

Advanced Conveyors & Bulk Handling Systems

The SMART Conveyor™ Company



SMART CONVEYOR™ MANUAL

36S

NEWLIFE FOREST PRODUCTS

14005 W Old Hwy 66
Bellemont, AZ 86015

BOTTOM DRAG CONVEYOR

JOB 0261 | Chip Conveyors

MACHINE

BDC36S-XF-0261-01..... 36S SMART Conveyor™, 30.2' OAL, from chipper

MAIN VOLTAGE

460 VAC

CONTENTS

Contents.....	i	Conveyor Paddle Orientation.....	11
Warranty Information	1	Conveyor Numbering & Flow Diagram	12
Safety.....	1	Best Practices.....	12
General.....	1	Troubleshooting	13
Safety Symbols.....	2	Components Installation and Specifications	14
Mechanical Safety Instructions.....	2	Gearmotor Documentation	14
Electrical Safety Instructions.....	2	SEW Motor Oil Fill Quantities	14
Maintenance	3	SEW Motor Wiring	15
Notices.....	3	Zero Speed Sensor (If equipped)	16
Instructions	3	Plug Detector and Mount (If equipped).....	17
Calendar	3	Machine Drawings	23
Maintenance References.....	4	General Information	23
Bolt Torque Specifications.....	5	BDC36S-XF-0261-01.....	28
Chain Replacement	6	Recommended Spare Parts List.....	31
Instructional Videos	6	Maintenance Record Table.....	33
Take-Up Units.....	7	BDC18S-XF-0261-01.....	33
Assembly and Startup Instructions	10	Support Information	34
Safety and Warnings	10	Copyright and Trademark Information	34
General Instructions.....	10		

WARRANTY INFORMATION

Your machine(s) come with certain limited warranties. Be aware that the warranty is void in the following cases:

- Improper use.
- Improper installation, startup, repairs, or maintenance.
- Delayed replacement of worn or broken parts.
- Use of spare parts not supplied by us.
- Overloading of the machine.
- Operation of the machine without proper guarding in place, either as provided by us or as determined necessary by you.
- Unapproved modification of the machine. All modifications to the machine must be performed by us or require written approval by us. In those cases of modifications done by written approval, the final modifications must be inspected by us to be approved.
- Failures caused by the occurrence of a Force Majeure, including natural disasters.

SAFETY

General

Biomass Engineering & Equipment (BE&E) makes every effort to use the latest technology and best practices to ensure a safe machine when used properly. We hereby offer a guide to the practical measures that the owners and users of the machines should take to maintain safety.

The machine is supplied with features for safe operation and maintenance. However, the machine is not supplied with all necessary safety equipment to meet every system layout and all operating conditions. It is impossible for BE&E to anticipate every circumstance that can arise in actual operation and therefore cannot ensure absolute safety of the machine in such circumstances. The buyer must review the installation and make adjustments to the safety systems to make the machine safe to operate. The buyer must evaluate the circumstances at each maintenance operation after installation and adjust safety practices to ensure the safety of personnel. The buyer takes full responsibility for installing and maintaining the necessary safety equipment to meet the requirements of the machines for the application chosen by the buyer. The buyer takes full responsibility for training the operator(s) in the proper use of the machines and safety procedures. The buyer takes full responsibility for any injuries that occur from the use or maintenance of the machines.

In all cases observe these rules:

- ⚠ Read the manual before installing, operating, or maintaining your Biomass Engineering and Equipment machinery to avoid personal injury or damage to property. Use lock-out, tag-out systems at all times.
- ⚠ There could be machinery in the system which starts automatically without warning. Do not assume a machinery component that is not moving has been switched off. It may merely be in a stopped position and can start immediately.
- ⚠ Do NOT operate your Biomass Engineering and Equipment machinery without all guards and electrical box covers in place. Serious injury could result from contact with moving parts or electrical circuits.
- ⚠ Do NOT place, leave, or store tools, or any other objects on the top of the machine. These items could go into the machine and cause severe injury or death. Best practice is to log out each tool used and log in each tool used.
- ⚠ Do NOT operate the machine with damaged or missing components.
- ⚠ Operation and maintenance of the machine must only be by properly trained personnel. Keep untrained personnel out of the working area of your Biomass Engineering and Equipment machinery. Serious personal injury could result from unexpected mechanical movement. The working area is defined as any area within arm's reach of a system component.
- ⚠ Remember that when the main disconnect is turned off all electrical safety locks are nonfunctional.
- ⚠ Do NOT remove safety guards, switches, barriers, safety, or warning labels at any time. Replace all such damaged labels immediately.

- ⚠ Do NOT defeat safety interlock switches. Serious injury or death could result from contact with moving parts or electrical circuits.
- ⚠ The machine must be stopped immediately and repairs made if a defect is identified.
- ⚠ Always turn off the machine prior to repair operations.
- ⚠ This machine contains rotating components that can store energy. Always release the stored energy when stopping the machine and always before entering the machine area.
- ⚠ Clean and inspect the electrical systems at least every month and replace defective components with the same rated parts. Do not allow dust to accumulate in electrical boxes and cabinets.

Safety Symbols

What do the Safety Symbols Danger, Warning, and Caution mean?

Danger: Immediate hazards which WILL result in serious injury or death. The instruction is stated first followed by the possible outcome of failing to heed the instruction.

Warning: Hazards or unsafe practices COULD result in serious personal injury or death.

Caution: Hazards or unsafe practices that COULD result in minor personal injury or property damage.

Mechanical Safety Instructions

- ⚠ **Danger:** Do not make adjustments to the machines while electrical power is connected. Unexpected machine motion will result in personal injury or death.

- ⚠ **Danger:** Stay clear of machinery during operation. Contact with rotating or moving parts will result in severe injury or death.
- ⚠ **Warning:** Stay clear of machinery during operation. Machine starts and stops automatically. Pinch points exist that could result in crushing or amputation injuries.
- ⚠ **Warning:** Keep all body parts and loose clothing clear of machinery. Pinch points exist that can result in crushing or amputation injuries.
- ⚠ **Caution:** Wear eye protection at all times near operating machinery. Severe eye injury can result from contact with flying debris.
- ⚠ **Caution:** Wear hearing protection at all times near operating machinery. Permanent hearing damage may result from prolonged exposure to machine noise.
- ⚠ **Warning:** NEVER weld anything to the conveyor box. The UHMW liners inside the conveyor are flammable. Burn injuries may occur if the liners catch fire.

Electrical Safety Instructions

- ⚠ **Danger:** Severe electrical shock or death will result from contact with energized circuits.
- ⚠ **Danger:** Disconnect the electrical power at the main machine disconnect before performing service on any electrical component. Practice proper lock-out/tag-out procedures when disconnecting electrical power. Severe electrical shock or death will result from contact with energized circuits.
- ⚠ **Danger:** Do not depend on EMERGENCY STOP / POWER OFF to de-energize the machine. Incoming electrical service is still powered. Severe electrical shock or death will result from contact with energized circuits.

MAINTENANCE

Notices

- ⚠ You are responsible for operating and maintaining the conveyor(s) in accordance with this manual.
- ⚠ You are responsible for monitoring bearing temperatures and establishing frequencies for doing so.
- ⚠ You are responsible for ensuring that foreign materials do not enter the material stream.

Instructions

- Always lock-out, tag-out machine before beginning maintenance.
- All fasteners must be checked monthly for tightness and any loose or damaged fasteners should be retightened or replaced.
- Chains must be free of slack and aligned. However, do not over tension, as this will prematurely wear the curves and chain.
- If chain shows excessive slack, it should be tightened. If chain has stretched to an extent that the slack cannot be removed by adjusting the take-up, the chain should be replaced or shortened.
- Replace the chain if it has excessive wear or other damage.
- Finding bent paddles in the conveyor is a sign of other problems. The paddles are designed to be the overload indication point and will bend to prevent damage to more critical conveyor components.

Calendar

Times are based on eight (8) hours of operation per day, five (5) days per week.

Daily Before Operation

Machine Cleaning

- Ensure that no strings are wrapped around rotating components, or shards are wedged between components.

- Remove any material around gearmotors and bearings.
- Ensure that all drive and take-up systems are free of debris.

Machine Safety

- Inspect that all machine guards are installed and functioning properly.
- Test all emergency stops.

Mechanical Inspection

- Watch for excessive play and listen for unusual noise that could indicate maintenance requirements. Immediately shut down any machine making unusual noise and address accordingly.

Controls Inspection

- Inspect for damaged sensors, cables, or wiring that pose hazards to function or safety. Note problems in the Maintenance Log Sheet.

Weekly

Machine Cleaning

- Open covers and remove excess chips from tail areas of the conveyors.

Machine Safety

- Inspect that all machine guards are installed and functioning properly.

Mechanical Inspection

- Ensure that keys are fully engaged with sprockets.
- Inspect that all paddles are straight on the conveyors.
- Inspect curve chain wear strips. The lower tracks of upper curves will degrade the fastest.
- Inspect chain for stretching. See **Measuring Chain Stretch** under **Maintenance References** for more details.

Monthly

Machine Cleaning

- Clean all electrical systems. Replace defective components with equivalently rated parts.

Lubrication

- Take-up and head bearings. Adjust the greasing frequency if needed. See **Take Up Lubrication Instructions** for more details.
- Check oil levels in gearboxes.

Machine Inspection

- Inspect chain systems for signs of wear and proper tension and alignment.
- Inspect bearings for signs of excessive wear, free rotation, and damage.
- All fasteners must be checked for tightness and any loose or damaged fasteners should be retightened or replaced.

Maintenance References

Lubrication Types & Schedule*

Location	Lubricant	Quantity (cm ³) [▲]	Interval**	Recommended Lubricant
Take-up, Head Bearings, Tail Bearings	NLGI 2 Lithium-Based Grease	1.9	12 Weeks	Mobilith SHC™ 100

*See *Bearing Lubrication* below for more details. **Times are based on 8 hours of operation per day, 5 days per week under normal operating conditions without excessive dust, water, corrosive vapors, or heat. [▲]The average hand-held grease gun dispenses ~0.6cc per stroke. Mobilith™ SHC 100 is a product of the Mobil Oil Co.

Bearing Lubrication

NORMAL OPERATION

The bearings on your conveyor(s) have been greased at the manufacturer's factory and come ready to run.

OPERATION IN THE PRESENCE OF DUST, WATER, OR CORROSIVE VAPORS

Under these conditions, the bearing should contain as much grease as the speed will

- Replace wear strips when the thinnest part measures 3/16".

Semi-Annual

Machine Inspection

- Thorough inspection of complete machine, noting all items that should be ordered for shutdown replacement.

Annual

Equipment Updates

- Contact Biomass Engineering and Equipment for retrofits and upgrades that may be available for your machinery. +1 317-522-0864.

Bi-Annual

Lubrication

- Replace motor oils. See **NORD Motor Lubrication** for details.

permit, since a full bearing with consequent slight leakage is the best protection against entrance of foreign material. Add grease until it shows at the seals and over the bearing; rotate the bearing to distribute the grease. Bearings should be greased as often as necessary (daily, if required) to maintain a slight leakage at the seals.

OPERATION AFTER STORAGE OR IDLE PERIOD

After storage or an idle period, add a small amount of fresh grease before running.

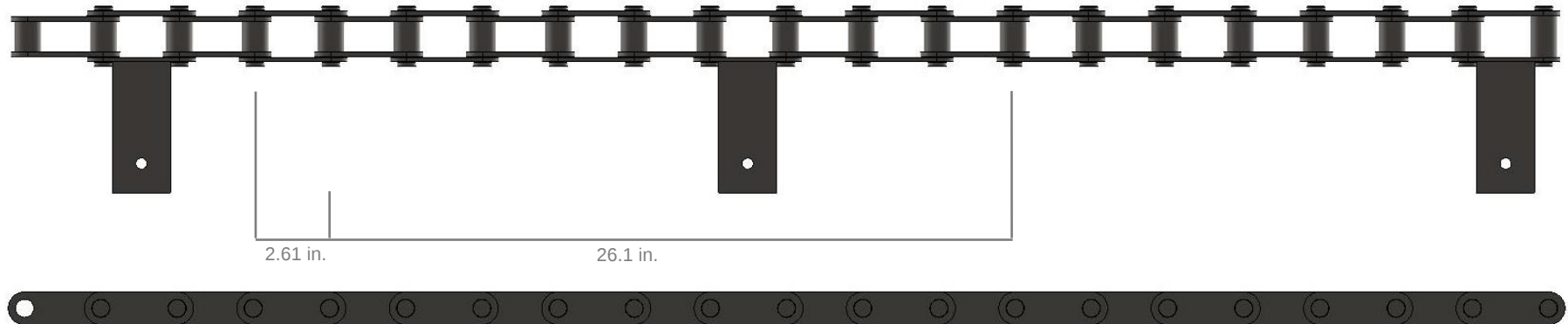
Average Weights of Loaded Sections

	Head		Straight		Tail		Curves		
Width (inches)	lbs/ft	lbs/5ft	lbs/ft	lbs/5ft	lbs/ft	lbs/5ft	lbs/15°	lbs/30°	lbs/45°
18	210	1050	105	425	210	1050	120	175	260
24	240	1200	100	500	240	1200	150	200	300
36	270	1350	135	675	270	1350	175	225	340
48	300	1500	150	750	300	1500	225	250	375

Bolt Torque Specifications

Bolt Size (inch)	Coarse Threads/Inch	Standard Dry Torque in Foot-Pounds					
		SAE Grade 0-1-2 74,000 psi Low Carbon Steel	SAE Grade 3 100,000 psi Med. Carbon Steel	SAE Grade 5 120,000 psi Med. Carbon Heat Temp. Steel	SAE Grade 6 133,000 psi Med. Carbon Temp. Steel	SAE Grade 7 133,000 psi Med. Carbon Alloy Steel	SAE Grade 8 150,000 psi Med. Carbon Alloy Steel
1/4	20	6	9	10	12.5	13	14
5/16	18	12	17	19	24	25	29
3/8	16	20	30	33	43	44	47
7/16	14	32	47	54	69	71	78
1/2	13	47	69	78	106	110	119
9/16	12	69	103	114	150	154	169
5/8	11	96	145	154	209	215	230
3/4	10	155	234	257	350	360	380
7/8	9	206	372	382	550	570	600
1	8	310	551	587	825	840	700
1-1/8	7	480	872	794	1304	1325	1430
1-1/4	7	375	1211	1105	1815	1825	1975
1-3/8	6	900	1624	1500	2434	2500	2650
1-1/2	6	1100	1943	1775	2913	3000	3200
1-5/8	5.5	1470	2660	2425	3985	4000	4400
1-3/4	5	1900	3463	3150	5189	5300	5650
1-7/8	5	2360	4695	4200	6980	7000	7600
2	4.5	2750	5427	4550	7491	7500	8200

Chain Replacement



⚠ BE&E recommends replacing the 81X-series chains in its S-Series SMART Conveyors™ when the average pitch reaches 1.21% of the rated pitch or 10 pitches measure 26.40". Failing to replace the chains when they have stretched this amount may result in chain failure. Chains may be replaced earlier as needed.

Chain	Pitch (in.)	Total Hardening Zone (in.)	Allowable Wear (%)	% Elongation @ Allowable Wear	Total Elongation (one pitch) (in.)	10 Pitches (in.)
81X	2.609	0.0394	80%	1.21%	2.640	26.40

Measuring Chain Stretch

To determine stretch in a chain, measure the average pitch of ten links and compare the result to the maximum allowable length as calculated below.

$$(\text{Rated Pitch}) \times 10 \times 101.21\% = \text{Maximum allowable length}$$

Example

For an 81X-series chain, multiply the chain's rated pitch (2.609") by 10 by 1.0121. The result is 26.40". If the center-to-center pitch measurement for 10 pitches is greater than 26.40", the chain should be replaced.

Instructional Videos

Instructional resources are available online.

- How to Replace Curve Wear Strips: <https://youtu.be/p-vvcR7DB7k>
- How to Replace Straight-Section Wear Strips: <https://youtu.be/fHm5jaT3Udw>

Take-Up Units

Adjustments for Standard Take-Up Systems

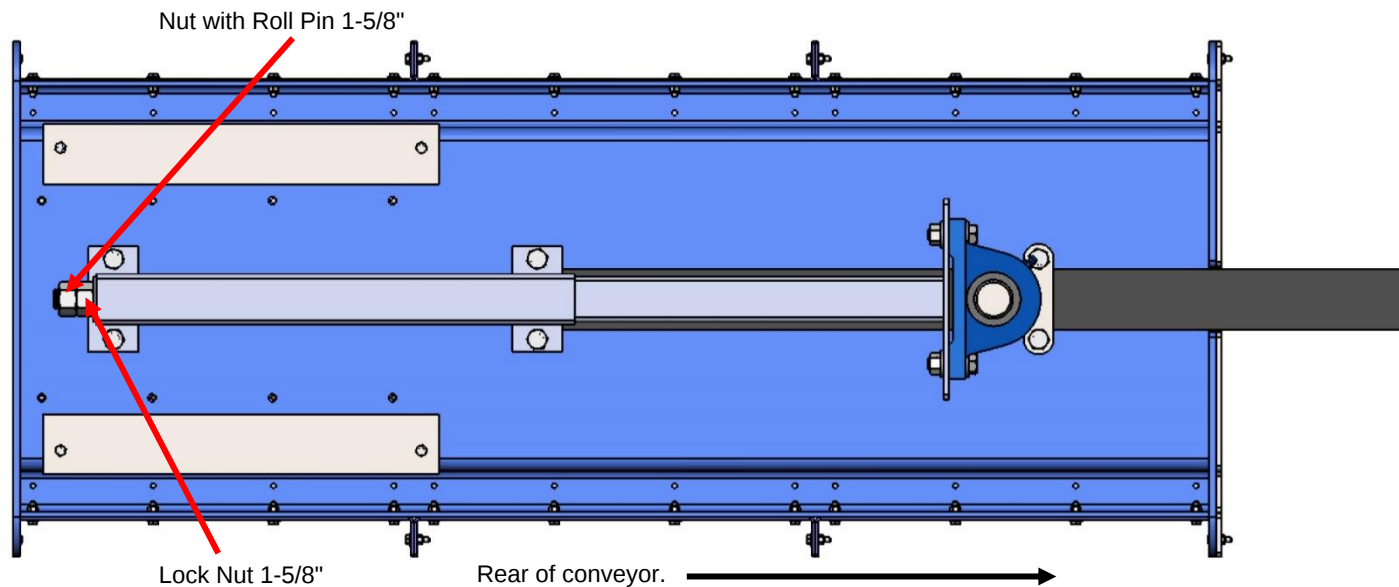
The take-up adjustment located at the tail end of the machine to help compensate for the extra chain slack added as the chain wears. To remove chain slack, the take up needs to be extended towards the rear of the machine.

The take-up system has a stroke of 18". Remove chain links if nearing the limit of the stroke. Loosen the lock nut shown in the diagram first. The pinned nut can then be turned to drive the bearing towards the rear of the machine. Adjust with the machine

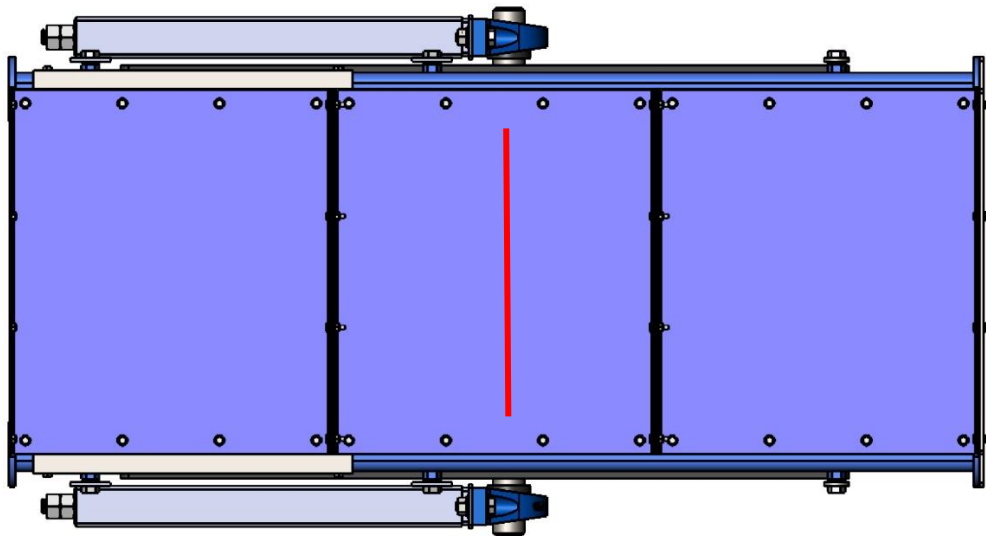
running. Be sure to tension the take-ups gradually and evenly to keep the tailshaft perpendicular to the length of the conveyor.

Please note that while some pillow block bearings used with our take-up frames are self-aligning, many are not. (The ones that are self-aligning have limits of 1 to 3 degrees.) Therefore, tighten both take-up frames at the same time; do not turn one screw more than one turn ahead of the other. If one person is tightening both frames, they will need to turn one screw a turn, then the other, and so on until proper tensioning is achieved.

⚠ Not following these precautions may lead to serious damage.

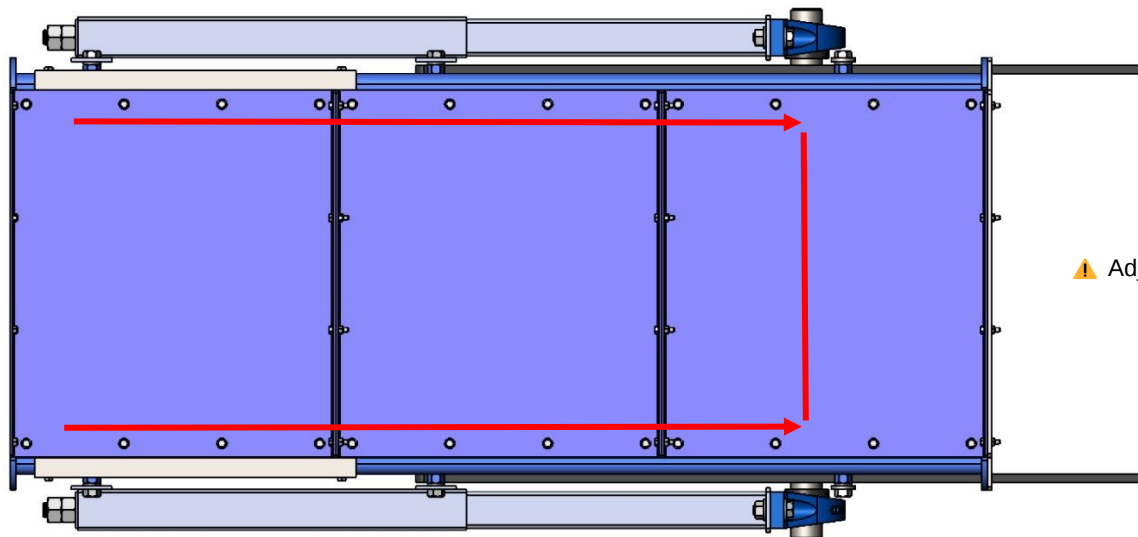


Beginning of Chain Life



⚠ Adjust both sides equally.

Extend Out as Chain Wears



⚠ Adjust both sides equally.

Take-Up Lubrication Instructions

The take-up frames are greased prior to assembly to protect them from corrosion. We recommend greasing the take-up frame bearings before installation or storage and at regular service intervals. Check the grease condition for excessive contamination and adjust the greasing frequency accordingly. You may find detailed suggested greasing intervals below:

Conditions	Up to 120°F (50°C)	120° to 200°F (50° to 90°C)
Clean	2 to 6 months	1 to 2 months
Moderate	Monthly	1 to 4 weeks
Dirty	Weekly	1 to 7 days
Extremely Dirty	Daily	Every shift

Video instructions for greasing are available at https://youtu.be/eJ8_CVEZKnA or upon request. An online version of these written instructions is available at <https://bit.ly/3d5gR9e>.

What You'll Need

- Two people
- 1"-diameter PVC tube rigged with a grease application zerk
- Impact wrench with 1-5/8" socket
- Adjustable wrench or open 1-5/8" wrench
- Grease gun with grease zerk fitting

Steps

1. Disassemble the take-up by reversing the welded bolt. You may need to hold the lock nut while doing this. Use an open or adjustable wrench if the lock nut tightens.
2. Slide the PVC pipe over the all-thread and apply grease through the zerk. Stop applying grease when the pipe has reversed out of the take-up housing about 5".
3. Slowly tighten the welded bolt while the second person pushes on the PVC pipe. Continue until the pipe fully enters the housing and covers all the threads with grease.
4. Remove the PVC pipe and check whether the all-thread is greased all the way to the step nut.
5. Reassemble the take-up by placing the interior housing on the floor and setting the exterior housing with the threaded bolt onto it. Run the take-up all the way down, and then reverse it to adjust the take-up as needed. This ensures all the threads are greased.



Pictured: A greased take-up thread.

ASSEMBLY AND STARTUP INSTRUCTIONS

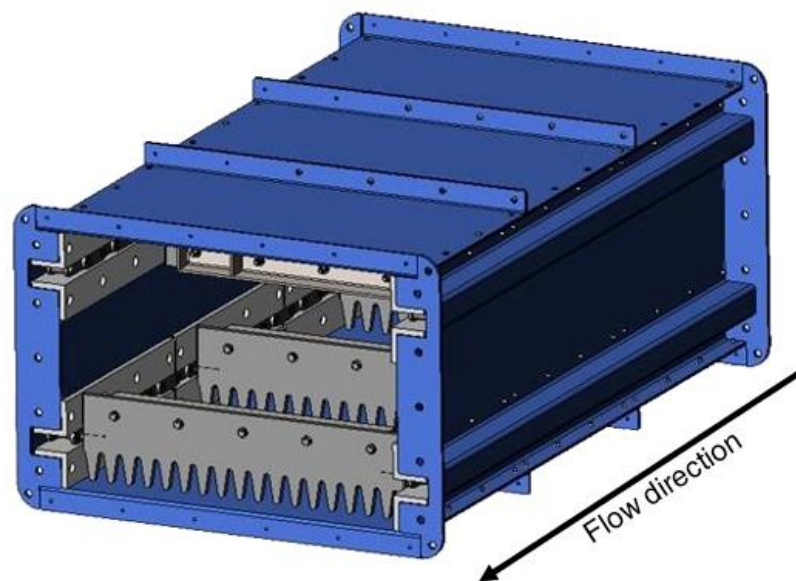
Safety and Warnings

- ⚠ Before starting the equipment, verify all personnel, tools, and foreign objects are away from the machine and all guards are in place.
- ⚠ **Warning:** NEVER weld anything to the conveyor box. The plastic liners inside the conveyor are flammable. Substantial damage will occur to the conveyor if these catch fire. If you desire to hang items like conduit along the conveyor, contact Biomass Engineering & Equipment for bolt-in hangers we have designed for this purpose.

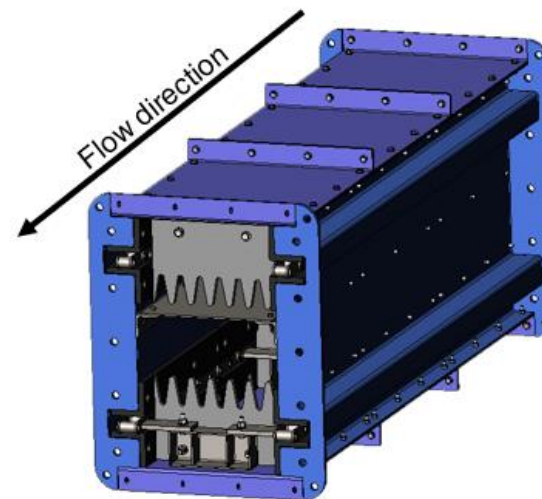
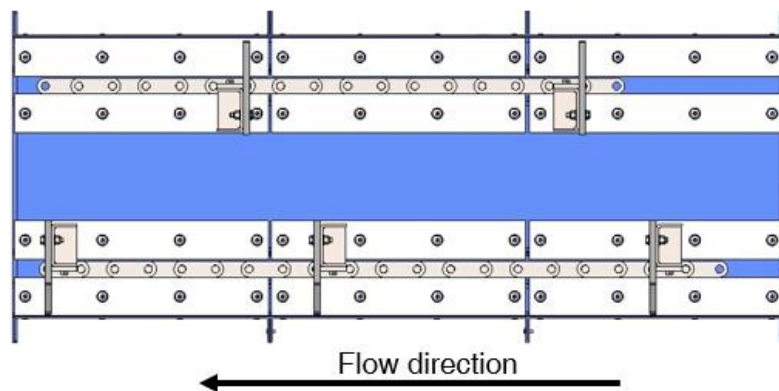
General Instructions

1. To assemble, set two (2) 10' sections on ground, leaving about 6" between them. Align them well enough that you can splice the chains with master links, **cotters inward**.
 - a. **Before** bolting the sections together, note of the locations for the S-Supports and Feet on the assembly and place them accordingly by the sections.
 - b. Note that assembling the conveyor on a flat, level surface will make construction much easier.
 - c. ⚠ **Line up the conveyor with each section oriented correctly.** Paddle brackets should face the tail (infeed end) of the conveyor as they travel toward the head (discharge end). Be mindful of whether the system is configured as a top-drag or bottom-drag conveyor. In bottom drag conveyors, the brackets will face the tail while traveling along the bottom of the conveyor. In top drag conveyors, the brackets will face the tail while traveling along the top of the conveyor. See **Conveyor Paddle Orientation** and **Flow Diagram** after this section for a visual explanation.
 2. Push the chains out to align the master links, and attach the links.
 - a. ⚠ **Caution:** When assembling sections in an awkward position or in the air, there is a risk that the sections will collide and pinch fingers or hands.
 - i. To avoid this risk, bolt the sections first, installing lifting lugs where needed. See note on Step 3. regarding placement of lugs. Next, take off the top and bottom panels around the connection and unbolt the paddles on either side of the master links. You will thus be able to safely connect the master links. After connecting the master links, re-bolt the paddles and panels.
 3. Bolt together the sections on the ground and install lifting lugs where needed. You can lift up to 60' at a time if you place the lifting lugs 40' apart (with 10' hanging over each end).
 4. ⚠ Check the chains when you fully assemble the conveyor. Add or remove chain links so you start with the tensioners fully retracted. **The chain should be neither loose nor taut. Simply remove slack from the chain.**
 - a. Take the cover off the head to inspect the chain. Ensure it is not sagging more than approximately 1" and that it is not taut.
 - b. Take off the cover at the tail. Ensure the chain is not sagging more than approximately 1" and that it is not taut.
 - c. Adjust the tail for the tightest chain. The tail should be parallel even if one chain is slightly slacker than the other. Get the tail as close to parallel as you can; you will perform the final adjustments to the chains while the conveyor is running.
 5. Refer to drawings for assembling and installing slide gates, deluge, inspection ports, or other components.
 6. After the conveyor is commissioned and has run for 1 hour, recheck the chain tension.
- ⚠ Biomass Engineering & Equipment will send a technician to do a final check before startup. You are OK to assemble the conveyor, adjust the chains, and prepare the conveyor for inspection. **Inspection is required to validate the warranty.**

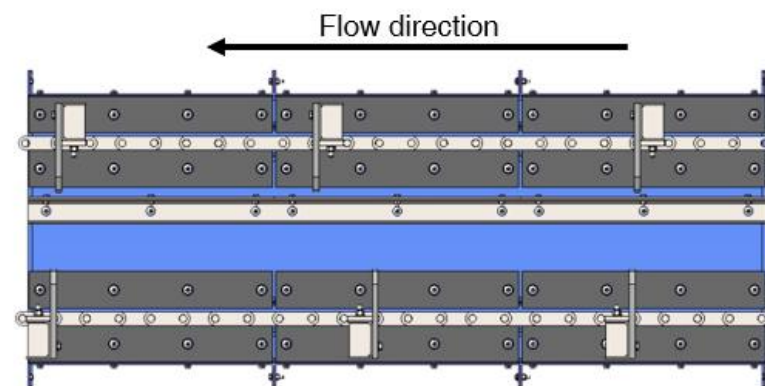
Conveyor Paddle Orientation



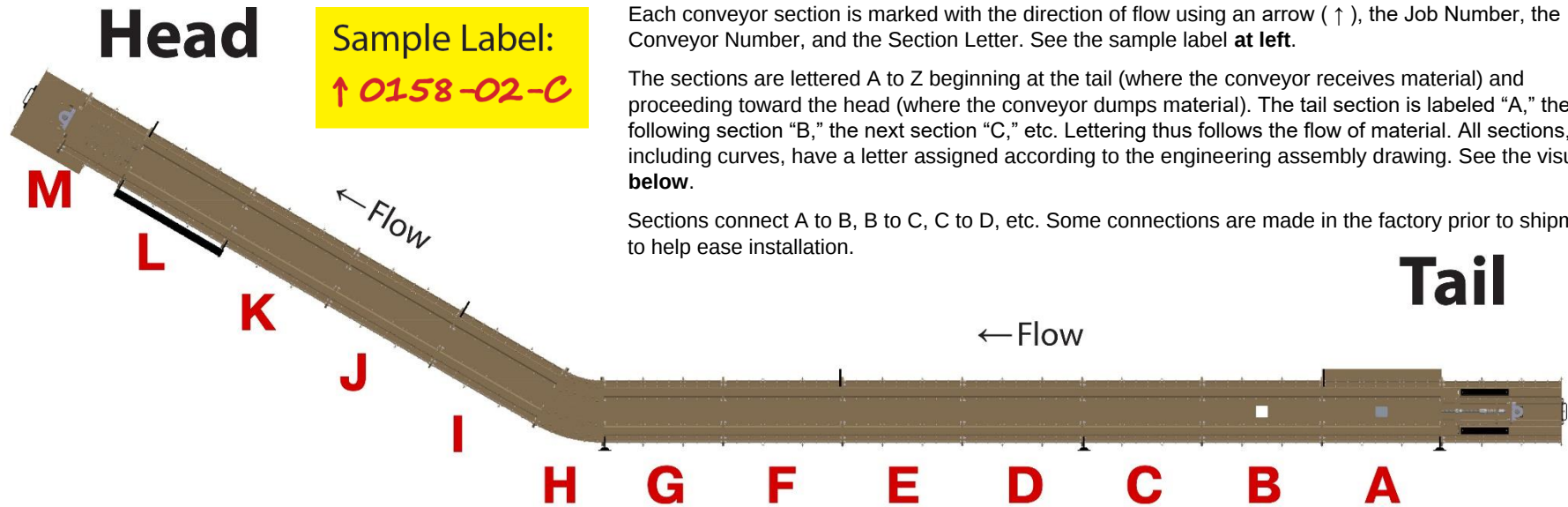
Bottom Drag Conveyor



Top Drag Conveyor



Conveyor Numbering & Flow Diagram



Best Practices

- **Do not set crossing conveyors too tight on each other.** Leave enough room in the chute to install a plug detector.
- **Construct chutes as big as reasonably possible and with a relieving design** (i.e., wider on the bottom than the top). Material gets packed as it moves down the conveyors and releases (fluffs up) in the chutes.
- **Get the chute’s splash plate to dump in the middle of the conveyor floor.** Uneven loads will cause uneven wear in the conveyor.
 - Use AR400 for splash plates.
- **Always extend chutes to the end of the head.** If chutes do not extend to the end, a shelf will form where material can build up.
- **Do not flood bottom drag conveyors.** When bottom drag conveyors are flooded, the return paddles must pull through the material against the material flow. This will damage the system. Be mindful of surges and either adjust the system to prevent them or ensure the conveyor can accept them without flooding.
- **Adjust the speed so the conveyor is full.** The conveyor should run only as fast as needed. Use VFDs to program the conveyor to vary the speed according to the load. A full paddle is, by default, evenly loaded from side to side. A conveyor that is partially full will likely have the material on one side of the floor, which will load the chains unevenly and lead to uneven wear.
- **Run the conveyor as slow as possible.** Slowing down the conveyor will ensure the chains last longer, as chains primarily wear at the pins and bushings as they rotate. *BE&E has sized and calculated the speed of your conveyor so it will run full without overloading the chain.*
- **Do not leave construction debris on the conveyor.**

TROUBLESHOOTING

	Problem	Common Causes	Solutions
1	Plugs are forming in the infeed or outfeed chute.	A. The chute is too narrow. B. Material is collecting on a ledge inside the chute. C. Oversized have entered the material stream and are catching in the chute. D. Too much material is entering the chute at once. E. The chute is not steep enough.	A. Widen the chute. If possible, create relieving walls, where the base is wider than the top. B. Remove the ledges. C. Screen obstructions from the material. D. Meter the material stream. E. Increase the chute angle.
2	A plug has formed, and the conveyor has not turned off.	A. No plug detector is installed. B. Automatic safety responses have not been programmed. C. Error in programming. D. Damaged plug sensor.	A. Install a plug detector and program the system to shut down the conveyor if it senses a plug. B. Program automatic responses. C. Consult an IT professional. D. Replace the plug detector.
3	Paddles rub against the sidewalls.	A. Paddles are too wide. B. The shaft or sprockets are misaligned.	A. Trim the paddles to fit. B. Align the shaft and sprockets.
4	Popping noises emanate from the conveyor.	A. Paddles are rubbing against bolts or rivets.	A. Trim the overlong rivets or bolts.
5	Conveyor is running backwards.	A. Motor is wired incorrectly.	A. Swap positive and negative wires.
6	Gearbox is overheating.	A. O-ring hasn't been removed.	A. Remove O-ring.
7	Chain wraps around tailshaft.	A. The chain is not properly tensioned.	A. Tension the chain to remove slack.
8	Material is getting into the chain path.	B. The conveyor lacks wear strips around the chute connection.	B. Add wear strips around the chute.
9	Amperage is spiking on the gearbox.	<i>Causes vary by gearbox manufacturer.</i> A. An obstruction has entered the material path and is blocking the normal operation of the conveyor. B. There is no oil in the gearbox. C. A bearing has no grease or is otherwise damaged. D. Paddle frames are rubbing against the sidewall.	A. Remove the obstruction and screen for future obstructions. B. Fill the gearbox with oil. C. Grease or replace the bearing. D. See Problem No. 3
10	Paddle teeth are bent or broken.	A. Obstructions have formed in the conveyor. B. A plug has formed in the infeed or outfeed chute.	A. Screen out metals and oversized materials from the material stream. B. See Problems No. 1 and 2.
11	Paddle frames are bent.	A. See Problem No. 10	A. See Problem No. 10
12	Chain has broken prematurely.	A. An obstruction has formed in the conveyor. B. A plug has formed in the infeed or outfeed chute. C. Conveyor is overloaded. D. Sprockets are misaligned. E. Chains are too tight and have accelerated the wear.	A. Screen out metals and oversized materials from the material stream. B. See Problems No. 1 and 2. C. Meter the material entering the conveyor to comply with its rated capacity. D. Align the sprockets. E. Do not overtighten the chains.
13	Broken drive shaft.	A. An obstruction has formed in the conveyor. B. The conveyor has been overloaded.	A. Remove the obstruction. Screen material entering the conveyor. B. Meter material entering the conveyor.

COMPONENTS INSTALLATION AND SPECIFICATIONS

Gearmotor Documentation

Conveyor	Gearmotor
BDC36S-XF-0261-01	VSEFA097-10-23-01R

VSEFA097-10-23-01R (10.0 hp)

Gear Ratio	75.63	Shaft Location	--	Cable Entry Loc	1
Prim/Sec Stages	3 / 0	Output Shaft Dia.	2.938"	Overhung Load	7,660 lbs
Output Speed	23 RPM	Output Shaft Style	Hollow Shaft	Output Torque	27,020 lbs-in
Motor Power	10.0 HP	Input Shaft Style	--	Torque Capacity	38,100 lbs-in
Motor Voltage	460 VAC	Flange Diameter	--	Nameplate S.F.	1.40
Frequency	60 Hz	Flange Location	--	Load S.F.	--
Brake Voltage	--	Conduit Box Loc	270	Weight (w/oil and ops)	535 lbs
Mtng. Position	M5				

Click the hyperlink to access the Operation and Maintenance Manual for this line of gearmotors: [General Gearmotor Maintenance Manual](#). This same document may be obtained as a separate attachment or hard copy upon request.

SEW Motor Oil Fill Quantities

For motor series FA., FH., FV., FAF., FAZ., FHF., FZ., FHZ., FVF., FVZ., FT..

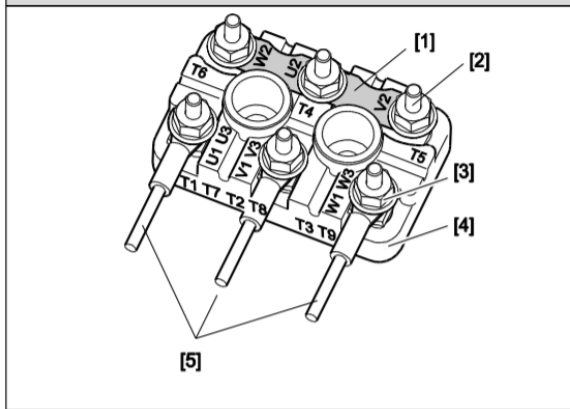
Gear Units	Mounting Position (Fill quantities are in liters)					
	M1	M2	M3	M4	M5	M6
F..27	0.60	0.80	0.65	0.70	0.60	
F..37	0.95	1.25	0.70	1.25	1.00	1.10
F..47	1.50	1.80	1.10	1.90	1.50	1.70
F..57	2.70	3.50	2.10	3.40	2.90	3.00
F..67	2.70	3.80	1.90	3.80	2.90	3.20
F..77	5.90	7.30	4.30	8.00	6.00	6.30
F..87	10.80	13.00	7.70	13.80	10.80	11.00
F..97	18.50	22.50	12.60	25.20	18.50	20.00
F..107	24.50	32.00	19.50	37.50	27.00	
F..127	39.0	54.50	34.00	61.00	45.00	46.50
F..157	68.00	103.00	62.00	104.00	85.00	79.50

SEW Motor Wiring

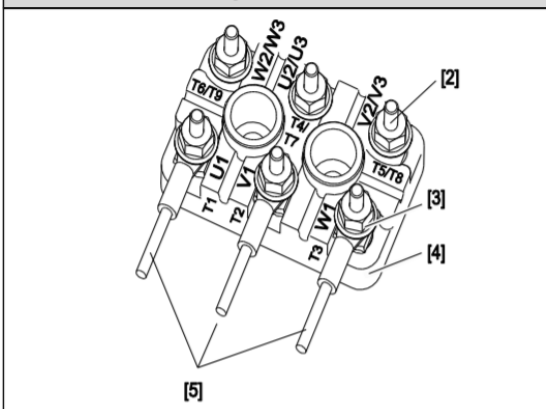
Connection Type: R76

Single Speed, Dual Voltage **Example: 230V YY / 460V Y**

Arrangement of terminal links for YY connection

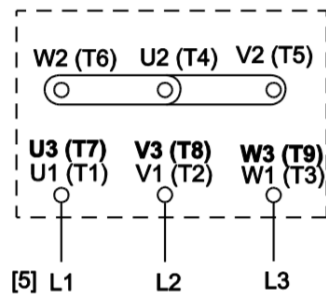
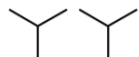


No terminal links required for Y connection



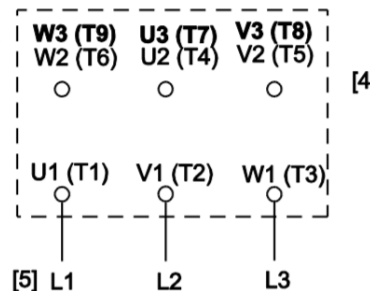
- [1] Terminal link
- [2] Terminal stud
- [3] Flange nut
- [4] Terminal board
- [5] Voltage supply (customer connection)

Low Voltage



Example: 230V

High Voltage



Example: 460V

⚠ VOLTAGE CHANGE

Three wires must be relocated and terminal links added to change from high to low voltage. The wires designated U3 (T7), V3 (T8), and W3 (T9) must be reconnected and terminal links added as shown in the diagram.

Changing from low to high voltage is carried out in reverse order.

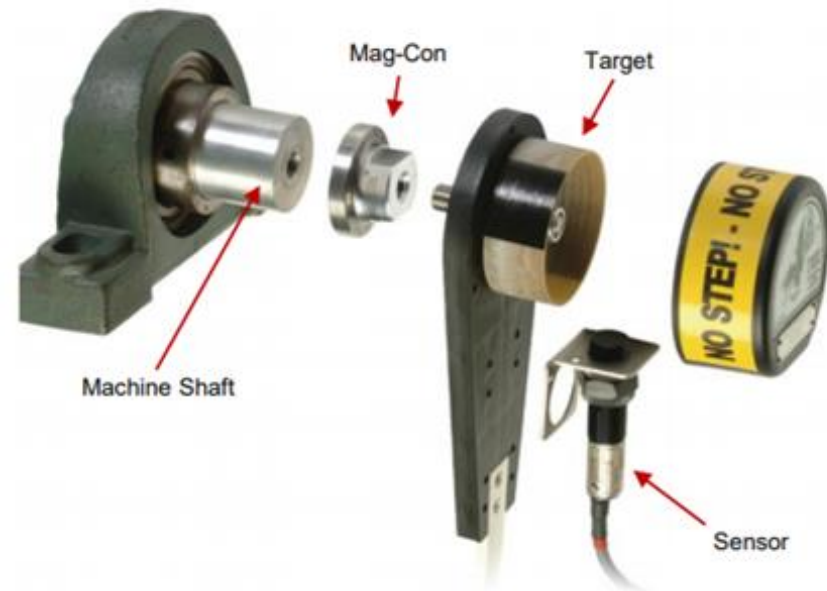
In both cases, the supply voltage is connected to U1 (T1), V1 (T2), and W1 (T3). The direction of rotation is changed by exchanging two wires.

Zero Speed Sensor (If equipped)

Specifications

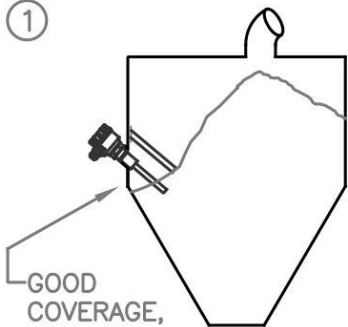
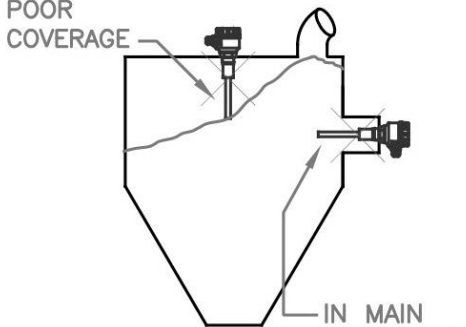
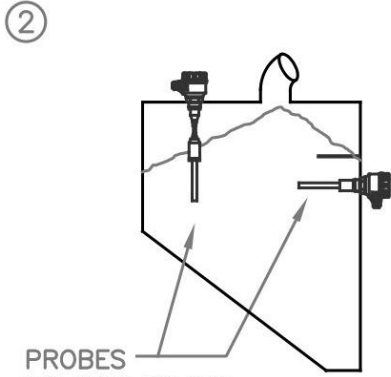
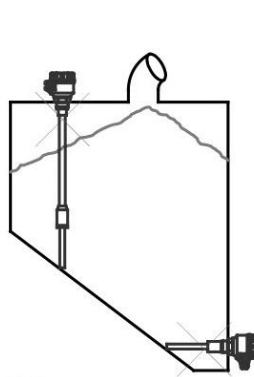
⚠ Proper lock-out and tag-out procedures must be followed during the installation procedure. The shaft must be stopped during the entire installation process.

Whirligig®	
Shaft Material	Stainless Steel
Body Material	Polypropylene
Bearing	Sealed Stainless Steel
Thread Size	1/2" UNC
Hex Wrench Size	5/8"
Maximum Speed	1,500 RPM
Pulses / Targets	1, 2, 4, or 8 (must specify)
Mag-Con™ Magnetic Connector	
Material	Stainless Steel
Holding Force	150 lbs.
Maximum Speed	300 RPM
Stop Switch	
Power Supply	24-240 VAC/VDC
Switching Capacity	200 mA Maximum
Saturation Voltage	8 Volts Maximum (output on)
Leakage Current	1.6 mA Maximum (output off)
Operation Temperature	-13°F (-25°C) to 158°F (70°C)
Relative Humidity	90% RH
Sensing Range	Ferrous Target – 5/16" (8mm) Max. Non-Ferrous Target – 3/16" (5mm) Max.
Enclosure	Nylon – ISO Threaded 18mm x 1mm Pitch
Cable	6' (2m) – 2 Conductor
Output State	Normal Closed (Volt drop 8V max.) above minimum speed. Normally Open (Leakage current 1.6mA max.) at Stopped Motion.
Input Pulse Range	20 to 2,000 PPM Maximum
Start Up Delay	4s
Trip Point	Stopped Motion if no input received for a period of 4s
LED indicators (2)	Red (input) = Target Sensed Green (output) = Closed Circuit
Protection	IP67
Approvals	CSA Class II Division 1 Groups E, F, and G (USA and Canada)



Plug Detector and Mount (If equipped)

- ⚠ The plug detector mount needs to be vertical even if the conveyor and chute are at an angle.
- ⚠ Handle the plug sensor with care. Any impact on the sensing probe may damage the sensing system. Do NOT hold the plug detector by the sensor. Do NOT hit the unit with a hammer. Do NOT step on it.

RECOMMENDED	NOT RECOMMENDED
①  GOOD COVERAGE, BAFFLED, OUT OF MAIN FLOW, ANGLED MOUNTING FOR POWDERS	POOR COVERAGE  IN MAIN FLOW, NOT BAFFLED, RECESSED MOUNTING
②  PROBES DO NOT TOUCH THE VESSEL STRUCTURE	 PROBES CAN TOUCH THE VESSEL WALL

Installation

Switching Point

In general, the vibrating rod can be installed in any position. The instrument only has to be mounted in such a way that the vibrating element is at the height of the desired switching point.

Mounting

- ⚠ The housing must not be used to screw the instrument in! Applying tightening force can damage internal parts of the housing. Use the hexagon above the thread for screwing in.

The vibrating element should protrude into the vessel to avoid buildup. For that reason, avoid using mounting bosses for flanges and screwed fittings. This applies particularly to use with adhesive products.

Mount the instrument in such a way that the vibrating rod does not protrude directly into the filling stream. If the rod is mounted in the filling stream, unwanted false measurement signals can be generated. If such an installation location should be necessary, mount a suitable protective sheet above or in front of the vibrating element.

To achieve a very precise switching point, you can install vibrating rod horizontally. However, if the switching point can have a tolerance of a few centimeters, we recommend mounting the rod approx. 20° inclined to the vessel bottom to avoid buildup.

Electrical Installation

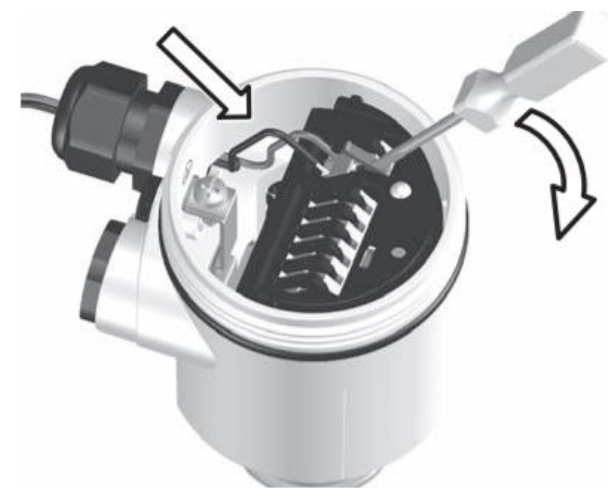
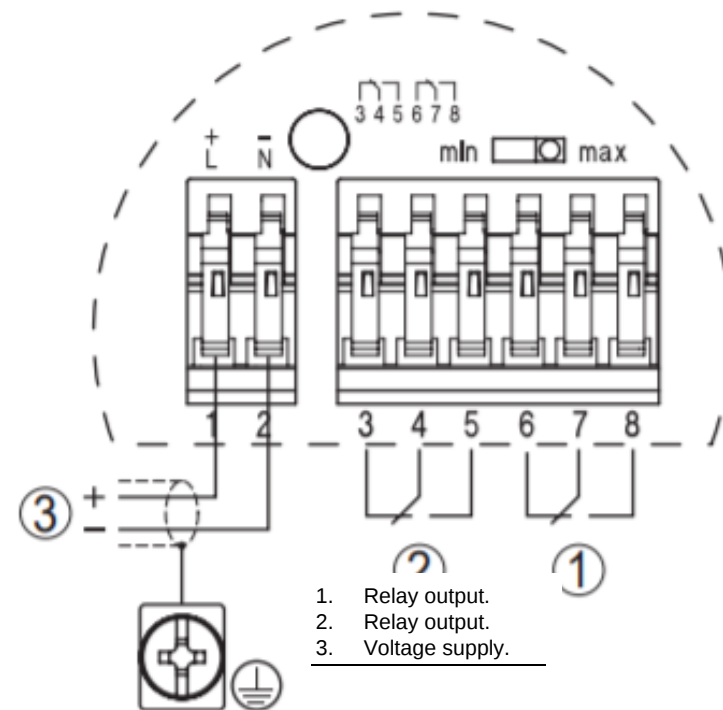
Hazardous Location Precautions

- ⚠ Observe the regulations listed in the NEC (USA) or CEC (Canada) regarding equipment in hazardous locations when installing the hazardous location models of the plug detector's level sensor in hazardous classified locations. Wiring must be performed according to the authority having site jurisdiction and is the sole responsibility of the installer to ensure such.
- ⚠ It is important to note that the hazardous location models are certified with two protection concepts: The probes and wires from them to the enclosure is an intrinsically safe circuit but is still Haz-Live. The enclosure and electronics within are not intrinsically safe and protection is by dust-ignition proof enclosure.
- ⚠ **Danger:** Connect only in the complete absence of line voltage.

Connection Procedure

We recommend connecting the vibrating rod's circuit in such a way that the switching circuit is open when there is a level signal, line break or failure (safe state). The relays are always shown in non-operative condition. See wiring plan at **right, top**.

1. Unscrew the housing lid
2. Loosen compression nut of the cable gland to remove blind plug.
3. Remove approx. 10 cm (4") of the cable mantle, strip approx. 1 cm (0.4") of insulation from the ends of the individual wires.
4. Insert the cable into the sensor through the cable entry.
5. Lift the opening levers of the terminals with a screwdriver (see illustration at **right, bottom**).
6. Insert the wire ends into the open terminals according to the wiring plan.
7. Press down the opening levers of the terminals, you will hear the terminal spring closing.
8. Check the hold of the wires in the terminals by lightly pulling on them.
9. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable.
10. If necessary, carry out a fresh adjustment.
11. Screw the housing lid back on.



Function/Configuration

On the electronics module (see figure **at right**) you will find the following display and adjustment elements:

- Potentiometer for adjustment of the density range (1)
- DIL switch for mode adjustment - min./max. (2)
- Signal lamp (5)

Adjustment of Density Range

With the potentiometer you can adapt the switching point to the solid. It is already preset and must only be modified in special cases. As a default setting, the potentiometer of VEGAVIB 61 is set to the complete right position ($> 0.1 \text{ g/cm}^3$ or 0.0036 lbs/in^3). In very light solids you have to turn the potentiometer to the complete left position ($0.02 \dots 0.1 \text{ g/cm}^3$ or $0.0007 \dots 0.0036 \text{ lbs/in}^3$). By doing this, the vibrating rod will be more sensitive and light solids can be detected more reliably. For instruments detecting solids in water, these settings are not applicable. The density range is preset and must not be changed.

Mode Adjustment

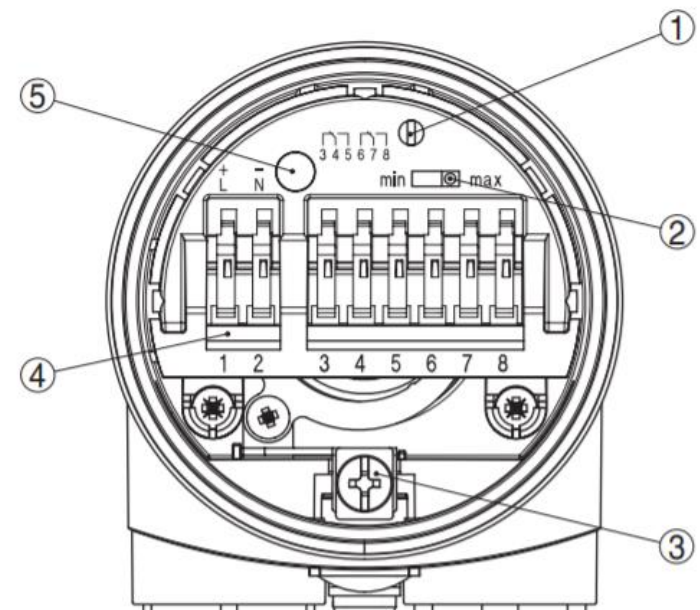
With the mode setting (min./max.) you can change the switching condition of the relay. You can set the required mode according to the "Function table" (max. - max. detection or overflow protection, min. - min. detection or dry run protection). We recommend connecting according to the idle current principle (relay contact deenergizes when the switching point is reached), because the relay always takes on the same (safe) state if a failure is detected.

- ⚠ As a rule, always set the mode with mode switch (2) before starting the setup of vibrating rod. The switching output will change if you set the mode switch (2) afterwards. This could possibly trigger other connected instruments or devices.

Signal Lamp

Control lamp for indication of the switching status

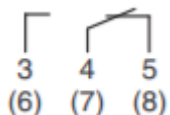
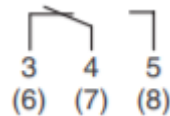
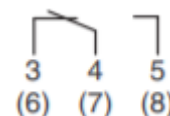
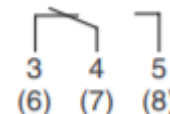
- **Green** = Relay energized
- **Red** = Relay deenergized
- **Red (flashing)** = Failure



1. Potentiometer for adjustment of the density range.
2. DIL switch for mode adjustment.
3. Ground terminal.
4. Connection terminals.
5. Control lamp.

Functions

The following table provides an overview of the switching conditions depending on the set mode and the level.

	Level	Switching Status	Control Lamp
Mode Max. Overflow Protection		 Relay Energized	 Green
Mode Max. Overflow Protection		 Relay Deenergized	 Red
Failure of the Supply Voltage (min./max. mode)	Any	 Relay Deenergized	
Fault	Any	 Relay Deenergized	 Flashes Red

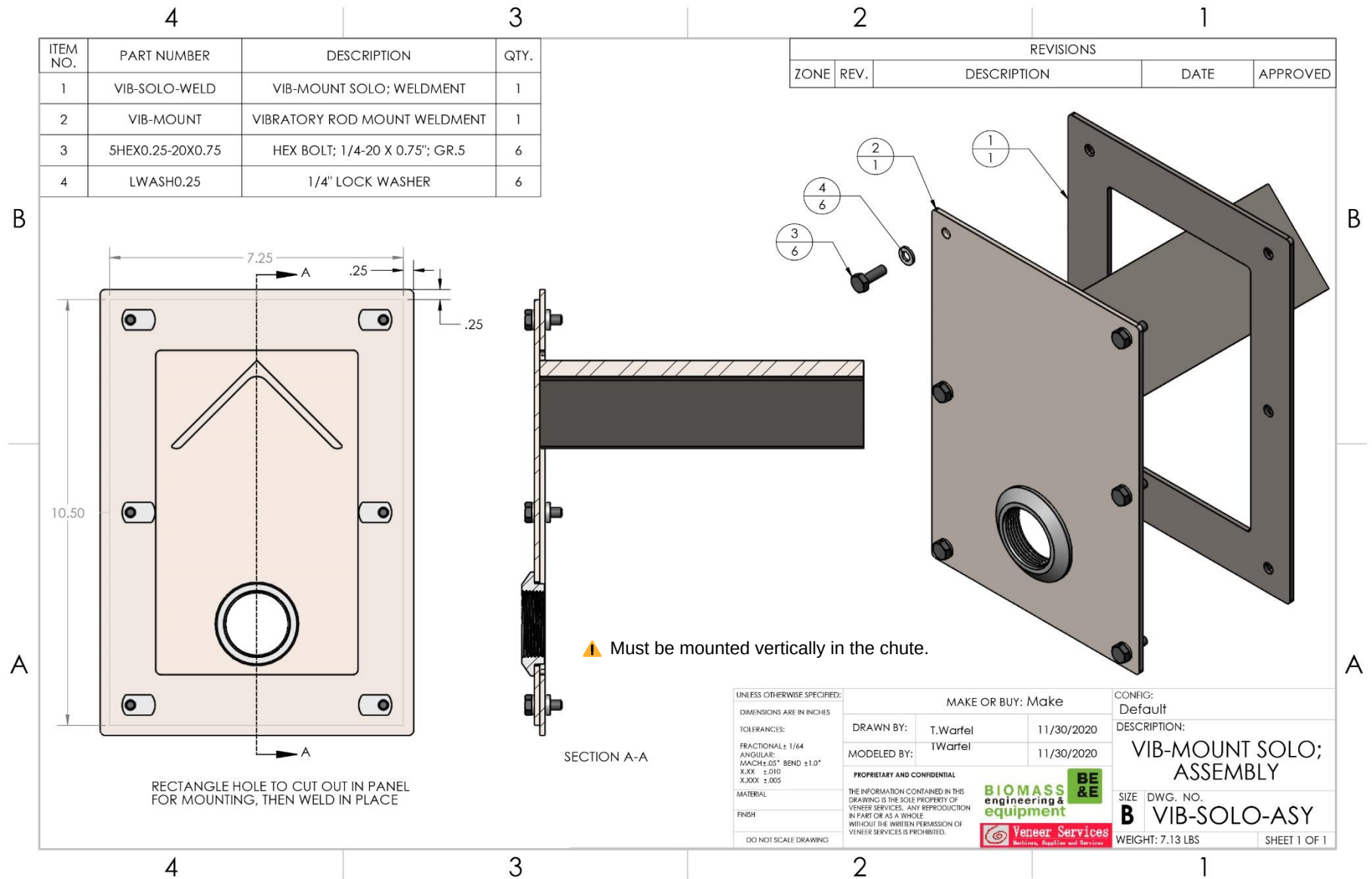
Electromechanical Data

Cables and Plugs	
Cable Entry	Plug
Single Chamber Housing	1 x cable entry M20 x 1.5 (cable Ø 5...9mm), 1 x blind plug M20 x 1.5; attached 1 x cable entry M20 x 5
	—OR—
	1 x cable entry ½ NPT, 1 x blind plug ½ NPT, 1 x cable entry ½ NPT
	—OR—
Spring-Loaded Terminals	1 x plug M12 x 1; 1 x blind plug M20 x 1.5
	For wire cross-section up to 1.5mm ² (AWG 16)
Adjustment Elements	
Mode Switch	Purpose
Min.	Min. detection or dry run protection.
Max.	Max. detection or overflow protection.
Voltage Supply	
Supply	Note
Operating Voltage	20...253 V AC, 50/60 Hz, 20...72 V DC (at U >60 V DC, the ambient temperature can be max. 50°C/122°F)
Max. Power Consumption	8 VA (AC), 1.5 W (DC)

Troubleshooting

Error	Cause	Solution
Vibrating rod signals "covered" without being submerged (overflow protection) or Vibrating rod signals "uncovered" when being submerged (dry run protection)	Operating voltage too low.	Check operating voltage.
	Electronics defective.	Press the mode switch. If the instrument then changes the mode, the vibrating element may be covered with buildup or mechanically damaged. Should the switching function in the correct mode still be faulty, return the instrument for repair.
		Press the mode switch. If the instrument then does not change the mode, the electronics module may be defective. Exchange the electronics module.
	Unfavorable installation location.	Mount the instrument at a location in the vessel where no dead zones or mounds can form.
Signal lamp flashes red.	Buildup on the vibrating element.	Check the vibrating element and the sensor for buildup and remove the buildup if there is any.
	Wrong mode selected.	Set the correct mode with the mode switch (overflow protection, dry run protection). Wiring should be carried out according to the closed-circuit principle.
	Error on the vibrating element.	Check if the vibrating element is damaged or extremely corroded.
	Interference on the electronics module.	Exchanging the electronics module.
	Instrument defective.	Exchange the instrument or send it in for repair.

Mount Parts and Descriptions



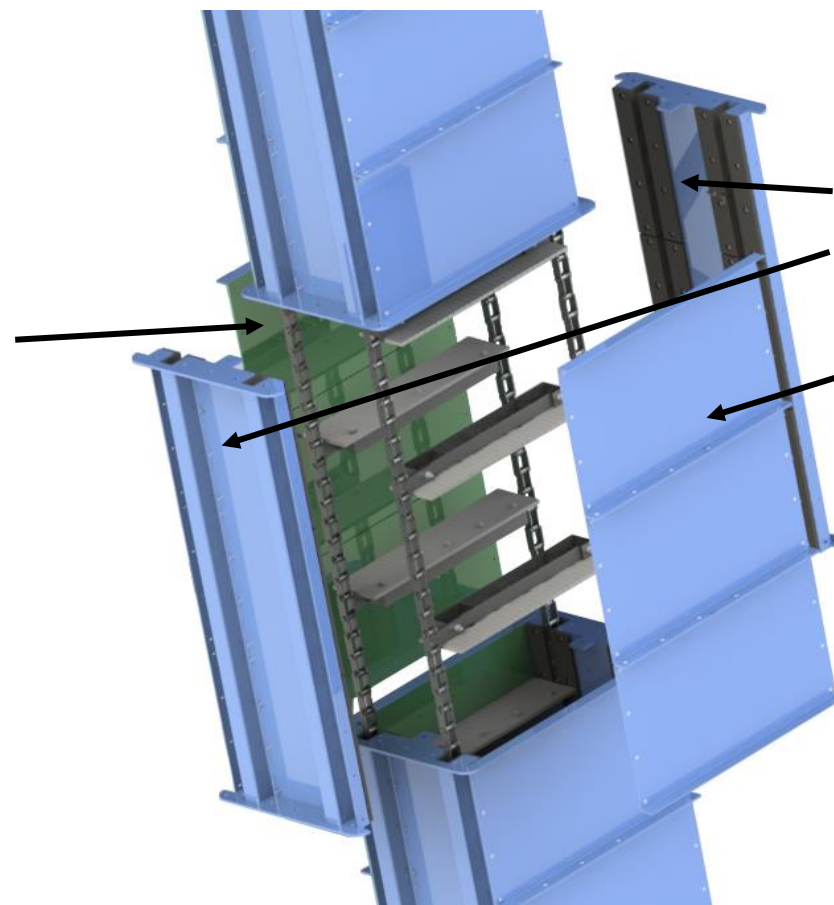
MACHINE DRAWINGS

General Information

Notes on Galvanized and Stainless Options

- Add the suffix “-SS” for stainless parts; e.g., 18S-TBP-SS (18S 304SS Top/Bottom Panel).
- Add the suffix “-GAL” for galvanized parts; e.g., 18S-TBP-GAL (18S Galvanized Top/Bottom Panel).
- Specify Hot Dipped Galvanized finish when ordering replacement side panels.

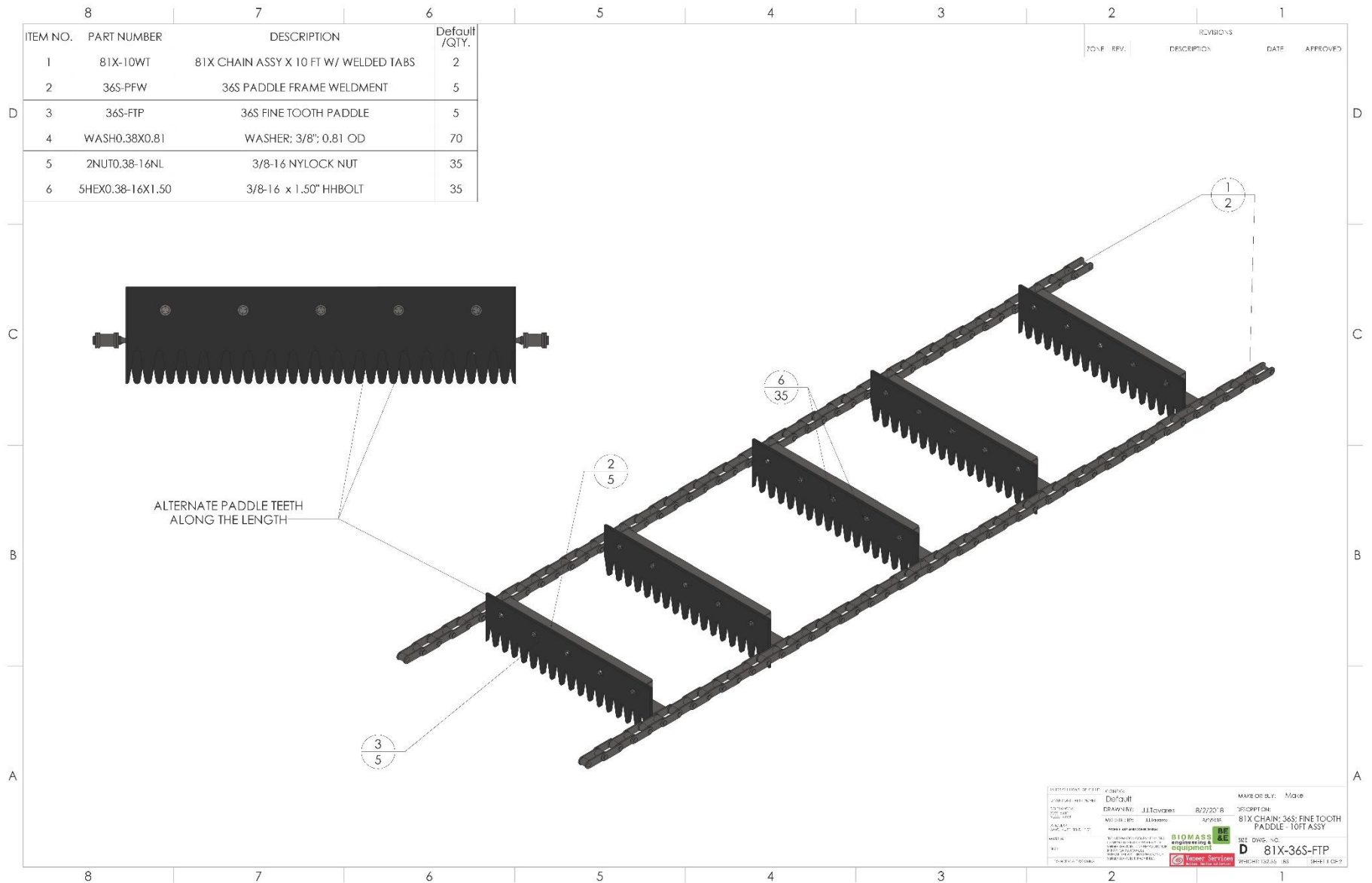
Bottom panels: 3 pieces
AR liner plates (if included): 3/16"
Tri-Braze liner plates (if included): 1/4"
If galvanized: 10-gauge steel
If stainless: 11-gauge 304 SS



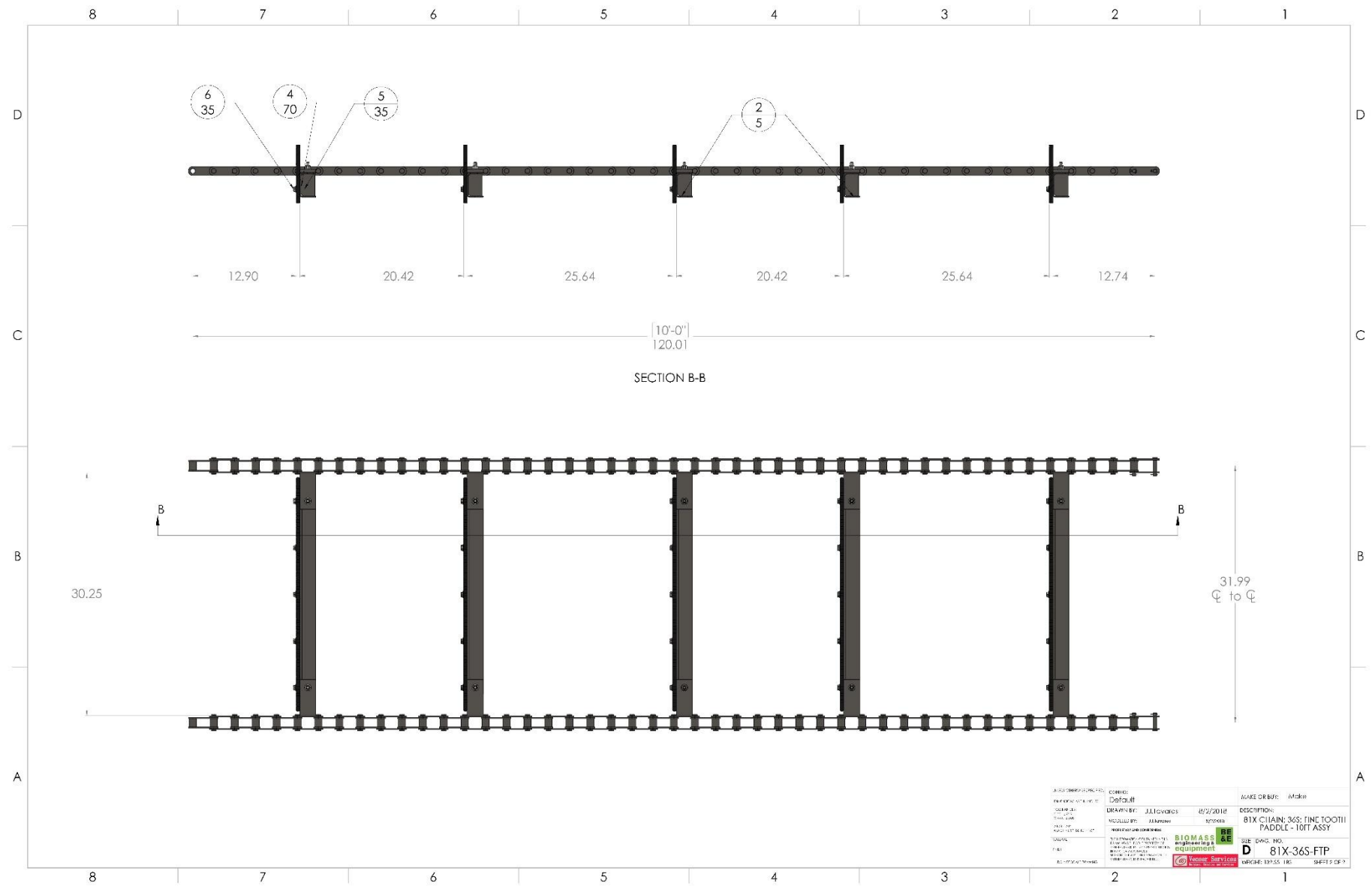
Side panels: 2 pieces
If galvanized: Steel weldment is galvanized after welding.

Top panels: 3 pieces
If galvanized: 10-gauge steel
If stainless: 11-gauge 304 SS

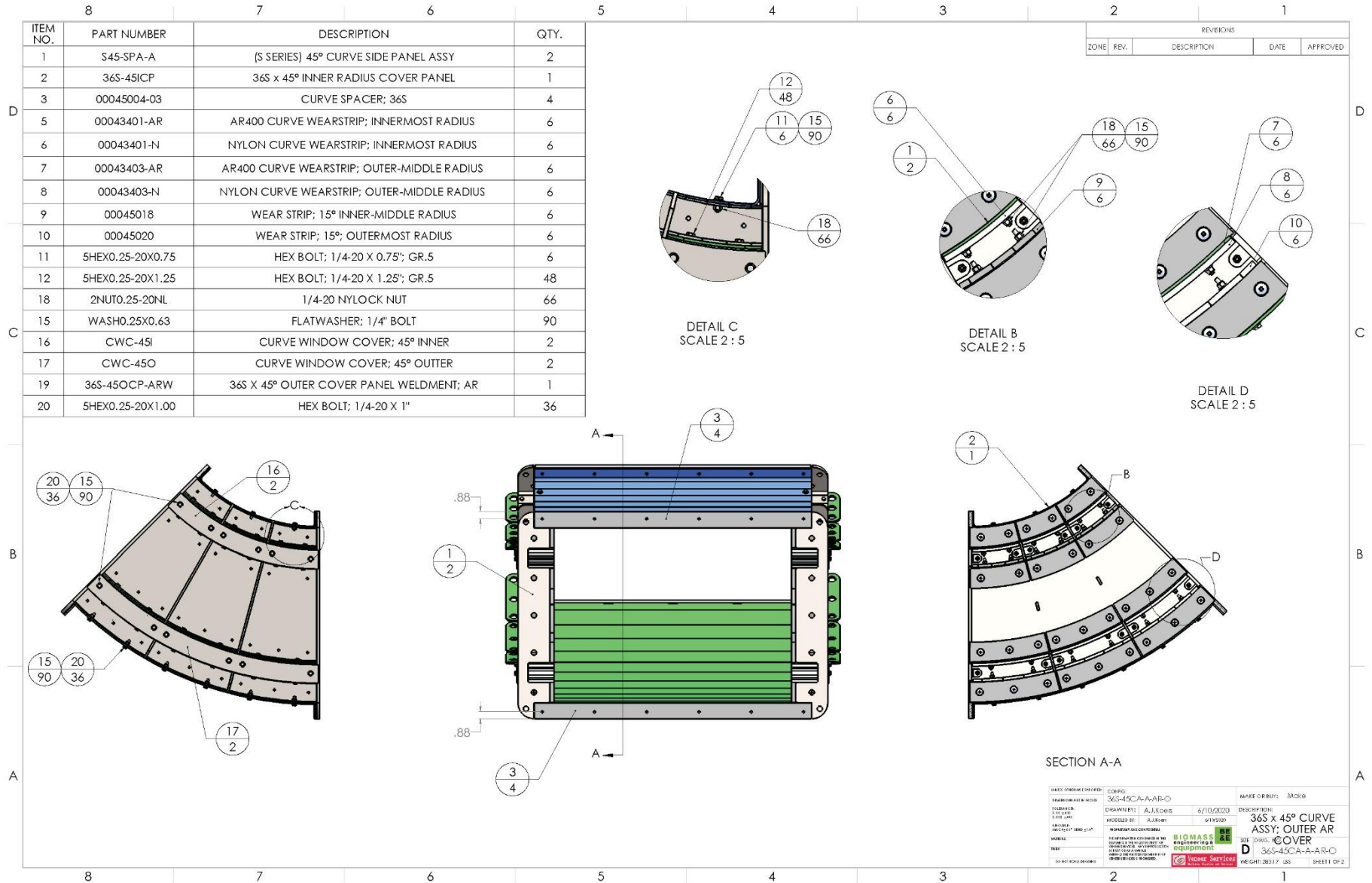
Chain and Paddle Assembly (1)



Chain and Paddle Assembly (2)



Curve (1)



DETAIL E
SCALE 2:5



BDC36S-XF-0261-01

Parts and Descriptions

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	36S-TSA-AR	36S TAIL SECTION ASSY; AR PLATE	1
2	36S-FA97-215R-A-AR	36S HEAD SECTION ASSY; FA97; 2-15/16" AR PLATE	1
3	36S-45CA-A-AR-O	36S x 45° CURVE ASSY; OUTER AR COVER	1
4	VSEFA097-10-23-01R	GEARMOTOR; 10HP @ 23RPM; SHAFT DIAMETER 2.938"; KEYED HOLLOW SHAFT	1
5	36S-SSB-AR	36" STRAIGHT SECTION; W/ AR FLOOR	4
6	CHUTE-36S1	36S DISCHARGE CHUTE ASSY; 1-PANEL STRAIGHT	1
7	CHUTE-36S3	36S DISCHARGE CHUTE ASSY; 3-PANEL STRAIGHT	1
8	CHUTE-36S2	36S DISCHARGE CHUTE ASSY; 2-PANEL STRAIGHT	1
9	36S-TBP-AWA	SEALED ACCESS WINDOW	3
10	S-FOOT	CONVEYOR FOOT SUPPORT ASSY	6
11	S-SUPPORT	CONVEYOR SUPPORT ASSY (S-SERIES)	2
12	LIFT-S	LIFTING LUG (S-SERIES)	4
13	VVV00061	VIBRATORY SENSOR	2
14	VIB-SOLO-ASY	VIB-MOUNT SOLO; ASSEMBLY	2
15	V4800010	ZERO SPEED SENSOR PACKAGE; 110VAC	1
16	81X-36S-FTP	81X CHAIN; 36S; FINE TOOTH PADDLE - 10FT ASSY	7
17	36S-FTPW	36S FINE TOOTH PADDLE; WHITE	1
18	00044830	S-STRAIGHT SECTION WEAR STRIP; 1/2" THK	14
19	5HEX0.25-20X0.75	HEX BOLT; 1/4-20 X 0.75"; GR.5	56
20	5NUT0.25-20	NUT; 1/4-20	56
21	8WASH0.25X0.63	FLATWASHER; 1/4" BOLT	56
22	KIT36S-0261-01	BOLT KIT	1

*ITEMS 17, 19, 20, 21, & 22 ARE NOT SHOWN
 **MOST CHAIN ASSEMBLIES SHIPPED INSIDE STRAIGHT, HEAD, AND TAIL SECTIONS. EXTRA SHIPPED LOOSE
 ***INSTALL ANGLE WEAR STRIPS ON TOP ROW OF CONVEYOR DIRECTLY BELOW INLET CHUTES & THE FIRST PANEL BEFORE AND AFTER THE CURVE

DETAIL A
SCALE 1 : 10

DESCRIPTION: 36S BOTTOM DRAG CONVEYOR; FROM CHIPPER DISCHARGE 60-610

REV: 01

DATE: 10/10/2018

APPROVED: [Signature]

DESCRIPTION: 36S BOTTOM DRAG CONVEYOR; FROM CHIPPER DISCHARGE 60-610

REV: 01

DATE: 10/10/2018

APPROVED: [Signature]

DESCRIPTION: 36S BOTTOM DRAG CONVEYOR; FROM CHIPPER DISCHARGE 60-610

REV: 01

DATE: 10/10/2018

APPROVED: [Signature]

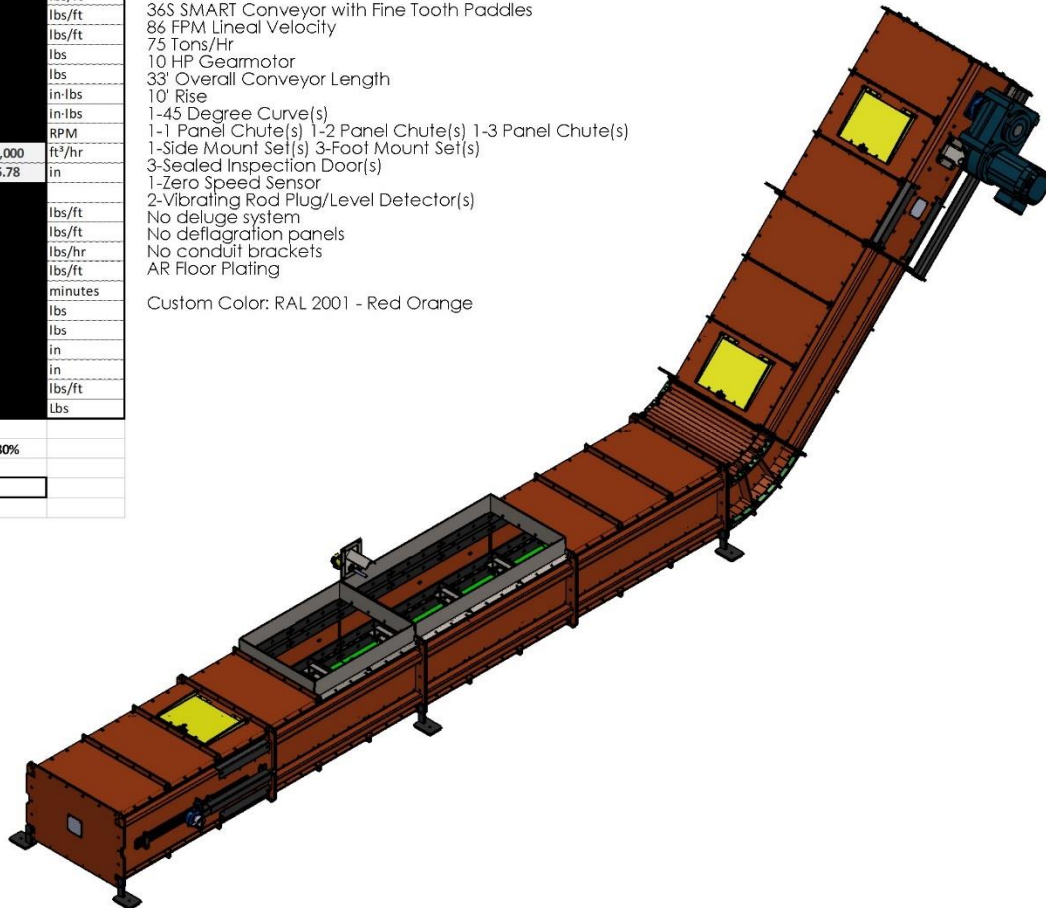


Sizing and Workload Calculations

	8	7	6	5	4	3	2	1
Conveyor Length (Effective)	33	ft	Average Tension/ft	93.86	lbs/ft			
Total Δ Height of System	10	ft	Drag Fill Tension/ft	87.72	lbs/ft			
Drag Fill Length	16	ft	Friction Tension/ft	28.09	lbs/ft			
Mass Flow Rate	75	tons/hr	Total Tension	3,097	lbs			
Angle of combined Curves	45	°	Curve Friction	401	lbs			
Material Density (HP)	25.0	lbs/ft ³	Torque	21,992	in-lbs			
Material Density (Volumetric)	25.0	lbs/ft ³	Torque + 1.25 Safety Factor	27,490	in-lbs			
Linear Velocity	85.50368	ft/min	Shaft Rotational Speed	23.00	RPM			
Conveyor Width	365	in	Volumetric Flow Rate	6,000	ft ³ /hr			
Chain Type	81X	73%	Average Material Height	5.78	in			
From Chipper Discharge			Number of Paddles Required	33				
60-610			Material Weight/ft	29.24	lbs/ft			
			Paddle Weight /ft	13.50	lbs/ft			
			Mass Flow Rate	150,000	lbs/hr			
			Material, Chain, & Paddle Lbs/ft	52.74	lbs/ft			
Constants			Total Material Transfer Time	0.39	minutes			
Paddles/ 10 ft Section of Chain	5		Shaft Tension	3,214.91	lbs			
Sprocket Pitch Diameter	14.2	in	Paddle Weight	13.5	lbs			
Drag Fill Constant	3		Paddle Height	7.25	in			
Coef Chips/wall and Floor	0.8		Paddle Width	29.125	in			
Coef UHMW/Steel Chain	0.2		Chains Weight/ft	10	lbs/ft			
			Est. Fully Loaded Conr. Wt.	6,753	Lbs			
			Conveyor Capacity	80%	80%			
			Empty conveyor HP	0.51	HP			
			Horse Power w/ SF	10.0	HP			
			10 HP @ 23 RPM					

36S SMART Conveyor with Fine Tooth Paddles
 86 FPM Lineal Velocity
 75 Tons/Hr
 10 HP Gearmotor
 33' Overall Conveyor Length
 10' Rise
 1-45 Degree Curve(s)
 1-1 Panel Chute(s) 1-2 Panel Chute(s) 1-3 Panel Chute(s)
 1-Side Mount Set(s) 3-Foot Mount Set(s)
 3-Sealed Inspection Door(s)
 1-Zero Speed Sensor
 2-Vibrating Rod Plug/Level Detector(s)
 No deluge system
 No deflagration panels
 No conduit brackets
 AR Floor Plating

Custom Color: RAL 2001 - Red Orange



Model	FA97/GDRN132M4		
Gear Ratio	75.63		
Prim/Sec Stages	3 / 0	Shaft Location	--
Output Speed	23 RPM	Output Shaft Dia	2.938"
Motor Power	10 HP	Output Shaft Style	Hollow Shaft
Motor Voltage	460 VAC	Input Shaft Dia	--
Frequency	60 Hz	Flange Diameter	--
Brake Voltage	--	Flange Location	--
Mtg. Position	M5	Conduit Box Loc	270
		Cable Entry Loc	1
		Overhung Load	7,660 lbs
		Output Torque	27,020 lb-in
		Torque Capacity	38,100 lb-in
		Nameplate S.F.	1.40
		Load S.F.	--
		Weight (w/oil & opts)	535 lbs

DATE		MATERIAL		DESCRIPTION	
APP				36S BOTTOM DRAG	
DO NOT SCALE DRAWING				CONVEYOR; FROM CHIPPER	
REVISIONS				DISCHARGE 60-610	
1.0					
2.0					
3.0					
4.0					
5.0					
6.0					
7.0					
8.0					
9.0					
10.0					
11.0					
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RECOMMENDED SPARE PARTS LIST

Drag Conveyor – BDC36S-XF-0261-01

Paddles and Chains		
Chain Type: 81X Strand Quantity: 14		
Part Number	Description	QTY
36S-FTP	36S Fine Tooth HDPE Paddle	4
36S-PFW	36S Paddle Frame Weldment	4
81X-10WT	81X Chain Assy x 10 ft, W/Welded Tabs	2
81X-LINK-K	81X Connecting Link	2
Drivetrain Components		
Part Number	Description	QTY
36S-215-FA	36S Headshaft; 2-15/16"; Keyed	1
36S-115KT	36S Tailshaft; keyed; 1-15/16"	1
4BFB-215	2-15/16" 4 Bolt flange bearing; UFC212-39	2
PBSD-115	1-15/16" 2-Bolt Pillow Block Bearing (Tail)	2
81X-215	2-15/16" sprocket; B-HUB; std sq keyway	2
81X-115	Sprocket, 81X, 17 tooth FCFH, 1-15/16", B HUB, STD KWY	2
VSEFA097-10-23-01R	Gearmotor; 10HP @ 23RPM; shaft diameter 2.938"; keyed hollow shaft	1

Plastic/Curve Wear Parts

Part Number	Description	QTY
00044830	HD Straight Section Wear Strip; 1/2" THK	8
36S-45ICP	36S x 45° Inner Cover Panel	2
36S-45OCP-ARW	36S x 45° Outer Cover Panel	2
00043401-AR	AR400 Curve Wearstrip; Innermost Radius	6
00043401-N	NYLON Curve Wearstrip; Innermost Radius	6
00043403-AR	AR400 Curve Wearstrip; Outer-Middle Radius	6
00043403-N	Nylon Curve Wearstrip; Outer-Middle Radius	6

Miscellaneous

Part Number	Description	QTY
36S-TBP	36S Top/Bottom Panel	2
V4B00010	Zero-Speed Sensor Package; 110V	1
VVV00061	Vibratory Sensor; 1-1/4" NTP Connection	1

Light gray cells indicate long lead time or high wear item.

BDC18S-XF-0261-01

33



SUPPORT INFORMATION

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