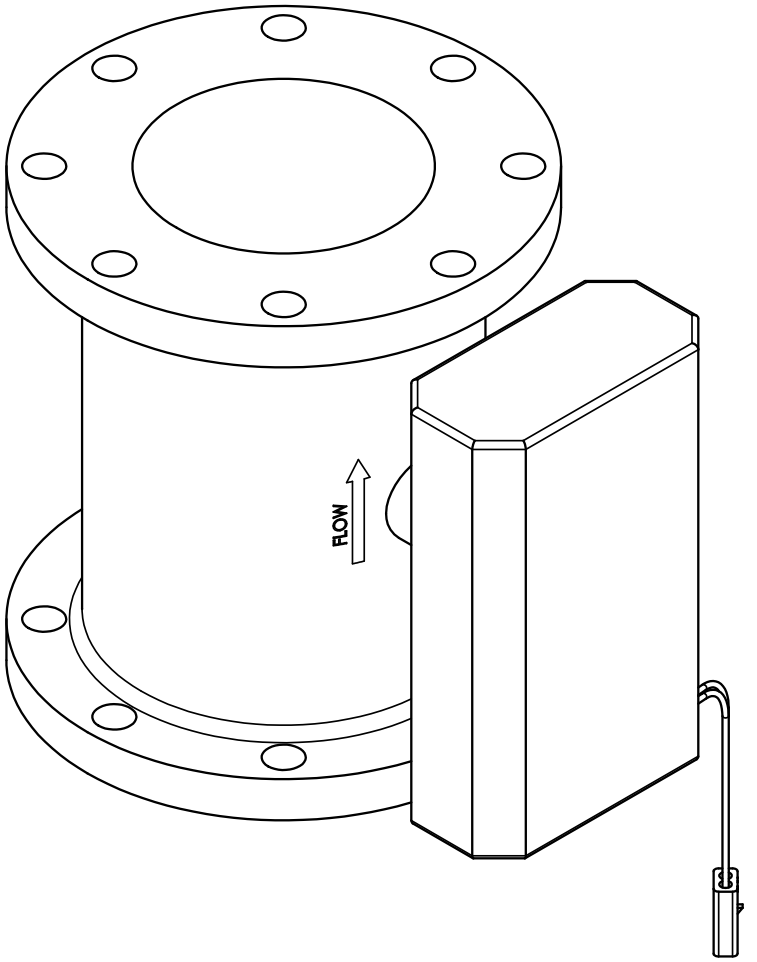
LM300000 REV A
11/11/2009

SIOUX
AUTOMATION CENTER, INC.
QUALITY PEOPLE, QUALITY PRODUCTS

SAC Liquid Manure Flow Meter

Operation and Service Manual



ASSEMBLY
CALIBRATION
OPERATION
REPLACEMENT PARTS

READ complete manual CAREFULLY
BEFORE attempting operation

SAC - SIOUX AUTOMATION - 877 1ST AVE. NW - SIOUX CENTER, IA 51250
PH: (712)-722-1488 - TOLL FREE: 1-866-722-1488
WWW.SIOUXAUTOMATION.COM

GENERAL INFORMATION

1. Unless otherwise specified, high-strength (grade5) (3 radial-line head markings) hex head bolts are used throughout assembly of this piece of equipment.

2. Whenever terms "LEFT" and "RIGHT" are used in this manual it means from a position behind wagon and facing forward.

3. When placing a parts order, refer to this manual for proper part numbers and place order by PART NO. and DESCRIPTION.

4. Read assembly instructions carefully. Study assembly procedures and all illustrations before you begin assembly. Note which parts are used in each step. This unit must be assembled in proper sequence or complications will result.

TABLE OF CONTENTS

SAFETY

TAKE NOTE! THIS SAFETY ALERT SYMBOL FOUND THROUGHOUT THIS MANUAL IS USED TO CALL YOUR ATTENTION TO INSTRUCTIONS INVOLVING YOUR PERSONAL SAFETY AND SAFETY OF OTHERS. FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN INJURY OR DEATH!

SIGNAL WORDS

Note: use of following signal words DANGER, WARNING, and CAUTION with safety messages. Appropriate signal word for each has been selected using following guidelines:

DANGER:

Indicates an imminently hazardous situation that, if not avoided, will result in serious injury or death. This signal word is to be limited to most extreme situations typically for machine components which, for functional purposes, cannot be guarded.

WARNING:

Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION:

Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

If you have questions not answered in this manual, require additional copies, or if your manual is damaged, please contact your dealer or Sioux Automation Inc., 877 1st Ave. NW Sioux Center, IA 51250 ph: (712)-722-1488 or 866-722-1488 http://www.siouxautomation.com

SAFETY...YOU CAN LIVE WITH IT

EQUIPMENT SAFETY GUIDELINES

Every year many accidents occur which could have been avoided by a few seconds of thought and a more careful approach to handling equipment. You, the operator, can avoid many accidents by observing the following precautions in this section. To avoid personal injury, study the following precautions and insist those working with you, or you yourself, follow them.

In order to provide a better view, certain illustrations in this manual may show an assembly with a safety shield removed. However, equipment should never be operated in this condition. Keep all shields in place. If shield removal becomes necessary for repairs, replace shield prior to use.

Replace any caution, warning, danger or instruction safety decal that is not readable or is missing. Location of such decals is indicated in this booklet.

Do not attempt to operate this equipment under the influence of alcohol or drugs.

Review safety instructions with all users annually.

Operator should be a responsible adult. DO NOT ALLOW PERSONS TO OPERATE OR ASSEMBLE THIS UNIT UNTIL THEY HAVE DEVELOPED A THOROUGH UNDERSTANDING OF SAFETY PRECAUTIONS AND HOW IT WORKS.

To prevent injury or death, use a tractor equipped with a roll over protective system (ROPS). Do not paint over, remove, or deface any safety signs or warning decals on your equipment. Observe all safety signs and practice instructions on them.

Never exceed limits of a piece of machinery. If its ability to do a job, or to do so safely is in question DON'T TRY IT.

SAFETY TIPS

- Keep hand, feet, and clothing away from moving parts.
- DO NOT climb on or enter machine during operation.
- DO NOT make high speed maneuvers when operating or towing machine.
- Disengage clutch and remove keys before servicing.
- Keep ALL shields in place
- DO NOT allow riders
- DO NOT attempt to clean, oil, or adjust machine while in motion

Regardless of the care used in the design and construction of equipment, there are many points that can not be completely safeguarded without interfering with accessibility and efficient operation. A careful operator is the best insurance against an accident.

LIGHTING AND MARKING

It is the responsibility of customer to know lighting and marking requirements of local highway authorities and to install and maintain equipment to provide compliance with regulations. Add extra lights when transporting at night or during periods of limited visibility.

Lighting kits are available from your dealer or from manufacturer.

SAFETY SIGN CARE

- Keep safety signs clean and legible at all times.
- Replace safety signs that are missing or have become illegible.
- Replacement parts that displayed a safety sign should also display current sign.
- Safety signs are available from your distributor, dealer parts department, or factory.

How to install safety signs:

- Be sure that installation area is clean and dry.
- Decide on exact position before you remove backing paper.
- Remove smallest portion of split backing paper.
- Align decal over specified area and carefully press small portion with exposed sticky backing in place.
- Slowly peel back remaining paper and carefully smooth remaining portion of decal into place.
- Small air pockets can be pierced with a pin and smoothed out using piece of decal backing paper.

TIRE SAFETY

- Failure to follow proper procedures when mounting a tire on a rim can produce an explosion which may result in a serious injury or death.
- Do not attempt to mount a tire unless you have proper equipment and experience to do job.
- Inflating or servicing tires can be dangerous. Whenever possible, trained personnel should be called to service and/or mount tires.
- Always order and install tires and wheels with appropriate type and load capacity to meet or exceed anticipated weight to be placed on the equipment.

REMEMBER

Your best assurance against accidents is a careful and responsible operator. If there is any portion of this manual or function you do not understand, contact your local authorized dealer or manufacturer.

BOLT TORQUE
TORQUE DATA FOR STANDARD NUTS, BOLTS, AND CAPSCREWS.

Tighten all bolts to torques specified in chart unless otherwise noted. Check tightness of bolts periodically, using bolt chart as guide. Replace hardware with same grade bolt.

NOTE: Unless otherwise specified, high-strength Grade 5 hex bolts are used throughout assembly of equipment.

Torque Specifications

Bolt Torque for Standard bolts *

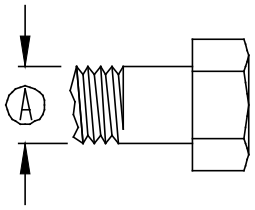
	GRADE 2		GRADE 5		GRADE 8	
"A"	lb-ft	(N.m)	lb-ft	(N.m)	lb-ft	(N.m)
1/4"	6	(8)	9	(12)	12	(16)
5/16"	10	(13)	18	(25)	25	(35)
3/8"	20	(27)	30	(40)	45	(60)
7/16"	30	(40)	50	(70)	80	(110)
1/2"	45	(60)	75	(100)	115	(155)
9/16"	70	(95)	115	(155)	165	(220)
5/8"	95	(130)	150	(200)	225	(300)
3/4"	165	(225)	290	(390)	400	(540)
7/8"	170	(230)	420	(570)	650	(880)
1"	225	(300)	630	(850)	970	(1310)

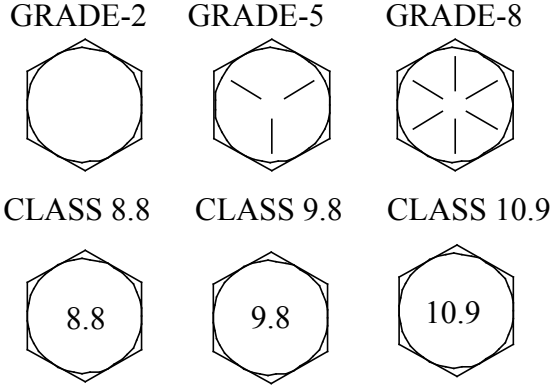
Bolt Torque for Metric bolts *

	CLASS 8.8		CLASS 9.8		CLASS 10.9	
"A"	lb-ft	(N.m)	lb-ft	(N.m)	lb-ft	(N.m)
6	9	(13)	10	(14)	13	(17)
7	15	(21)	18	(24)	21	(29)
8	23	(31)	25	(34)	31	(42)
10	45	(61)	50	(68)	61	(83)
12	78	(106)	88	(118)	106	(144)
14	125	(169)	140	(189)	170	(230)
16	194	(263)	216	(293)	263	(357)
18	268	(363)	--	--	364	(493)
20	378	(513)	--	--	515	(689)
22	516	(699)	--	--	702	(952)
24	654	(886)	--	--	890	(1206)

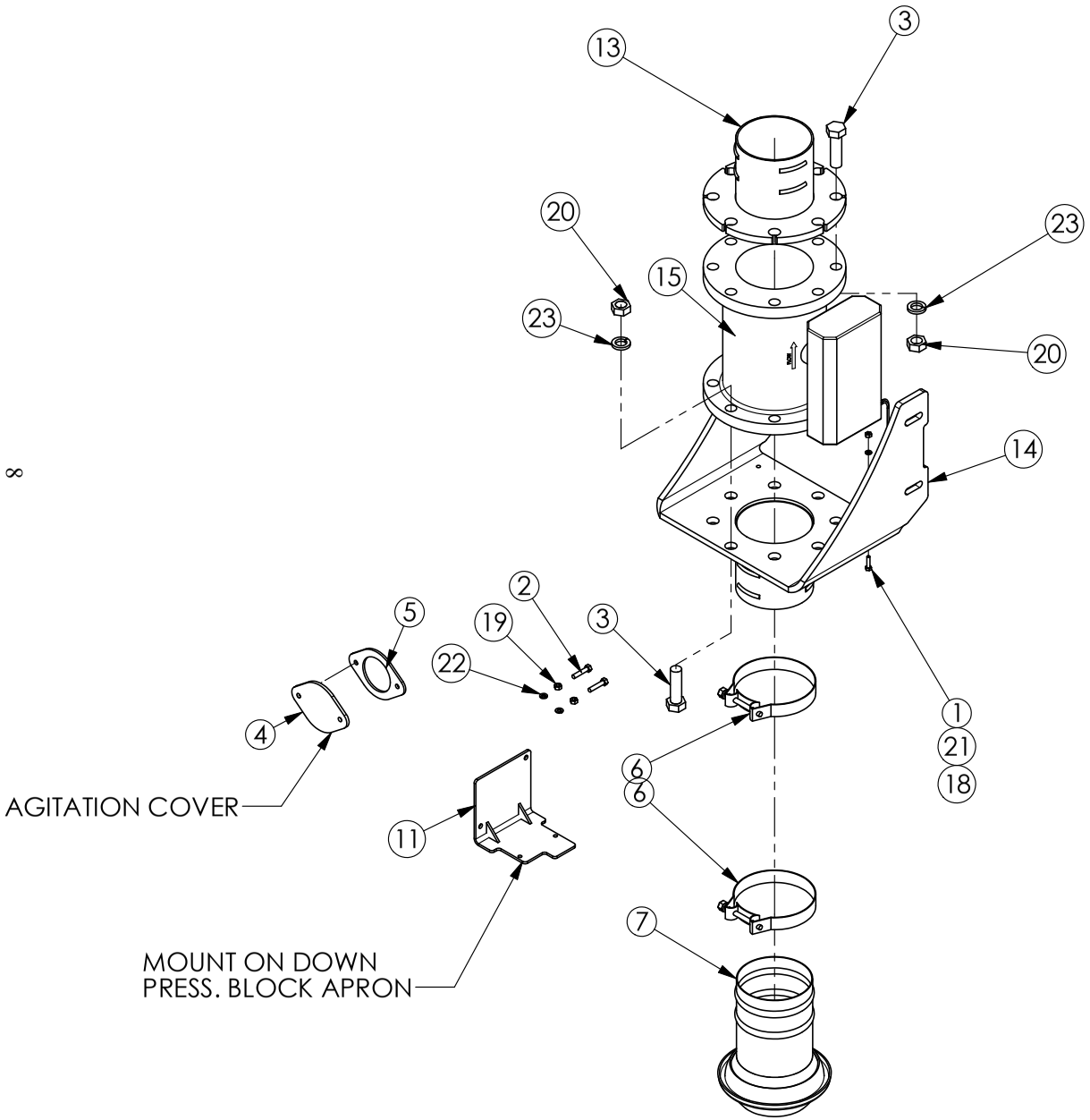
Torque figures indicated are valid for non-greased or non-oiled threads and heads unless otherwise specified. Therefore, do not grease or oil bolts or capscrews unless otherwise specified in this manual. When using locking elements, increase torque values
by 5%.

* GRADE or CLASS value for bolts and capscrews are identified by their head markings.



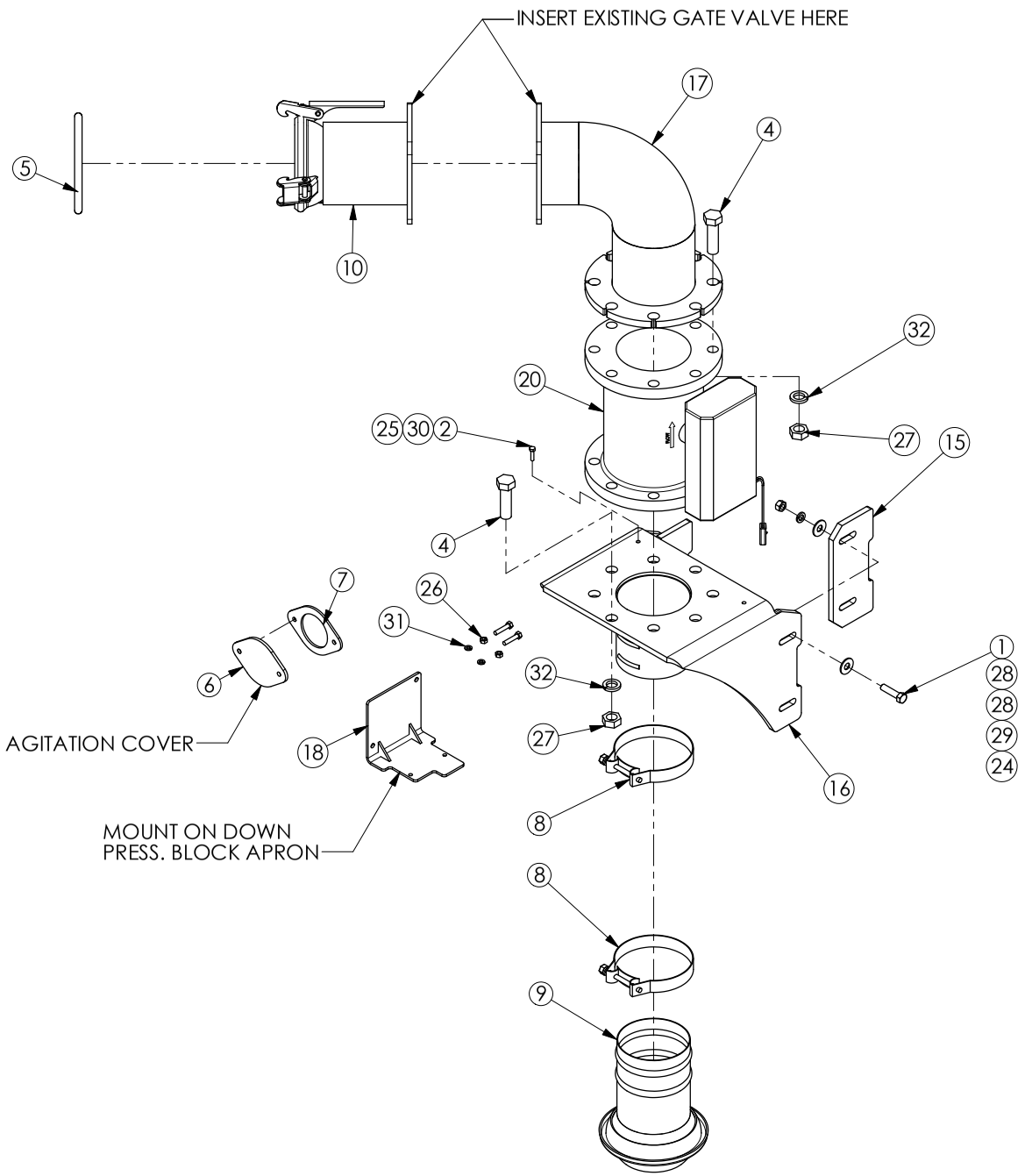


FLOW METER BRACKETS FOR FRONT MOUNT



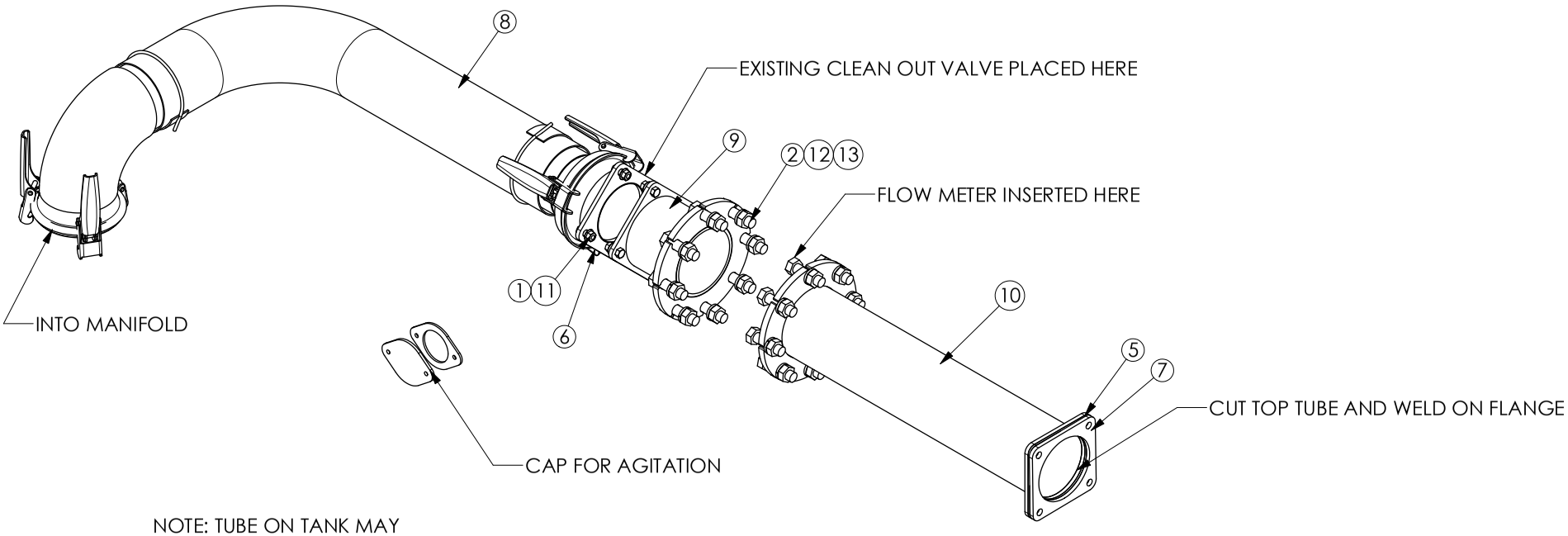
ITEM #	QTY	PART #	DESCRIPTION
1	1	BLT14X1NC	1/4X1 BOLT
2	2	BLT516X112NC	5/16X1-1/2 BOLT
3	16	BLT78X3NC	7/8X3 BOLT
4	1	BLZ13101	AGITATION COVER
5	1	BLZ15625	GASKET
6	2	BLZ16009	HOSE CLAMP
7	1	BLZ16044	MALE COUPLER
8	36	HOSIS6	HOSE
9	1	LM0630172194	REGULATING VALVE
10	1	LM300000	MANUAL
11	1	LM380095	MOUNTING BRACKET
12	1	LM380102	WIRE HARNESS
13	1	LM380103	COUPLER
14	1	LM380104	FLOW METER MOUNTING BRACKET
15	1	LM380116	FLOW METER
16	1	LM380118	WIRE HARNESS
17	1	LM390018	FLOW METER HYDRAULIC KIT
18	1	NUT14NC	1/4" NUT
19	2	NUT516NC	5/16" NUT
20	16	NUT78NC	7/8" NUT
21	1	WSH14LOCK	1/4" LOCK WASHER
22	2	WSH516LOCK	5/16" LOCK WASHER
23	16	WSH78LOCK	7/8" LOCK WASHER

FLOW METER BRACKETS FOR REAR MOUNT



ITEM #	QTY	PART #	DESCRIPTION
1	4	BLT12X2NC	1/2X2 BOLT
2	1	BLT14X1NC	1/4X1 BOLT
3	2	BLT516X112NC	5/16X1-1/2 BOLT
4	16	BLT78X3NC	7/8X3 BOLT
5	1	BLZ11979	O-RING
6	1	BLZ13101	AGITATION COVER
7	1	BLZ15625	GASKET
8	2	BLZ16009	HOSE CLAMP
9	1	BLZ16044	MALE COUPLER
10	1	BLZ16861	FEMALE COUPLER
11	30	HOSIS6	HOSE
12	1	LM0630172194	REGULATING VALVE
13	1	LM084115019	CABLE
14	1	LM300000	MANUAL
15	2	LM310339	MOUNTING BRACKET
16	1	LM380077	FLOW METER MOUNTING BRACKET
17	1	LM380078	COUPLER
18	1	LM380095	MOUNTING BRACKET
19	1	LM380102	WIRE HARNESS
20	1	LM380116	FLOW METER
21	1	LM380117	POWER CABLE
22	1	LM380118	WIRE HARNESS
23	1	LM390016	FLOW METER HYDRAULIC KIT
24	4	NUT12NC	1/2" NUT
25	1	NUT14NC	1/4" NUT
26	2	NUT516NC	5/16" NUT
27	16	NUT78NC	7/8" NUT
28	8	WSH12FLAT	1/2" FLAT WASHER
29	4	WSH12LOCK	1/2" LOCK WASHER
30	1	WSH14LOCK	1/4" LOCK WASHER
31	2	WSH516LOCK	5/16" LOCK WASHER
32	16	WSH78LOCK	7/8" LOCK WASHER

FLOW METER BRACKETS FOR TOP TANK MOUNT



NOTE: TUBE ON TANK MAY NEED TO BE RAISED FOR FLOW METER TO FIT PROPERLY

ITEM #	QTY	PART #	DESCRIPTION
1	2	BLT12X114NC	1/2X1-1/4 BOLT
2	16	BLT78X3NC	7/8X3 BOLT
3	1	BLZ13101	AGITATION COVER
4	1	BLZ15625	GASKET
5	1	BLZ16035	GASKET
6	1	BLZ6926	MALE COUPLER
7	1	BURN13000030	FLANGE
8	1	LM380161	HOSE ASSEMBLY
9	1	LM380162	FLOW METER MOUNT
10	1	LM380164	FLOW METER MOUNT
11	8	NUT12WHIZ	1/2" FLANGE NUT
12	16	NUT78NC	7/8" NUT
13	16	WSH78LOCK	7/8" LOCK WASHER

INSTALLATION OF FLOW METER BRACKETS

FLOW METER COMPONENT INSTRUCTIONS

1. Remove existing manure plumbing setup AFTER pump.

2. Cap agitation line on tank with provided parts

3. Locate flow meter bracket (LM380077 & LM310339) on tank wall, ensuring that it meets the following parameters.
   a. Flow meter requires a straight line run into and exiting meter for proper accuracy. All measurements are from flow meter center.
   b. Input length must be no less than five times hose diameter.
   c. Output length must be no less than two times hose diameter.
4. Plumb in new parts per assembly details.

5. Ensure directional flow arrow on flow meter is pointed in the proper direction of material flow.

6. Check to ensure flow meter control wires are pointed down to prevent water from entering the control box. If not, please contact Sioux Automation Center, Inc.

7. Install valve control bracket on hose apron (and opposite down pressure block if equipped).

8. Plumb hydraulic hoses per drawing details.

Installation of Flow Meter Brackets Top of Tank

Top mounted flow meter will only work with pumps mounted to the front of the tank.

1. Remove agitation hose from tank and cap agitation line with supplied cap (BLZ13101) and gasket (BLZ15625).

2. Lay out all components as shown in the illustration and parts breakdown drawing. Estimate the assembly length with flexible hose included. Measure and cut off the 6" hard line on top of the tank so flow meter components can be installed.

Note: 6" hard line hose must be spaced far enough above tank so that the bolt flange of the flow meter clears. Line may need to be raised to accomplish this.

3. Weld the four bolt flange (BURN13000030) on to the end of the 6" hard line cut off on the top of the tank. After welding repaint unpainted areas to prevent corrosion.

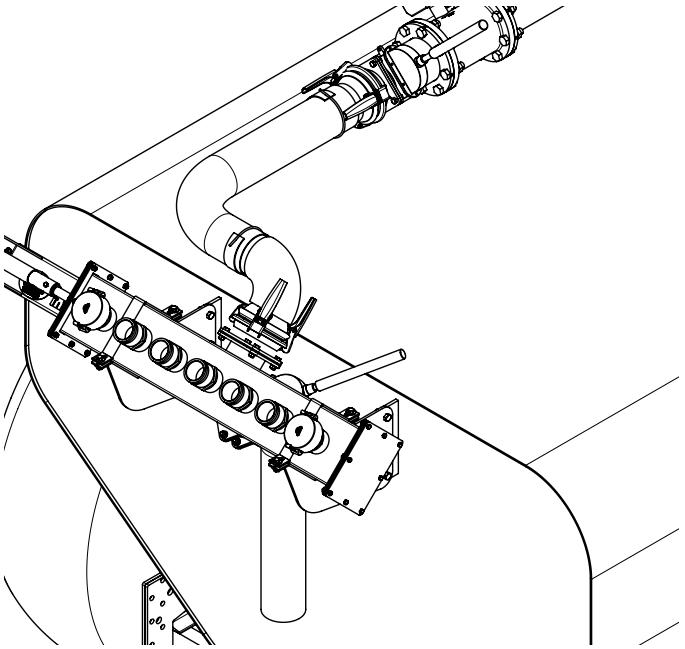
4. Bolt the four bolt flange end of LM380164 to the welded on flange. Use gasket (BLZ16035) to seal connection. Fasten with four 1/2" x 1-1/4" bolts, lock washers, and nuts.

5. Mount the flow meter to LM380164. Make sure extrusion on flow meter is not pointing straight up. Rotate extrusion minimum of a 45 degree angle. Use eight 7/8" x 3" bolts, lock washers, and nuts.

6. Mount LM380162 to the other end of the flow meter. Use eight 7/8" x 3" bolts, lock washers, and nuts.

Note: Custom brackets may need to be made to help support flow meter brackets

7. Install removed gate valve from original tank equipment. Mount to four bolt flange of LM380162.



INSTALLATION OF FLOW METER BRACKETS

Installation of Flow Meter Brackets Rear of Tank

1. Position two weld on brackets (LM310339) so that the flow meter mount (LM380077) can be bolted 24” directly above pump. Weld brackets in place and fasten LM380077 with four 1/2” x 2 bolts, flat washers, lock washers, and nuts.

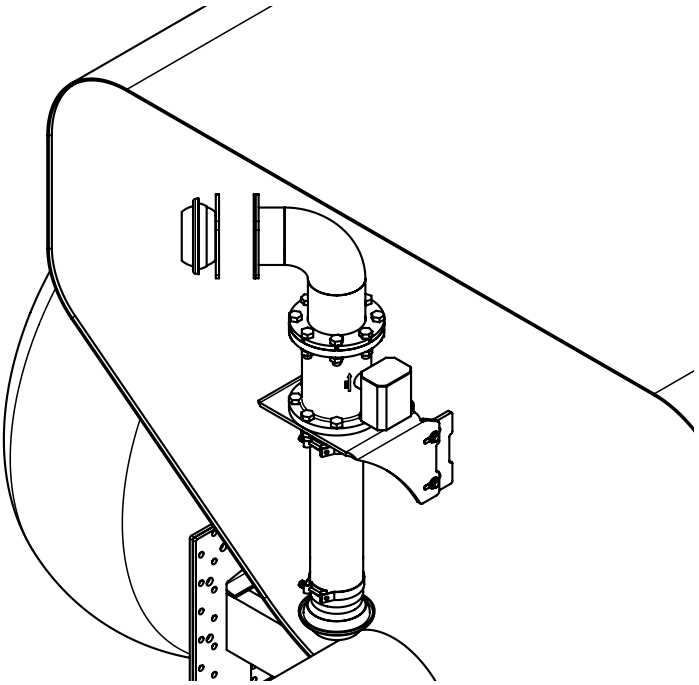
2. Assemble hose to connect flow meter mount (LM380077) with pump. Assemble quick connect fitting (BLZ16044) onto the 6” flexible hose (HOSIS6) and connect to pump outlet. Fasten other end to LM380077. Use two 8” hose clamps, one for each end.

3. Mount flow meter to top of LM380077. Fasten with 7/8” x 3” bolts, lock washers, and nuts. Be sure that the flow direction arrow on the flow meter is pointing up.

4. Fasten elbow (LM3800078) to the top of the flow meter. Use 7/8” x 3” bolts, lock washers, and nuts. Make sure to point elbow in the direct best suited for routing the outlet hose.

5. If applicable, reinstall clean out valve to elbow. Other wise mount (BLZ6926) quick coupler to flange on elbow or clean out valve.

6. Connect quick connect to manifold with 6” hose.



Installation of Flow Meter Brackets Front of Tank

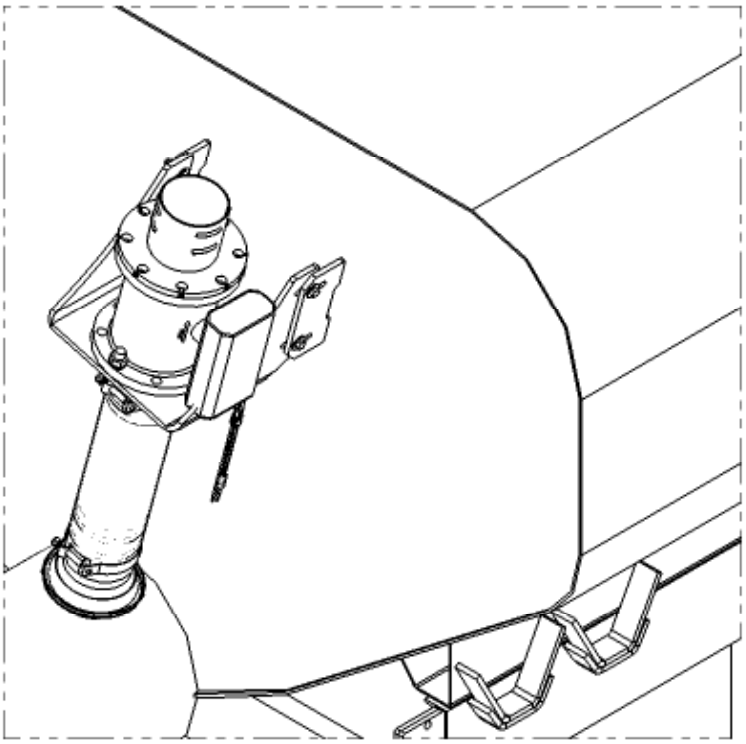
1. Position two weld on the flow meter mount (LM380104) directly above pump.

2. Assemble hose to connect flow meter mount (LM380104) with pump. Assemble quick connect fitting (BLZ16044) onto the 6” flexible hose (HOSIS6) and connect to pump outlet. Fasten other end to LM380104. Use two 8” hose clamps, one for each end.

3. Mount flow meter to top of LM380104. Fasten with 7/8” x 3” bolts, lock washers, and nuts. Be sure that the flow direction arrow on the flow meter is pointing up.

4. Fasten straight flange (LM380103) to the top of the flow meter. Use 7/8” x 3” bolts, lock washers, and nuts.

5. Connect LM380103 to hard line hose on top of tank.



FLOW METER INSTALLATION INSTRUCTIONS

RAVEN CONTROLLER AND WIRING INSTRUCTIONS

Note: Any and all information listed here may be superseded at anytime. Be sure to fully read and understand Raven Controller and Installation Manual (Granular Application).

1. Mount 660 controller inside cab at a readily visible and accessible position. (Hardware not included.)

2. Determine the boom switch location. Switch must be within six feet of controller. The boom switch starts and stops the manure flow in the field.

3. Ensure there are no parts that interfere with switch location (i.e. existing wires or circuit boards).

4. Drill one 7/16" hole and secure switch in location.

5. Route controller cable(LM380281) from 660 controller to tractor hitch.

6. Route wires from console cable(LM380102) to newly installed boom switch.

7. Route power supply wires (red and white) to 12V DC and grounding location.

8. Route and connect speed sensor harness to 660 controller. (This is customer specific, but could be radar, GPS, or wheel magnets.)

9. Route and secure final cable along tongue, allowing adequate slack for turning.

10. Attach 2-way flat connector in final cable(LM380281) to valve control located on hose apron.

11. Connect flow control cable(LM380279) to the final cable(LM380281).

12. Route and secure flow control cable(LM115059019) along inside of tank frame. Loop excess length under frame. Do not allow cables to droop to prevent catch points. (Front mount pumps skip to step 13.)

13. Connect to flow meter (LM200040).

14. Repeat steps 11-13 to install flow meter power cable (LM380280).

CONSOLE PROGRAMMING INSTRUCTIONS

NOTE: When system is first powered up the console will flash informing applicator to program console. After initial setup, settings will be retained in console memory. The following information is specific to liquid manure applications.

1. US-Volume per acre.
2. SP2-Radar speed sensor. Unless using wheel magnets.
3. GR1-Single Bed Belt
4. C-FC-Fast Close Valve
5. Boom 1 - Width Determined by number of shanks multiplied by the spacing in inches(i.e. 5 shanks on 30 inch spacing, boom width will be 150).
6. Boom 2 - Width will be zero.
7. Speed Cal - start with 598. This will need to be tested to ensure accuracy. Refer to 660 Controller Manual for steps on checking accuracy.
8. Meter Cal - 50 (Determined by tag on flow meter cable)
9. Valve Cal - 743 (Determined by tag on side of control valve)
10. Rate 1 - User specified in gallons per acre.
11. Rate 2 - User specified in gallons per acre.

Once this is completed flashing "CAL" will stop. The console is now programmed. Once all programming information is verified as accurate write down these numbers on tag located in Raven Controller Manual and keep in a safe place for future reference.

MAINTENANCE INCTRUCTIONS

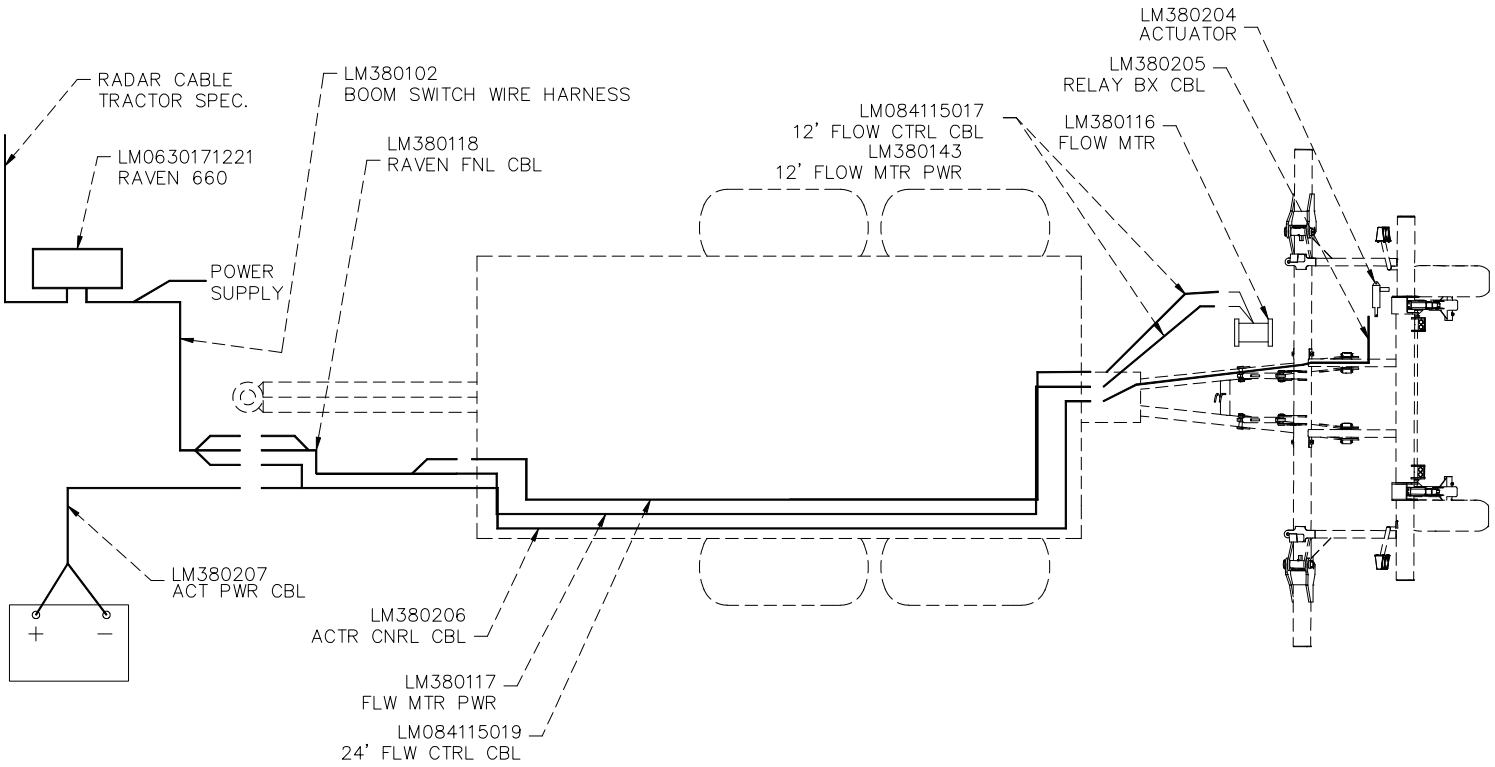
Refer to Owners Manual for Raven Controller for all maintenance information.

Refer to Owners Manual for Krohne Flow Meter for all maintenance information.

When washing down system, do not allow direct strike with power washer on flow meter control box. Hand washing is prefferred to prevent breaking the seal on the control box and damaging the system.

When system is not to be used for extended periods of time, take steps to protect control box from direct exposure to sunlight.

FLOW CONTROLLED



WIRING HARNESS INSTALLATION

Route wire harnesses as shown above. Keep wire harnesses clear of any pinch points. Secure plug connections at hitches and where ever nessessary. Power will need to be accessed from tractors battery.

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