SERIES 100 VOLUMERIK®
VOLUMETRIC DRY FEEDER

OPERATING AND MAINTENANCE INSTRUCTIONS

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Manual Revision 1-15-2002

1.0 SAFETY PRECAUTIONS

1.1 Danger from Electrical Hazard

Since this feeder is electric motor driven and includes electrical components, the hazard of electrical shock can exist. Installation and wiring of electrical components should be in accordance with all applicable codes.

1.2 Operational Hazards

To avoid possible personal injury, the following guidelines should be followed:

a) Do not operate feeder with helix or with lid removed.
b) Do not operate feeder with electrical component enclosures not in place or closed.
c) Any leakage or spillage of feed material should be cleaned up without delay in accordance with the applicable MSDS safety guidelines and/or plant instructions.

1.3 Safety

a) Before operating feeder or attempting to service, become familiar with contents of the Instruction Manual.
b) Observe all precautions established by plant safety procedures.
c) Observe all feed material handling instructions provided by any applicable MSDS guidelines.
d) Do not over paint or remove nameplates, labels or tabs.
e) If motor replacement is required, be certain that speed is the same as original motor.
f) If feeder is to be used for other than original service, first ascertain that it is suitable for new conditions and material compatibility.
g) Establishment of and adherence to a regular preventive maintenance program can prevent problems by early detection of unusual conditions. Such a program should include checking for unusual noise, overheating and leakage.

2.0 PRINCIPLES OF OPERATION

2.1 Model 100-V1, V2 or V3-04

Material in the hopper flows by gravity into a rotating horizontal feed helix, which is direct driven by a fixed speed motor and gear reducer. As the feed helix rotates, it moves the material along the base of the hopper and out through the discharge spout.

A built-in rate setter controls the feedrate which is manually selected by turning the rate setting knob graduated from 3-100%.

The rate setter stops and starts the feeder motor in a repeating cycle so that the operating time of the feeder is in direct proportion to the rate setting. For example, if the rate is set at 50%, with a one (1) minute repeating cycle, the feeder runs for thirty (30) seconds every minute.

2.2 Model 100-V1, V2 or V3-06

Material in the hopper flows by gravity into a rotating horizontal feed helix, which is direct driven by a variable speed motor and gear reducer. As the feed helix rotates, it moves the material along the base of the hopper and out through the discharge spout.

A variable speed drive consisting of a motor and DC motor controller determine the feed rate. Standard range with an SCR DC motor drive is 20 to 1. With a Merrick XTRA® DC drive, the range expands to 60 to 1. The controller converts alternating current to direct current to drive the DC motor. The DC drive as a standard is mounted as an integral part of the feeder and consists of a 0-100% speed adjusting potentiometer with an ON-OFF switch. If a signal conditioner is included (4-20 mA), a REMOTE-LOCAL switch is also included. If a vibrator is required for material conditioning, a vibrator timer with ON-OFF switch is included. A standard unit operates on 115V 50/60Hz AC current.

3.0 FEEDER DESCRIPTION

The Series 100 Volumerik® feeder is a rugged screw feeder that utilizes a single auger to meter powder or pellets to a process. The feeder is available in three sizes: 100-V1 (0.38”-1.25” diameter augers), 100-V2 (1.5”-3.0” diameter augers) and 100-V3 (3.5”-6” diameter augers). Construction is all stainless steel and is available in 304 or 316. The V1 is supplied standard with a 1.0 ft^3 hopper. The V2 is supplied standard with a 5.0 ft^3 hopper. The V3 is supplied standard with a 15.0 ft^3 hopper. Extension hoppers are available for all three models.

3.1 Drive System

a. The Series 100 utilizes a unique, low maintenance drive configuration. A high quality, quill output type gear reducer is used to direct drive the auger. This eliminates the need for pulleys, belts, couplings and flanged bearings to support and drive the auger. The bearings internal to the gear reducer provide the auger support. The result is a feeder with only one external moving part: the auger. Fewer moving parts means lower maintenance and higher reliability.

b. Power is supplied standard with a high efficiency PWM (Pulse Width Modulated) rated DC motor. When used in conjunction with a PWM rated drive, the higher efficiency reduces horse power lost to heat, thereby, permitting the use of smaller motors for horse power requirements. The smooth wave form generated by the PWM drive greatly extends brush life.

3.2 Metering System

a. The Series 100 utilizes a unique AUGER configuration. The AUGER is supplied in two sections. The drive end, called the STUB, extends through the reducer quill, through the powder isolation seal and into approximately half the length of the feeder body. The STUB never has to be removed unless damaged. The STUB has an auger flight wound around the outside diameter to move the material forward toward the AUGER. The STUB also drives an OVERWIND that is welded to the STUB. The OVERWIND, a concentric helix, acts as a bridge breaker or agitator for feeding difficult to handle powders. The AUGER attaches to the STUB via a left hand threaded stud. Since the OVERWIND is attached only to the STUB, the AUGER design is simple, low cost and easily replaceable for feeding various powders. The AUGER and STUB may be supplied with non-stick coatings when difficult to feed powders are metered. For some high density feed materials, the overwind material conditioner is not used and is omitted from the STUB. In these cases. a virbrator with timed cycle control is used the condition the material.

3.3 Motor Control

a. Volumerik Feeders are supplied standard with a high efficiency PWM (Pulse Width Modulated) DC drive that provides a 50:1 turndown at full torque. This permits a wide range of metered material with a single size auger. The high efficiency of the drive (1.05 form factor) extends motor and brush life. The drive is mounted off the motor flange and can be mounted in either of three positions in 90° increments.

b. The PWM drive is supplied standard with a 0-100% potentiometer and START-STOP switch. A 4-20mA signal isolator for external control can be supplied as an option and can be easily installed in the field. VFD or timer control is also available.

3.4 Seals

a. The Series 100 utilizes a simple but highly effective seal design that requires no maintenance. The SEAL is comprised of three rings of pliable, rectangular Teflon rope that is kept under constant compression via a wave spring.

4.0 FEEDER SET-UP

4.1 Initial Start-up

a. The feeder should arrive at your plant fully adjusted and ready to use. Set the feeder in its production position and level the feeder via the four adjustable feet. Make sure the motor controller is in the STOP position and the potentiometer is set to "0" ZERO. Then, connect power to the motor controller. Place the motor controller in the START position and slowly increase the potentiometer until the auger starts turning. Confirm that the auger rotates counter-clockwise when viewing rotation from the end of the auger protruding through the rear of the gear reducer. If rotation is incorrect, reverse the power leads. Refer to the electrical connection for any connection or voltage requirements.

b. If the auger rubs the spout, remove the auger (remember- left hand threads) and inspect for straightness. The auger should be straight within 1/32". Straighten as required. If the auger is straight and the auger still rubs the spout, the gear reducer mounting lugs must be adjusted to align the auger to the centerline of the spout.

Note: A helix type auger can droop from gravity even though straight when placed on a reference table. It is acceptable for this type auger to rub the spout when no powder is being fed. Once powder is fed through the auger, the rubbing will stop.

c. The motor controller is factory adjusted and ready to run. A separate manual is enclosed for the motor controller if adjustments or maintenance are required.

4.2 Setting the Current Limits

The Merrick XTRA DC drive has a CURRENT LIMITER feature to help protect the auger and gear reducer from damage. Use the following procedure to adjust.

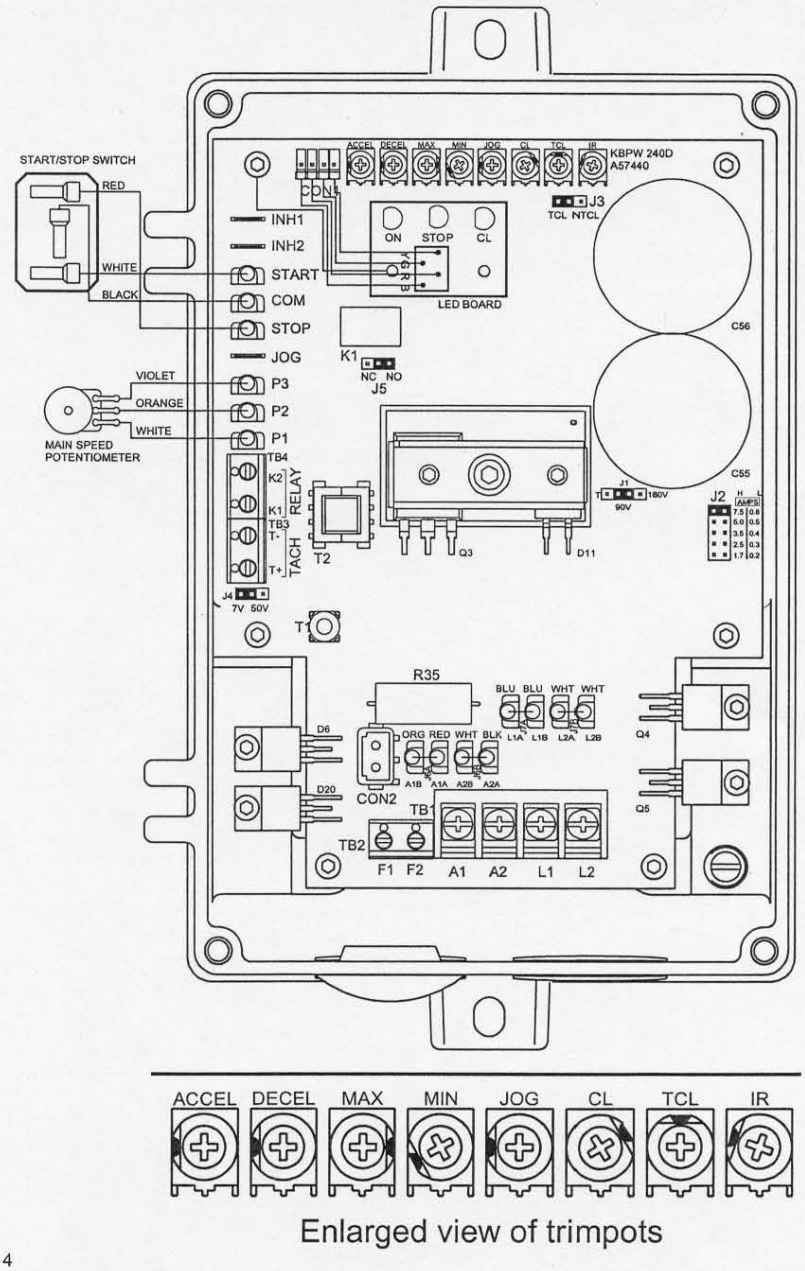
a. Run a hopper full of feed material and discharge via the auger until the material is just above the material conditioning helix (overwind). Refill the feeder and place an amp meter on one leg of the power lead to the DC drive. Start the feeder and read the amperage draw when the feeder starts and during material discharge. Record the maximum amperage. Now, adjust the current limit in accordance with Figure 1 – Control Layout.

4.3 Adjusting the Vibrator

a. If a Vibrator is included for pre-conditioning the feed material, the vibrator must be adjusted in both amplitude and activation time. It is important that only the amount of vibration required to keep the auger full is used. Over vibration can cause material packing and cause possible feeder damage. Do not run the vibrator continuously.

b. Vibration adjustment is by trial and error and varies with material and humidity conditions. Start by adjusting the vibrator amplitude to its lowest level. The vibrator is furnished with an adjusting screw to vary the vibration amplitude. Next, adjust the ON-OFF cycle. Two timing cycle adjustments are provided: The length of vibration time and the time between starts and stops of the vibrator. Each adjustment is scaled from 0-100% and represents a cycle of 2-30 minutes. First, adjust the length of vibration to approximately 3-4 minutes. Adjust the frequency between starts and stops to a time that equates to approximately the amount of time to empty half the hopper. If reliable, consistent material flow is maintained, keep this setting. If the helix starves, increase the frequency between cycles. If this does not solve the problem, increase the duration of vibration. If the problem remains, go back and increase the vibrator's amplitude to maximum.

FIGURE 1 – CONTROL LAYOUT
(Illustrates Factory Setting of Jumpers and Approximate Trimpot Settings)



A series of jumpers are located at J2. Place the jumper at the next highest current setting than was observed when feeding material. The feeder will now trip as soon as the drive mechanism sees an incremental current spike that exceeds this value.

5.0 FEEDER MAINTENANCE

a. The Series 100 requires virtually no maintenance. Only the lubricant in the gear reducer must be changed at the manufacturer's recommended interval. Motor brushes should be checked periodically, but brush life should be greatly extended due to the use of a PWM rated motor and PWM motor controller.

b. A complete bill of materials and assembly drawing are enclosed for identifying components for replacement.

c. When maintenance is required, the MOTOR MUST BE ELECTRICALLY LOCKED OUT BEFORE WORKING ON THE FEEDER. To disassemble the feeder, remove the four knobs supporting the SPOUT and remove the spout and gasket. Remove the AUGER by turning it clockwise (left hand thread). This is all the disassembly required for cleaning. If further disassembly is required, the next step is to remove the OVERWIND STUB. The STUB is held in place by two set screws and key way at the end of the reducer quill. Loosen the set screws and pull the STUB out of the reducer quill. Next remove the four screws holding the gear reducer in place and remove the reducer. This will expose the seal packing gland. The SEAL is captivated by a round retaining plate secured with three nuts. Remove the nuts and RETAINING PLATE and the compression WASHER and the SEALS (packing) will be exposed for removal.

d. When reassembling the feeder, reverse the procedure. Since construction is all stainless, it is necessary to guard against galling. Before reassembling the STUB, coat the shaft with Never-Sieze before inserting into the reducer quill. Likewise, apply Never-Sieze to the threads on the end of the STUB before attaching the AUGER.

e. Once the gear reducer has been removed and re-installed, alignment may be necessary. The AUGER is aligned to the centerline of the SPOUT by adjusting four hex stand-offs supporting the gear reducer. The reducer is aligned when the AUGER turns freely without rubbing the SPOUT.

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