOSYSTEMS
1	42		ISSUE FOR DIGITAL TRANSFORMATION
1	43		ISSUE FOR AI
1	44		ISSUE FOR BLOCKCHAIN
1	45		ISSUE FOR CLOUD
1	46		ISSUE FOR CYBERSECURITY
1	47		ISSUE FOR IoT
1	48		ISSUE FOR AR/VR
1	49		ISSUE FOR 5G
1	50		ISSUE FOR AUTOMATION
1	51		ISSUE FOR ROBOTICS
1	52		ISSUE FOR AIOT
1	53		ISSUE FOR DIGITAL MARKETING
1	54		ISSUE FOR SALES
1	55		ISSUE FOR CUSTOMER SERVICE
1	56		ISSUE FOR OPERATIONS
1	57		ISSUE FOR LOGISTICS
1	58		ISSUE FOR SUPPLY CHAIN
1	59		ISSUE FOR MANUFACTURING
1	60		ISSUE FOR QUALITY
1	61		ISSUE FOR INVENTORY
1	62		ISSUE FOR WAREHOUSING
1	63		ISSUE FOR DISTRIBUTION
1	64		ISSUE FOR RETAIL
1	65		ISSUE FOR E-COMMERCE
1	66		ISSUE FOR FINANCIAL SERVICES
1	67		ISSUE FOR BANKING
1	68		ISSUE FOR INSURANCE
1	69		ISSUE FOR INVESTMENT
1	70		ISSUE FOR REAL ESTATE
1	71		ISSUE FOR HEALTHCARE
1	72		ISSUE FOR PHARMACEUTICALS
1	73		ISSUE FOR MEDICAL DEVICES
1	74		ISSUE FOR BIOTECHNOLOGY
1	75		ISSUE FOR AEROSPACE
1	76		ISSUE FOR DEFENSE
1	77		ISSUE FOR AERONAUTICS
1	78		ISSUE FOR SPACE
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1	82		ISSUE FOR GAMES
1	83		ISSUE FOR SPORTS
1	84		ISSUE FOR TRANSPORTATION
1	85		ISSUE FOR AVIATION
1	86		ISSUE FOR MARITIME
1	87		ISSUE FOR RAIL
1	88		ISSUE FOR HIGHWAY
1	89		ISSUE FOR WATER
1	90		ISSUE FOR ENERGY
1	91		ISSUE FOR UTILITIES
1	92		ISSUE FOR CONSTRUCTION
1	93		ISSUE FOR INFRASTRUCTURE
1	94		ISSUE FOR CIVIL ENGINEERING
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1	96		ISSUE FOR ELECTRICAL ENGINEERING
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1	98		ISSUE FOR METALLURGICAL ENGINEERING
1	99		ISSUE FOR INDUSTRIAL ENGINEERING
1	100		ISSUE FOR AGRICULTURE
1	101		ISSUE FOR FORESTRY
1	102		ISSUE FOR FISHERIES
1	103		ISSUE FOR MINING
1	104		ISSUE FOR OIL AND GAS
1	105		ISSUE FOR PETROLEUM
1	106		ISSUE FOR CHEMICALS
1	107		ISSUE FOR PLASTICS
1	108		ISSUE FOR RUBBER
1	109		ISSUE FOR GLASS
1	110		ISSUE FOR CERAMICS
1	111		ISSUE FOR TEXTILES
1	112		ISSUE FOR PAPER
1	113		ISSUE FOR FOOD
1	114		ISSUE FOR BEVERAGE
1	115		ISSUE FOR TOBACCO
1	116		ISSUE FOR AEROSPACE
1	117		ISSUE FOR DEFENSE
1	118		ISSUE FOR AERONAUTICS
1	119		ISSUE FOR SPACE
1	120		ISSUE FOR TELECOMMUNICATIONS
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1	189		ISSUE FOR PLASTICS
1	190		ISSUE FOR RUBBER
1	191		ISSUE FOR GLASS
1	192		ISSUE FOR CERAMICS
1	193		ISSUE FOR TEXTILES
1	194		ISSUE FOR PAPER
1	195		ISSUE FOR FOOD
1	196		ISSUE FOR BEVERAGE
1	197		ISSUE FOR TOBACCO
1	198		ISSUE FOR AEROSPACE
1	199		ISSUE FOR DEFENSE
1	200		ISSUE FOR AERONAUTICS

DO NOT SCALE DRAWING

7601 WAIT DRIVE
FT WORTH TEXAS 76108-2587

SPM

DATE: 1/1/2024
BY: J. SMITH
CHECKED: M. JONES
APPROVED: K. BROWN

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REVISIONS TO BE MADE TO THIS DRAWING TO BE MADE TO THE ORIGINAL DRAWING

DATE: 1/1/2024
BY: J. SMITH
CHECKED: M. JONES
APPROVED: K. BROWN

SAFETY INFORMATION



IMPORTANT SAFETY INFORMATION ENCLOSED. READ THIS OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL BEFORE OPERATING PRODUCT.

IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE INFORMATION IN THIS MANUAL INTO THE HANDS OF THE OPERATOR. FAILURE TO READ, UNDERSTAND AND FOLLOW THE OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH.

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