

shivvers 653E-001A variable-speed controller Instructions

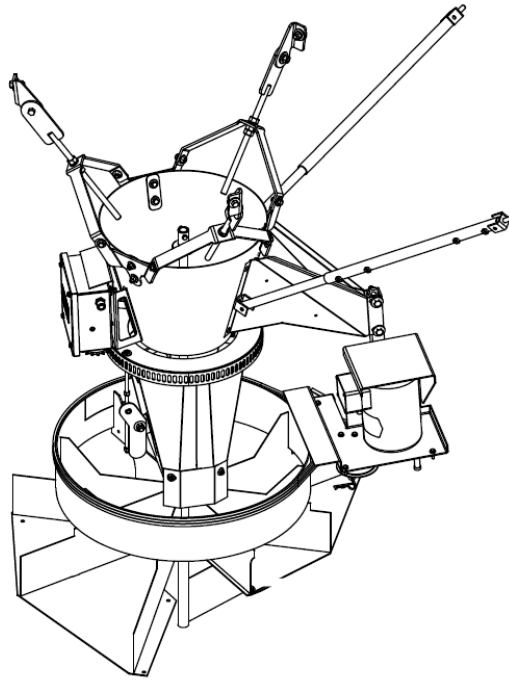
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shivvers 653E-001A variable-speed controller



INTRODUCTION

READ OPERATING INSTRUCTIONS, ADJUSTABLE FREQUENCY DRIVE INSTRUCTION MANUAL, AND YOUR SHIVERS SYSTEM OPERATOR'S SAFETY MANUAL (P-10001) COMPLETELY BEFORE INSTALLING OR USING THE CONTROLLED FLOW GRAIN SPREADER.

The Controlled Flow Grain Spreader is a unique design that allows for even spreading from an overhead downspout or auger into a grain bin. If a low spot should occur, it can be set to fill in the low area. It accomplishes this through the use of a variable speed drive system and an independent diverter motor. The diverter motor can be switched off, which will cause the grain to be thrown to a particular area of the bin. The spreader pan speed can also be adjusted so the majority of the grain hits the low area. Low areas on the outside edge of the bin are normally filled first, and then any remaining low areas near the center of the bin can be filled by slowing the spreader pan speed.

The 2 HP spreader unit will spread grain from 8" to 13" input augers into bins from 24' to 48' in diameter.

A spreader power fusible disconnect switch or circuit breaker, with lockout capability, is required but not included. The spreader control requires 220 VAC input power which must be single phase. For 3 phase just use two of the 3 phase lines (not the wild leg). An optional transformer is available for 3 phase installations which cannot obtain 115 VAC from one line of the 3 phase input.

This manual covers the INVERTEK Drive. This drive first went into production in 2022. Previously, three different versions of variable/frequency drives were used to control the speed of the spreader pan motor. The ABB ACS 150 was used from 2013 until 2022. The Cutler-Hammer AF91 drive was used from 2002 until approximately mid 2004. It became obsolete, and was replaced with a Cutler-Hammer MVX9000 drive. They operate similarly. See P-11649 (Installation) and P-11577 (Operation) manuals for Cutler-Hammer Drives.

653N-001A is a replacement INVERTEK drive kit. Use it when replacing an INVERTEK drive.

653L-001A is a replacement ABB drive kit. Use it when replacing an ABB drive.

653K-001A is a conversion kit. Use it when replacing a Cutler-Hammer MVX9000 drive. This kit will contain an ABB drive and the parts required to make the conversion. If replacing a Cutler-Hammer AF91 drive, consult the factory. The complete control box (653F-001A) may need to be replaced.

Top adjustment of the diverter valve was implemented approximately September 2005. Spreaders manufactured

before September 2005 used side bolts to adjust the diverter valve.

SAFETY INFORMATION

The operator of this machinery must assume the responsibility for his own safety, and that of those who are working with him. He must also make sure the equipment was installed properly. Factors that contribute to the overall safety of operation are: proper use, maintenance, and frequent inspection of the equipment. All of these are the operator's responsibility.

If any items covered in this manual are not completely understood, or there is a concern with the safety of the product, contact SHIWERS Incorporated at the address shown on the front page.

SHIVVERS is genuinely interested in providing the safest practical equipment to our customers. If you have a suggestion which you believe will enhance the safety of this product, please write us and let us know.

ATTENTION: TAKE NOTE ANYTIME THIS SAFETY ALERT SYMBOL APPEARS. YOUR SAFETY, AND THAT OF PERSONS AROUND YOU IS AT STAKE.

The safety alert symbol will be accompanied by one of three signal words whose definitions are given as:

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

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

CAUTION: Yellow and black. 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.

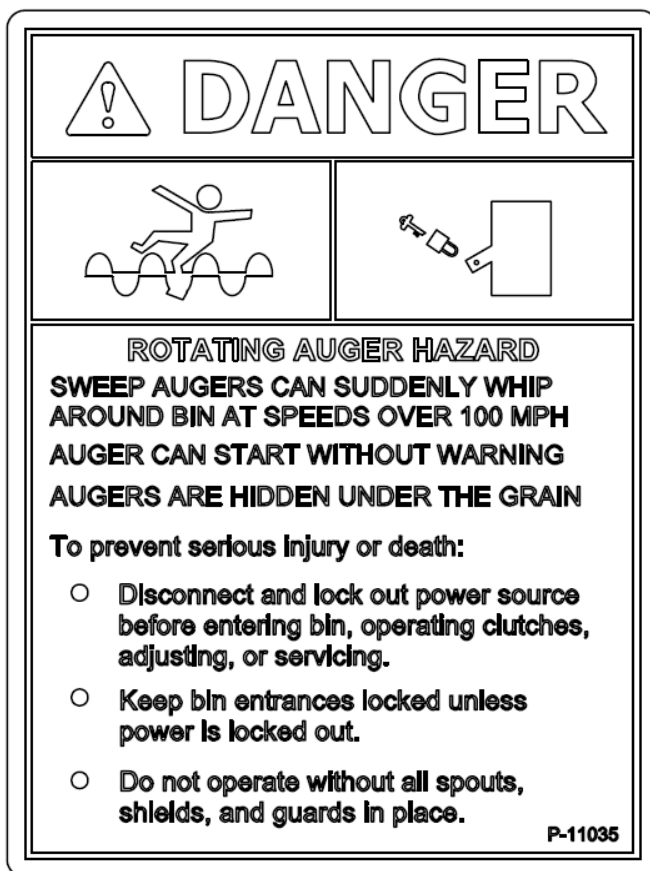
Be sure to observe these common sense rules when working with the dryer equipment:

1. All units must be equipped with a main power disconnect switch. This disconnect switch must shut power off to the complete drying system. It must have the capability of being locked into the OFF or OUT position. Disconnect and LOCK OUT this main power disconnect switch before conducting any inspection, maintenance, repair, adjustment, or cleaning of the drying system. When you must have the electrical power on to troubleshoot equipment, do it from a safe distance, and always from outside the bin.
2. Keep the bin entrances locked at all times. To unlock the bin, first lower the Level-Dry (if so equipped), then shut the main power disconnect off. Take the safety lock off the bin entrance and place it on the main power disconnect before opening the bin entrance. Never enter the drying bin unless the Level-Dry (if so equipped), is completely lowered, and all power is disconnected and locked out.
3. Always keep all shields and guards in place. If shields or guards must be removed for inspection or maintenance, replace them before unlocking and turning the power back on.
4. Be sure everyone is clear of all the drying and transferring equipment, and outside of all bins, before unlocking and turning the power on. Some equipment may run upon re-application of power.
5. Make sure that all decals are in place and are easy to read. Do not operate the equipment with missing or illegible decals. If replacements are needed, contact SHIWERS Incorporated or your dealer.
6. Prior to use, inspect all equipment to insure that it is in good operating condition.
Do not operate with missing, damaged, or worn parts. Use only SHIVVERS approved replacement parts.

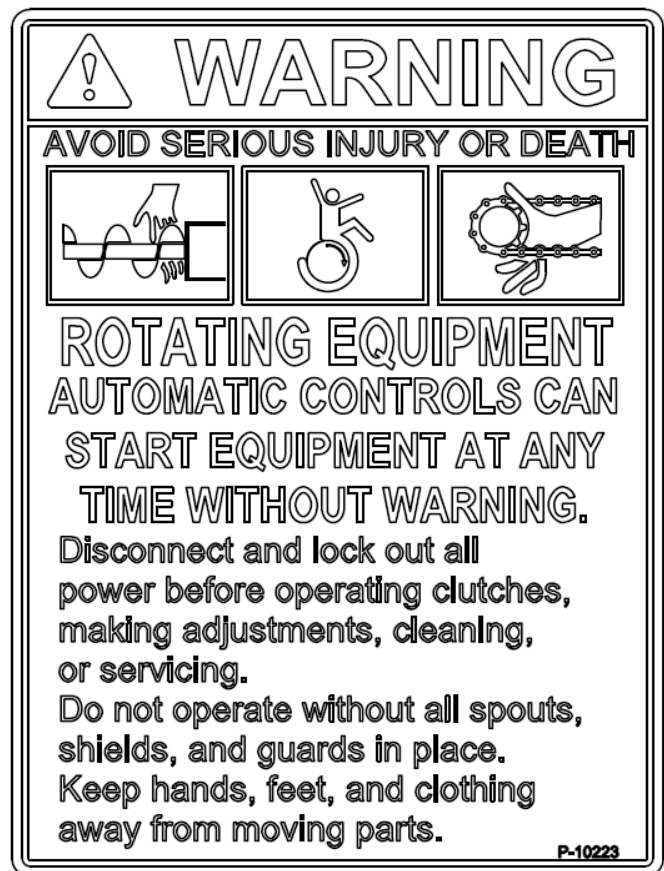
7. Metal edges can be sharp. Wear protective clothing and handle equipment and parts with care.
8. Keep children and bystanders away from drying and transferring equipment at all times.
9. If going up the bin ladder and/or performing maintenance on the top of the bin, take precautions to prevent accidental falls. When on top of the bin, wear a safety harness or other safety device.
10. At least annually, review all operating and safety manuals with any personnel working with this equipment.
Always train new employees before they operate the drying equipment. Insist that they read and understand the operating and safety manuals.

LOCATION OF SAFETY DECALS

This manual shows the location of safety decals that apply to the Controlled Flow Grain Spreader. For complete instructions on where to find safety decals for other installed SHIWERS equipment consult your Operator's Safety Manual (P-10001). Extra field installed safety decals are sent with the Controlled Flow Grain Spreader.



P-11035



P-10223

Both decals are located on the outside of the spreader control box. The P-10223 decal is also located on the spreader.

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LOCATION OF SAFETY DECALS

WARNING:

To prevent serious injury or death:

- Avoid unsafe operation or maintenance.
- Do not operate or work on equipment without reading and understanding the operator's manual.
- If manuals or decals are missing or difficult to read, contact
- Shivers Manufacturing, Inc. Corydon, IA 50060 for replacements.

DANGER

ELECTROCUTION HAZARD

- To prevent serious injury or death from electrocution:
- Lock out power before removing cover
- Disconnect power before operating
- Keep components in good repair

Both decals are located on the access panel of the spreader control box.
P-11232 is also located on the diverter drive assembly.

OTHER DECAL LOCATIONS

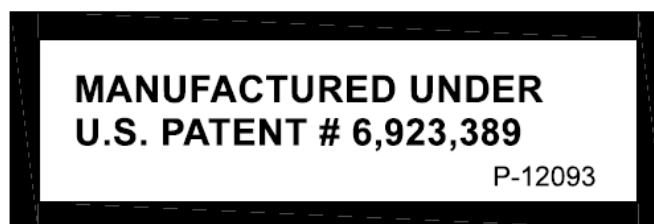
ABRIDGED INSTRUCTIONS

(See Owner's Manual for complete instructions)

- ADJUST THE DIVERTER VALVE SETTING. SEE OWNER'S MANUAL.
- PRESS "START" ON DRIVE TO BEGIN ROTATION OF SPREADER PAN.
- SPREADER PAN MUST BE ROTATING BEFORE GRAIN COMES IN.
- DIVERTER MUST BE ON UNLESS A HOLE IS BEING FILLED IN.
- ADJUST SPREADER PAN SPEED UNTIL GRAIN JUST HITS BIN WALL.
- SPEED CONTROL KNOB ON DRIVE IS NOT USED. USE TOGGLE SWITCHES.
- PRESS "STOP" ON DRIVE BEFORE SHUTTING POWER OFF.
- FOR BEST RESULTS, ALWAYS INPUT GRAIN TO THE SPREADER AT THE SAME RATE OF FLOW.

P-11620

Located on the access panel of the spreader control box.








P-12093

IDENTIFICATION OF PARTS

(INVERTEK DRIVE OPERATION DECAL)

INVERTEK OPERATION

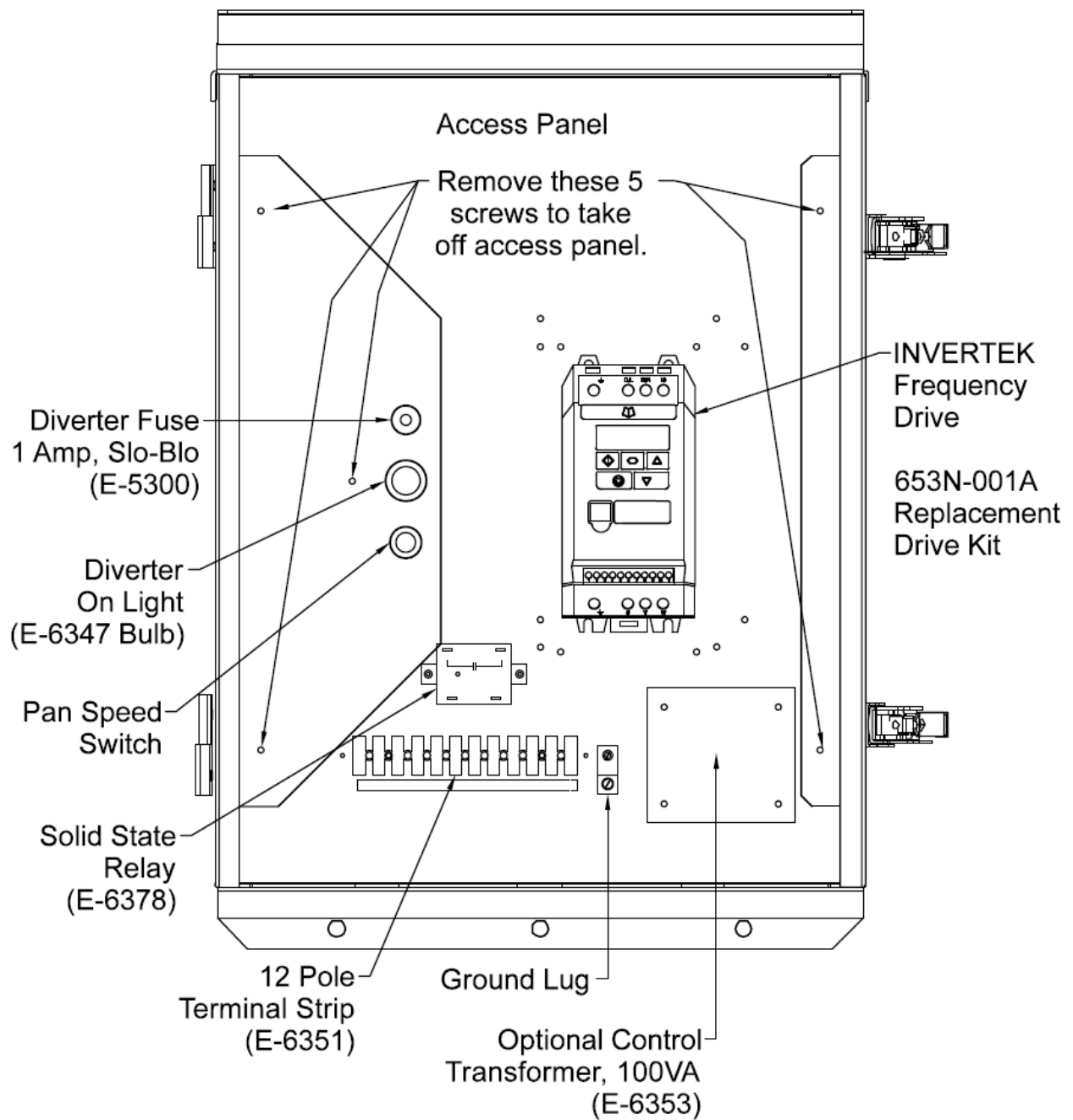
-  — **START (GREEN)** — Press to start a stopped drive.
-  — **STOP/RESET (RED)** — Press to stop a running drive. Used to reset a tripped drive. If pressed when stopped, will show speed setting in Hertz.
-  — **NAVIGATE** — Used to display real-time information, to access and exit parameter edit mode, and to store parameter changes.
-  — **UP** — Used to increase speed or to increase parameter values in parameter edit mode.
-  — **DOWN** — Used to decrease speed or to decrease parameter values in parameter edit mode.

	CUSTOM	HERTZ	AMPS	POWER
Drive Stopped / Disabled	Display shows output speed (0-100%)	Display shows output frequency (0-60 Hz)	Display shows the motor current (Amps, 5.4 Full Load)	Display shows the motor power (kW)
STOP	C 50.0	H 50.0	A 2.3	P 1.50

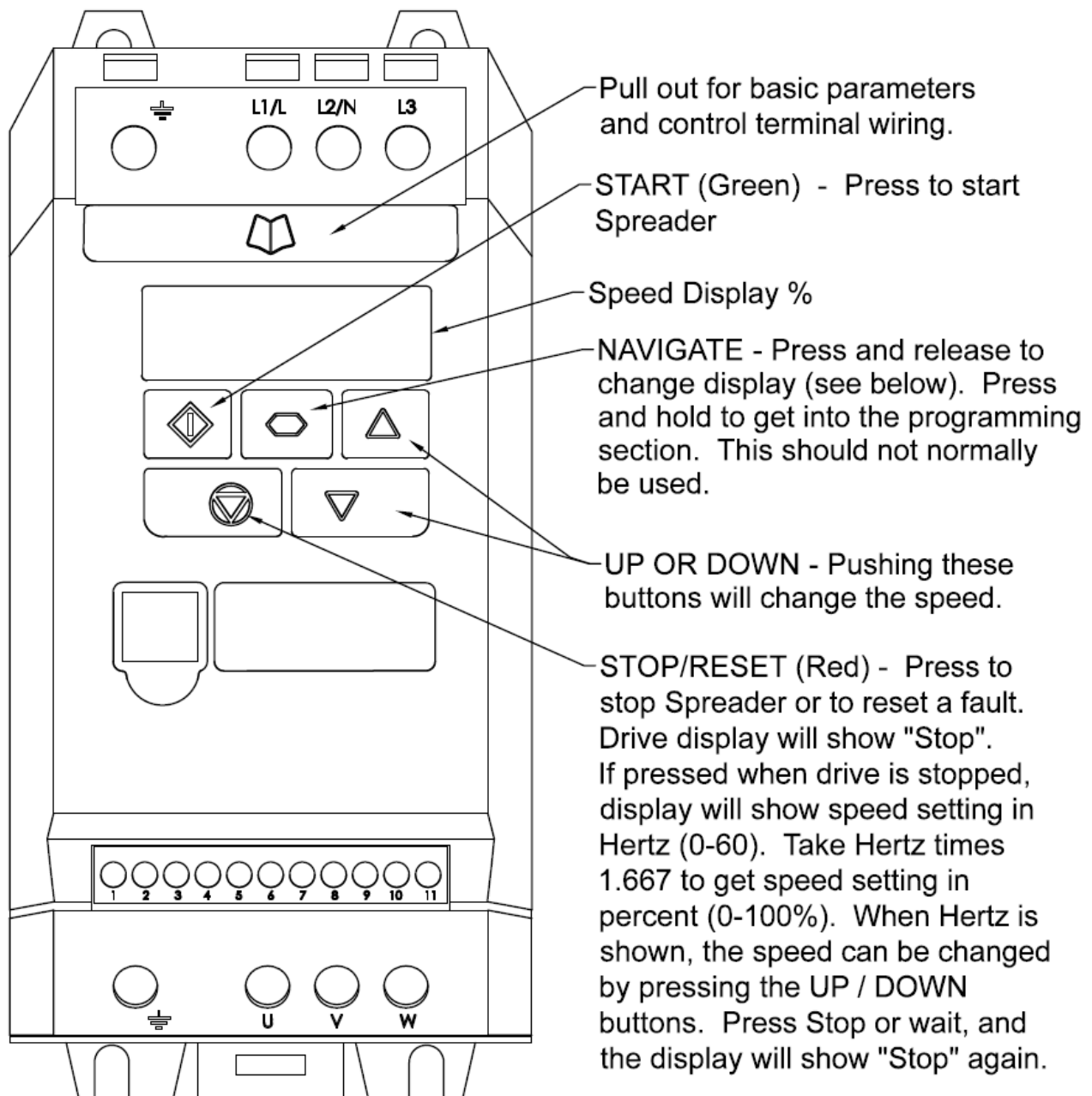
With drive running, press NAVIGATE for < 1 second to scroll through displays.

P-13607

(ELECTRICAL CONTROL BOX for INVERTEK DRIVE) (Started May 2022)



(INVERTEK DRIVE KEYPAD/DISPLAY OPERATION)

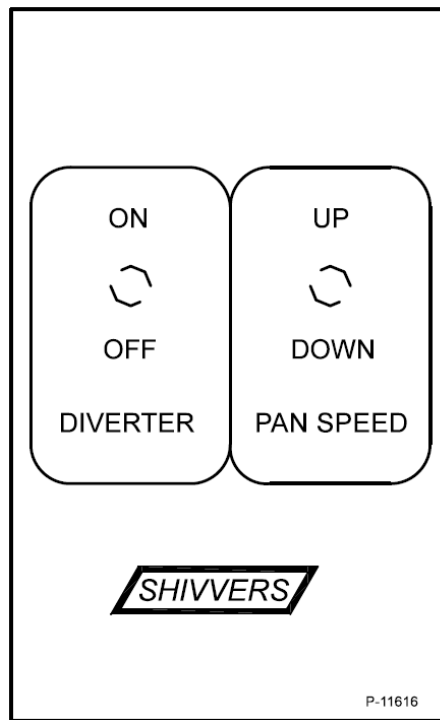


To get the drive back to its original display, with the drive running, quickly press and release the NAVIGATE button until the display shows c (custom) in the left digit. The speed will now be shown as 0-100%.

By pressing the NAVIGATE button for less than 1 second, the drive display can show:

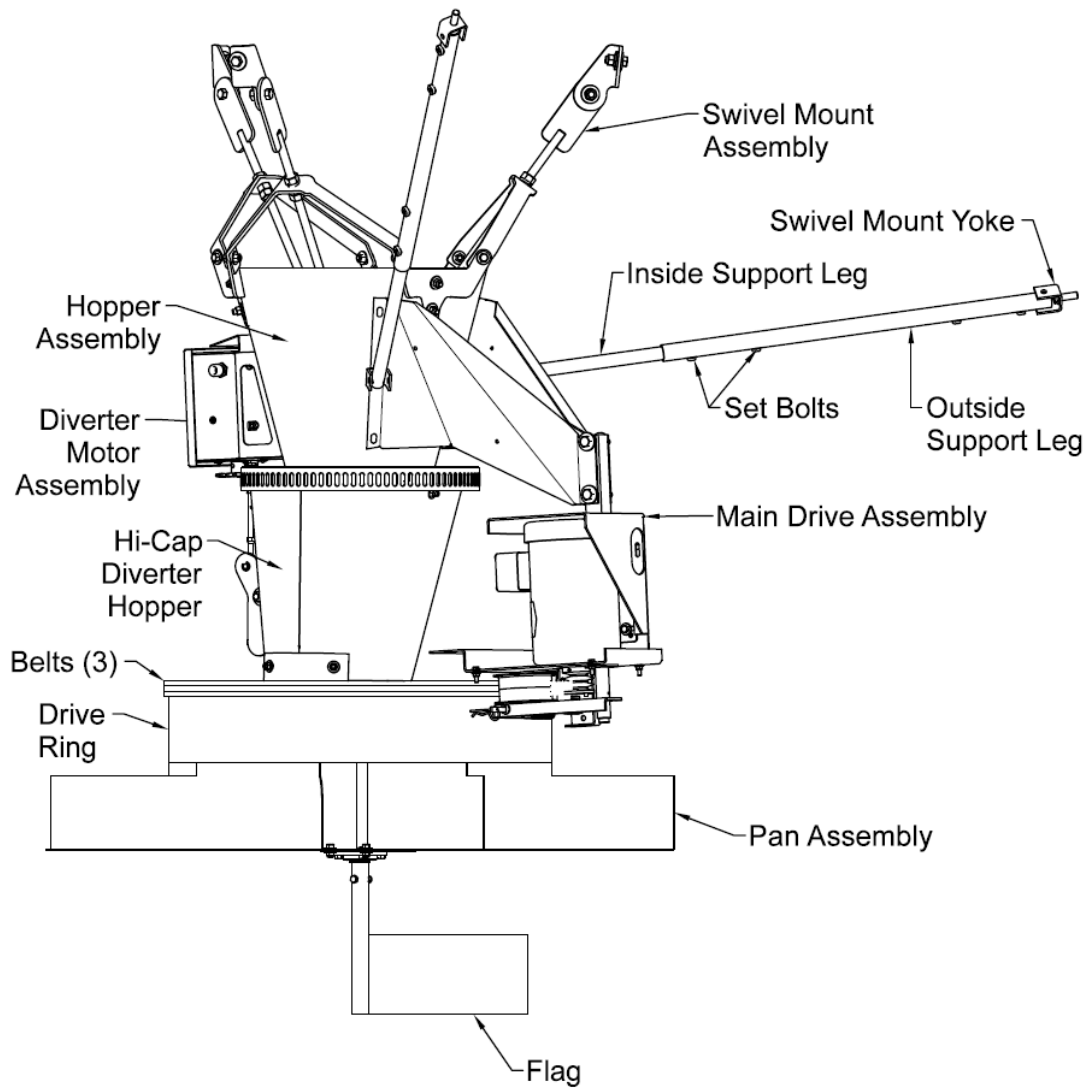
- P = Motor Power (kW)
- H = Hertz (0-60)
- A=Amps
- c = Custom display (0-100%)

(SWITCH BOX, 653-126A)



Located near manhole. Use to adjust spreader pan speed and to turn diverter on and off.

(CONTROLLED FLOW GRAIN SPREADER)



OPERATING INSTRUCTIONS

Initial Startup

Adjust the diverter valve and diverter plate to their nominal operating positions if this was not done during installation.

See pages 15-19. Make sure power is disconnected and locked out!

General Instructions

1. Press "Start" on the voltage/frequency drive box to begin rotation of spreader pan. Pan must be rotating before you put grain into the bin.
2. Turn on the diverter motor by using the "Diverter" lever in the Switch Box which should be located close to the roof manhole.
3. Using the "Pan Speed" switch in the Switch Box, which should be located close to the roof manhole, adjust the spreader pan speed so that some grain hits the bin sidewall 3-5 feet above the top surface of the grain. Use the toggle switches or up/down buttons on the drive to change the speed. There is a % of full speed readout on the voltage/frequency drive box.
4. Always press "Stop" on the voltage/frequency drive box before shutting electrical power off.
5. For best results, always input grain to the spreader at the same rate of flow.

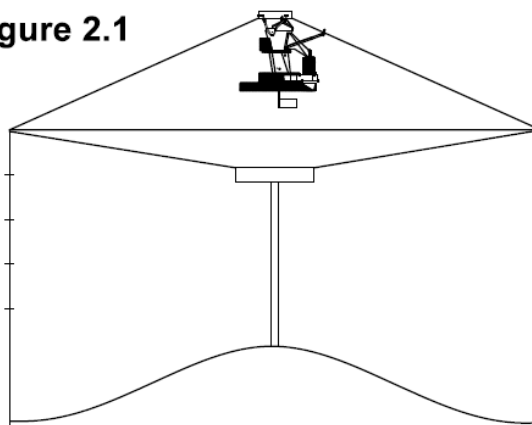
If Bin Fills Too Much in the Center or on the Outside.

The spread from the center to the outside of your bin is controlled by the rotating speed of the spreader pan, which is adjusted using the "Pan Speed" lever in the Switch Box. This should be located close to the roof manhole. The speed can also be adjusted at the control box.

Normally, adjust the spreader pan speed so that some grain hits the bin sidewall 3-5 feet above the top surface of the grain. This generally gives good spreading results. Note that as your bin fills up you will need to speed up the "Pan Speed" to keep throwing some of the grain to the bin wall. If your grain is piling too much in the center (see Figure 2.1), increase "Pan Speed". If your grain is piling too much near the outside of the bin (see Figure 2.2), decrease "Pan Speed".

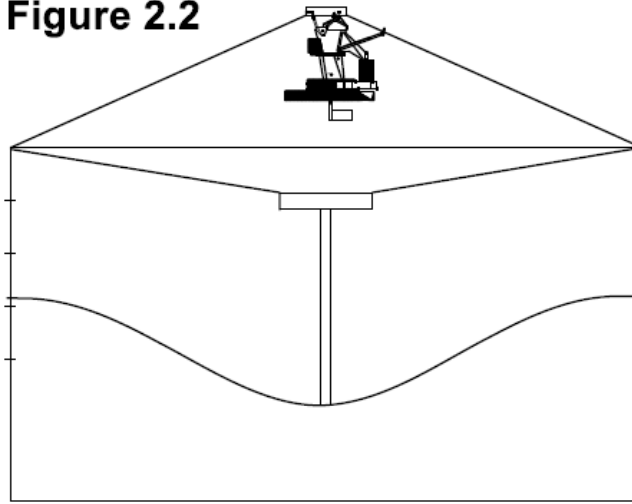
Note: Both conditions above can also be changed with adjustment of pan filler plate (see Figure 2.3) in the bottom of spreader pan, but the open position usually works best. (Unit is set with this plate in the open position at the factory).

Figure 2.1



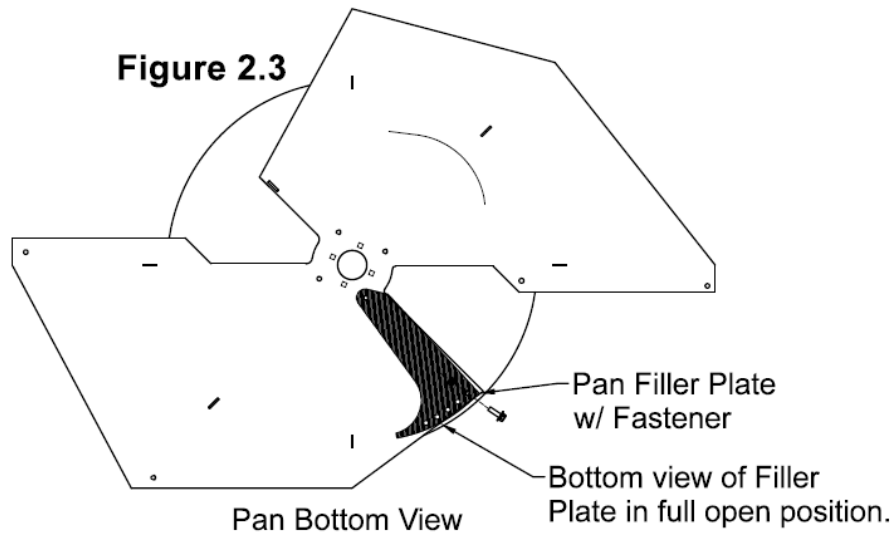
Increase pan speed, or close down filler plate, if grain level is too high in the center of the bin.

Figure 2.2



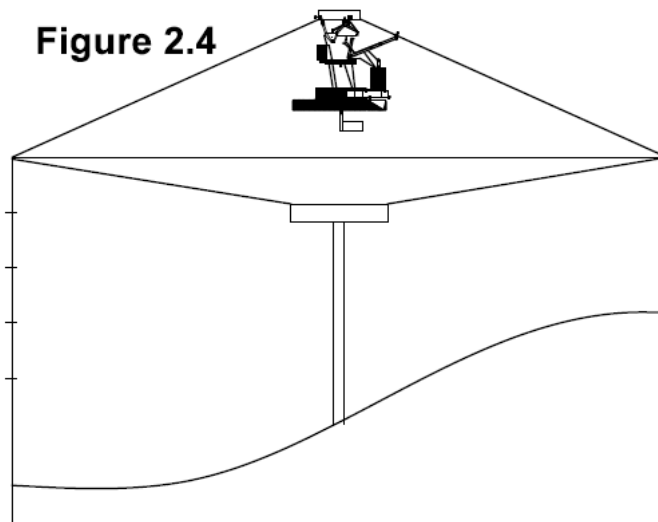
Slow down ran speed, or open filler plate, i grain is too low in the center of the bin.

Figure 2.3



If the Bin Fills Higher on One Side

Figure 2.4



The levelness of fill from side to side of the bin is affected the most by the size of the discharge opening of the diverter hopper. 2 HP units have been preset at the factory for most 13" transport auger applications. For other applications, the opening should have been set during installation. Make sure the spreader is level. This can also affect side to side filling. Hot spots in the plenum can also cause un-even unloading which may appear to be uneven side filling.

Note: The higher the auger outlet above the spreader, the smoother and faster the grain will flow. (Recommended space is 24" minimum.)

For “ideal spread” from side to side in your grain bin, the size of the discharge opening of the diverter hopper would have to be set to exactly correspond with the filling rate of the transport auger. Your actual day-to-day and load-to-load filling rate will vary some just due to normal variations in grain moisture, tractor speed setting, and unload rate from your truck or wagon. However, it is desirable to instruct your operators to always set the unload rate at one given flow rate which you choose. Your diverter hopper opening must be set to allow full grain flow at the maximum flow rate which you will use when filling your bin, otherwise the grain spreader will quickly plug and you will be dumping all of your grain into the center of the bin or onto one side of the pan.

We suggest that you choose a high flow rate for your particular set of equipment, and instruct your operators how to consistently achieve this flow rate. Normally this involves setting the tractor RPM at a given speed and then unloading your truck or wagon at the maximum flow which the transport auger will accept. Once you have established this flow rate and your operators understand the need to achieve this flow rate from load to load, you are ready to adjust the diverter hopper opening. If your bin is filling high on one side, the grain opening in the diverter hopper is set too far in the open position and may need to be closed down. If you find this to be simply a minor nuisance, you may level your bin from time to time by shutting off the Diverter Motor using the “Diverter” lever in the Switch Box, when the flag points to the low spot. Once the low spot is filled in, turn the diverter motor back on. If you find this to be a major nuisance, you need to adjust the size of the grain opening in the diverter hopper.

DIVERTER VALVE AND PLATE ADJUSTMENT

Danger: Make sure power is disconnected and locked out before making any adjustments.

You may make adjustments with the nuts on the top of the hopper ring. Use a long extension on a 9/16” socket to reach the adjustment nut. Be careful not to drop it into your grain! It is best to tape the pieces together before starting. Rotating the nuts clockwise opens the flow; counter-clockwise closes it.

Figure 3.1

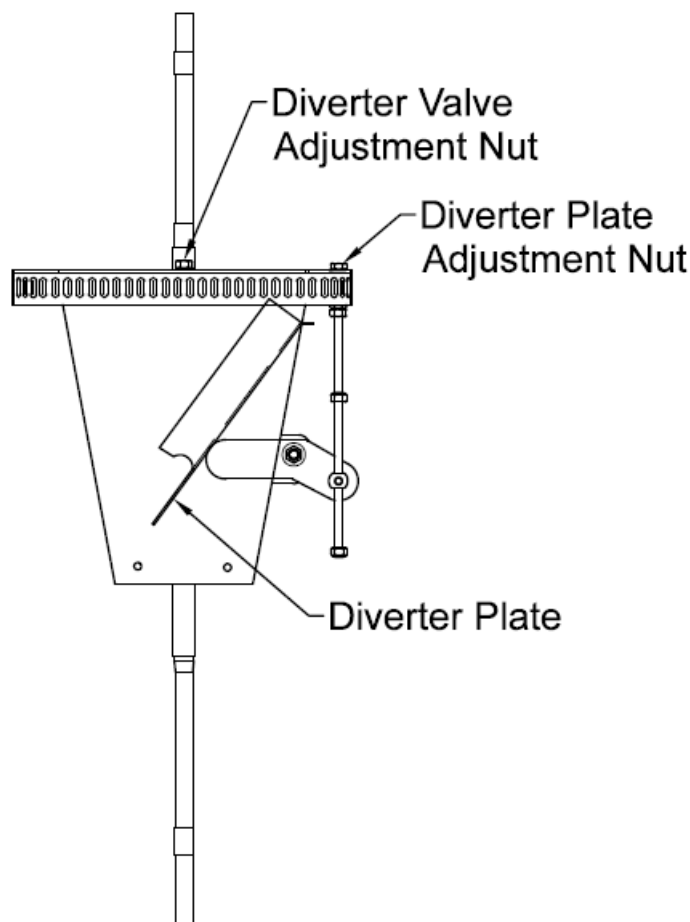
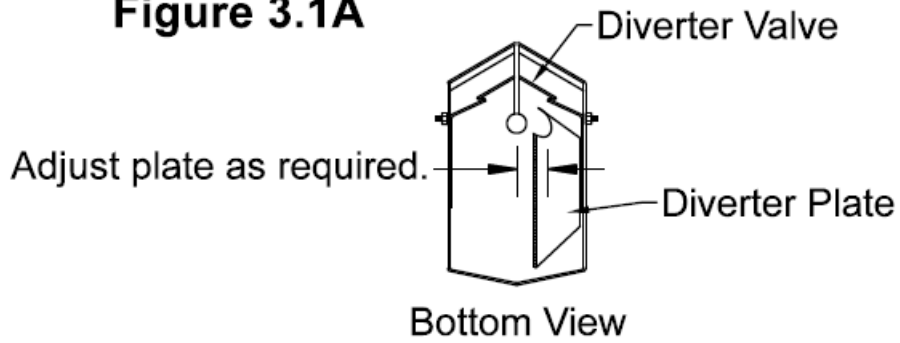


Figure 3.1A



Initial Adjustment of Diverter Valve

13" Augers Only

The diverter valve comes from the factory preset for 13" transport augers, with an opening of 2 1/2" from the center shaft. (See Figure 3.2) It will need to be adjusted for smaller augers.

The diverter plate comes from the factory set wide open.

At normal flow rates, adjust grain opening so that diverter hopper fills, but without overflowing or plugging.

Figure 3.2

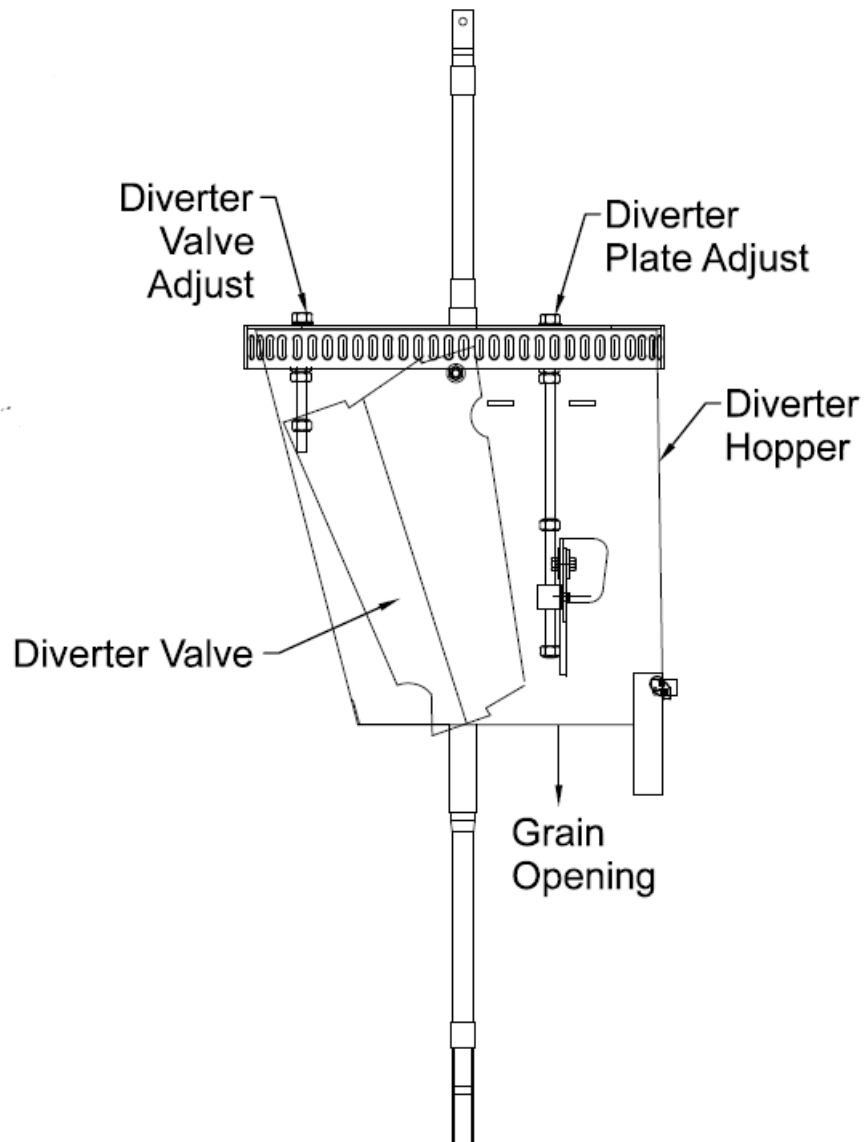
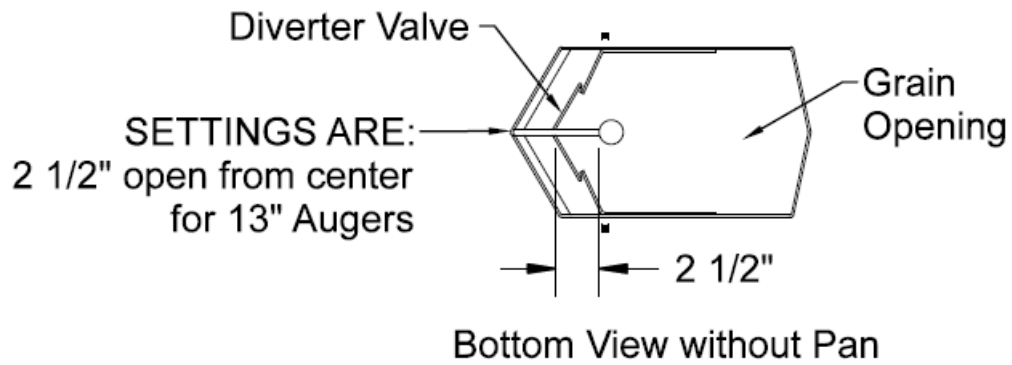


Figure 3.2A



Initial Adjustment of Diverter Valve

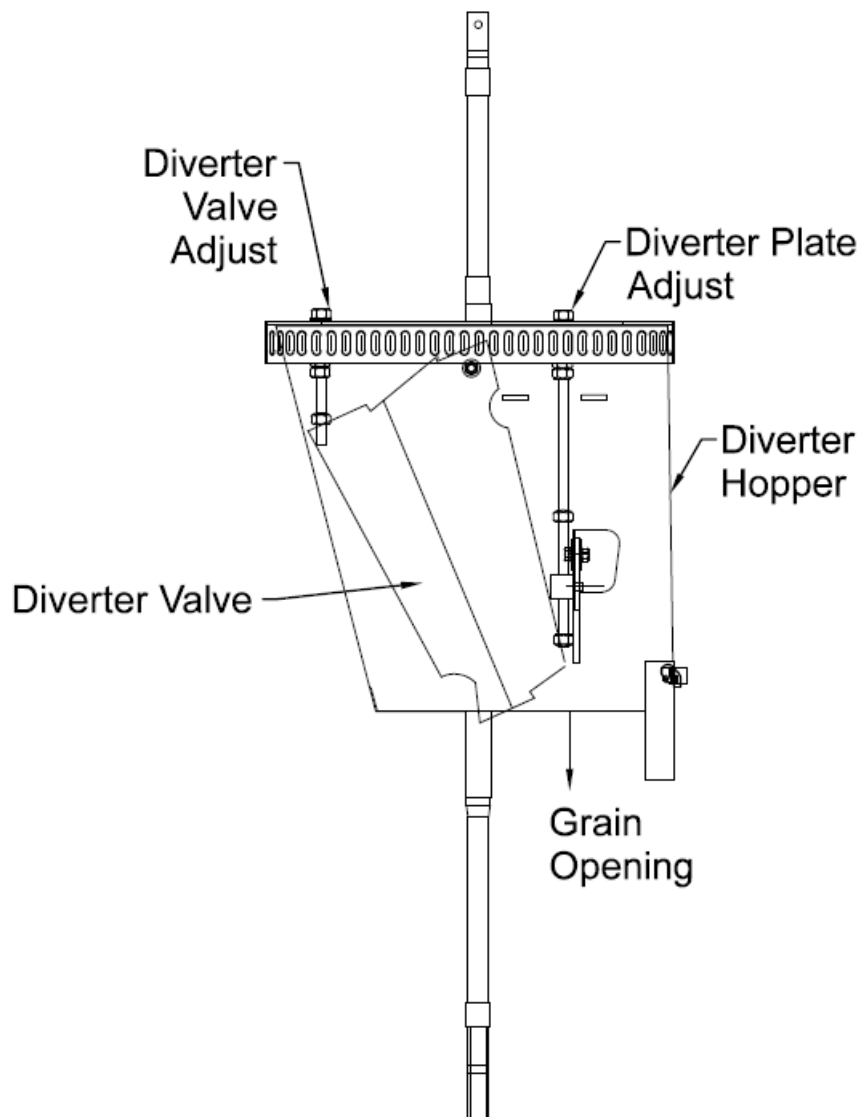
10" or Smaller Augers Only

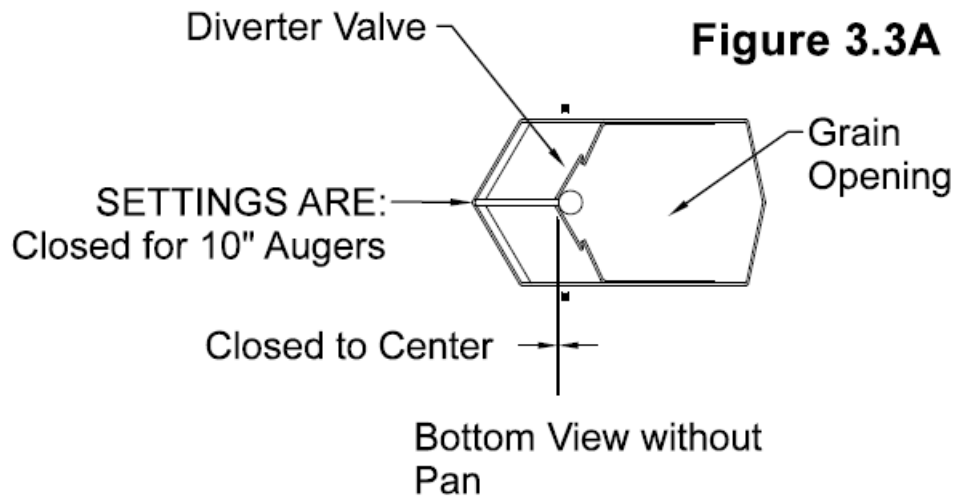
The diverter valve comes from the factory preset for 13" transport augers, with an opening of 2 1/2" from the center shaft. It will need to be adjusted closed for 10" or smaller augers. (See Figure 3.3)

Use the Diverter Valve adjustment to close the Diverter Valve against the center shaft. (See Figure 3.3A)

At normal flow rates, adjust grain opening so that diverter hopper fills, but without overflowing or plugging.

Figure 3.3





Fine-tune the grain flow by closing the diverter plate a small amount (we recommend moving the diverter plate by approximately $\frac{1}{4}$ " – $\frac{1}{2}$ " at any one time). Then unload a few loads (typically 3-4) and observe the effect inside your bin. If it is still loading unevenly, close it down a little more, fill another few loads, and observe the effect again.

Continue this process until you are satisfied with the spreading result.

Once you have closed the diverter plate past a given "critical point" your grain spreader will plug. It is important to be sure that you have your transport auger discharge opening such that if you plug the spreader during this adjustment process, you do not plug your transport auger. If you plug the grain spreader you have closed the diverter plate too much. With some truck and wagon unloading outlets, an excessive surge flow of grain will occur near the end of the truck or wagon load. Your grain opening must be sized to handle this flow rate.

We suggest having one observer stationed at the center fill hole of the grain bin, closely observing flow through the spreader each time an adjustment is made to the diverter valve, or plate, and another person prepared to quickly shut down the transport auger if signaled by the observer.

Figure 3.4

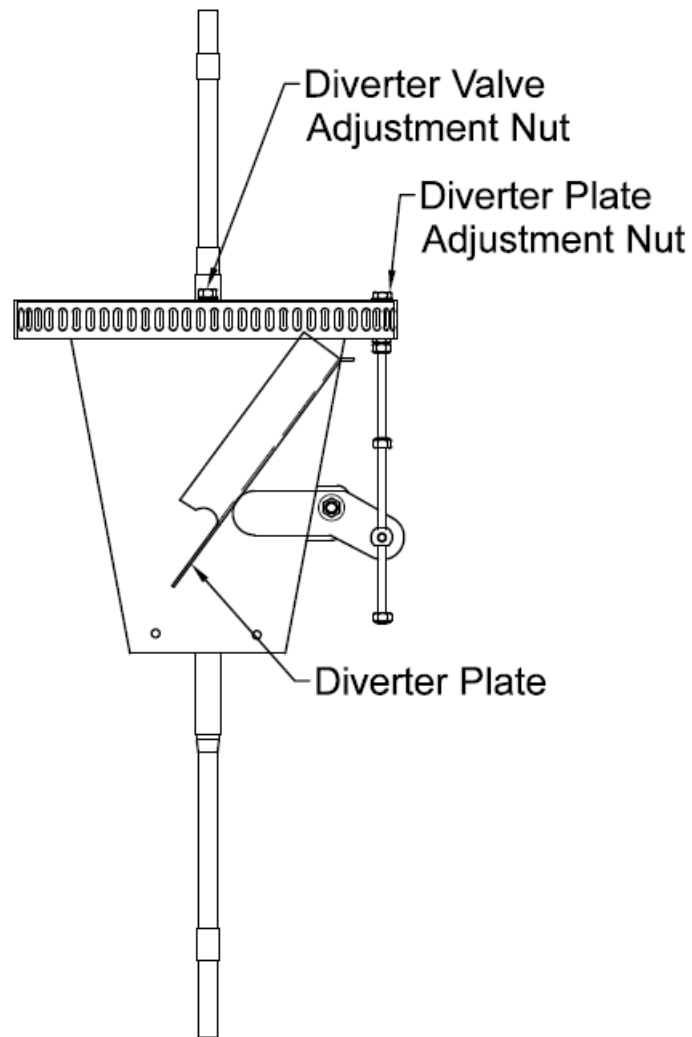
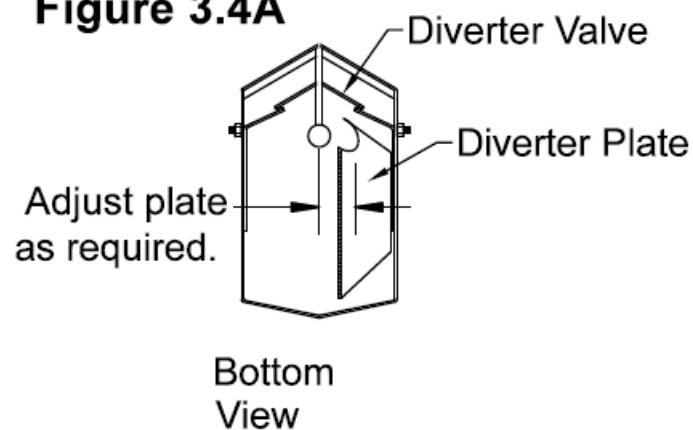


Figure 3.4A



Low Flow Applications

(Less Than 2500 Bu/hr, 8" or Smaller Inlet Augers)

A Lo-Flo choke plate is shipped with the spreader. It must be installed if there isn't enough adjustment in the diverter valve or diverter plate to throttle down the grain flow through the diverter hopper

Figure 3.5

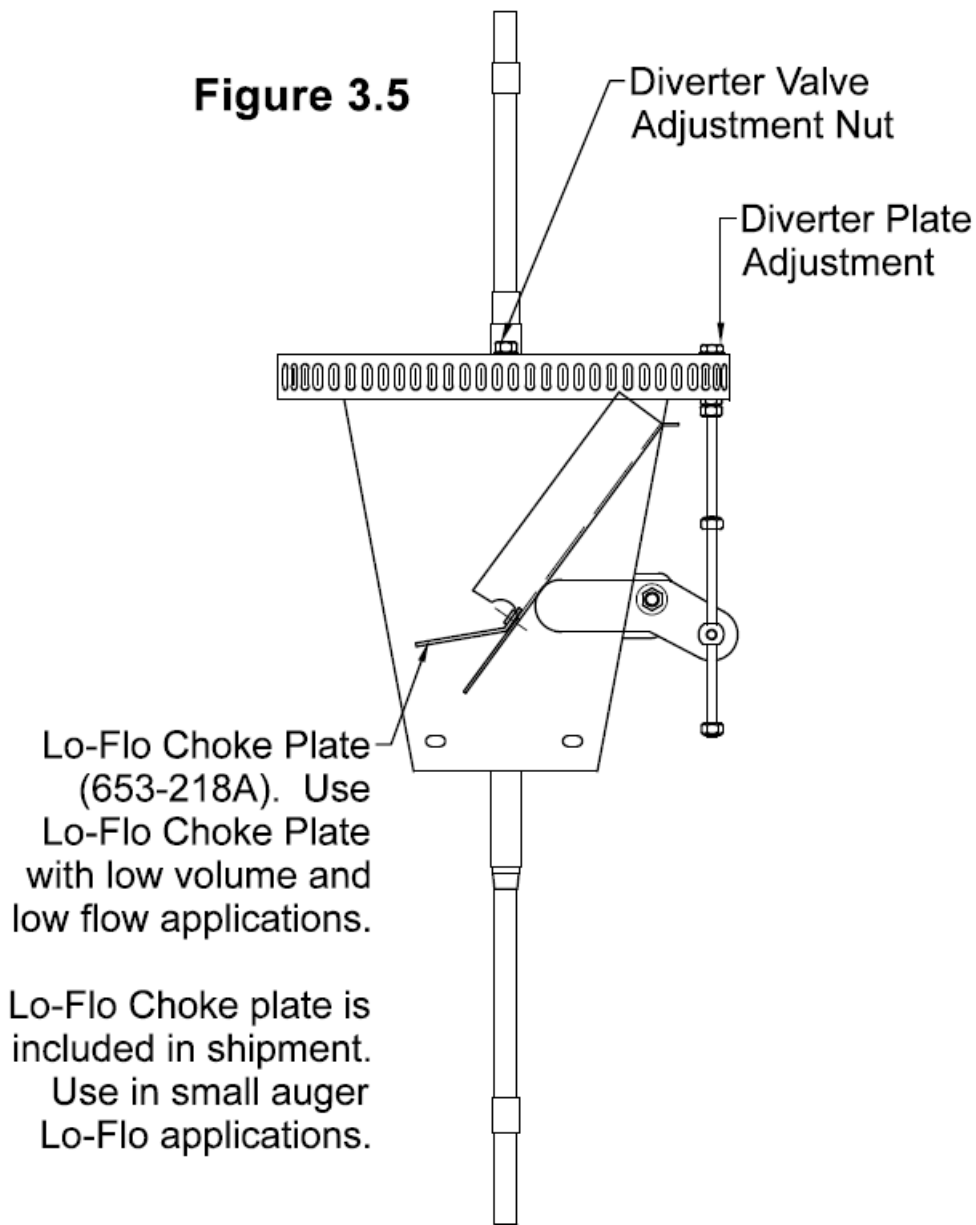
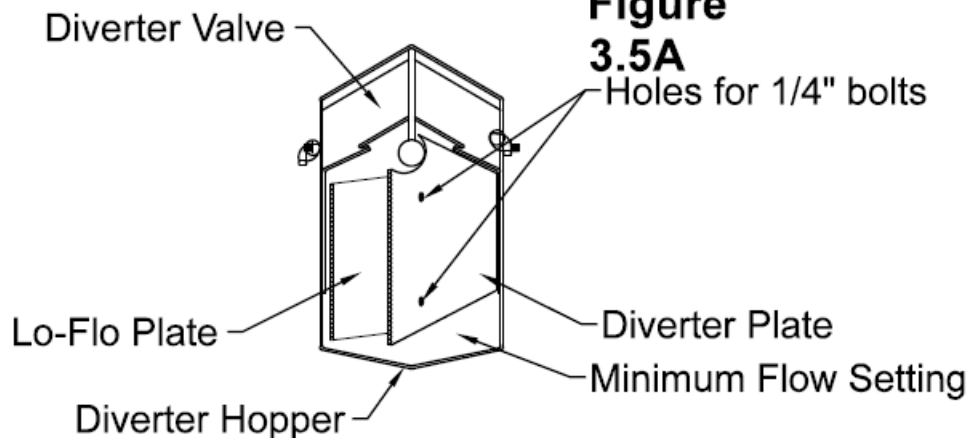


Figure 3.5A



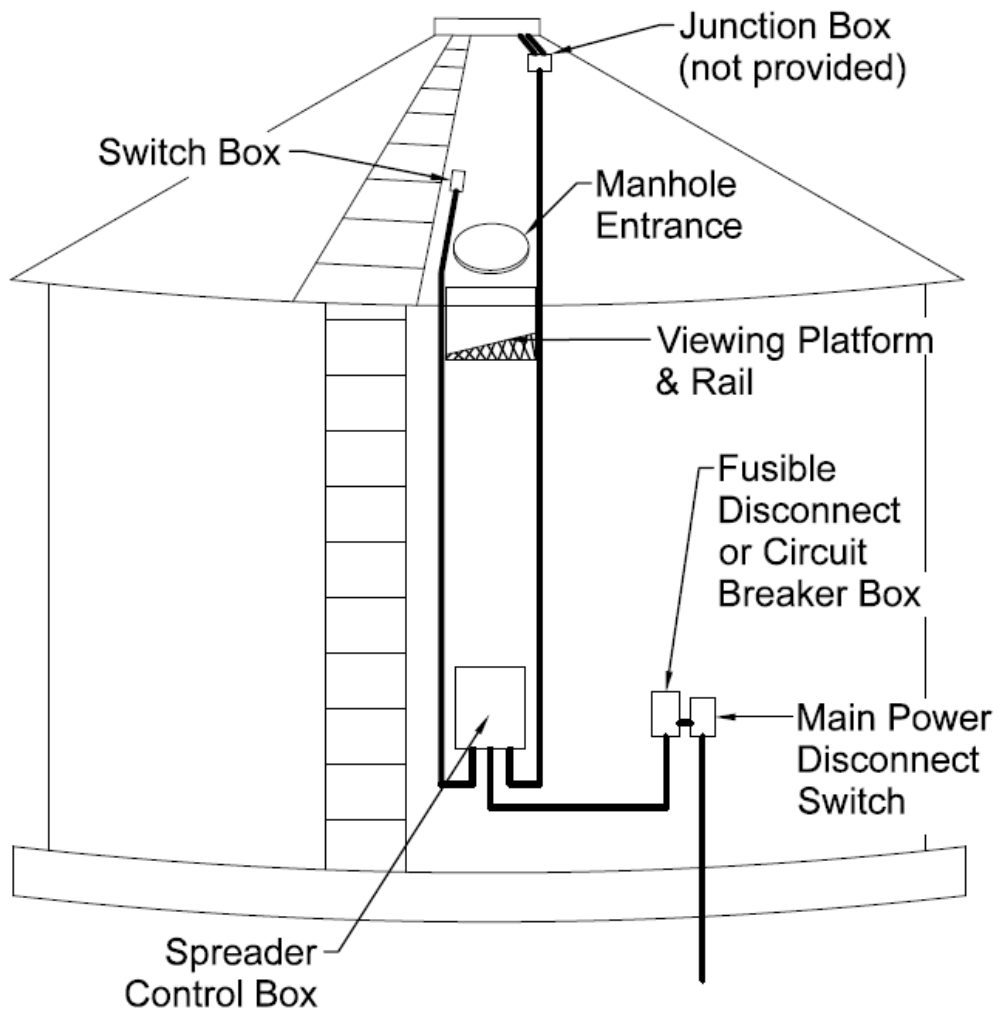
FILLING A LOW SPOT

If a low area occurs in the bin, go to the control box and note what the speed setting is on the variable frequency drive. Go to the manhole entrance and switch off the diverter motor when the grain indicator flag on the bottom of the spreader is pointing at the low area. Start putting grain through the spreader and most of the grain should be thrown to the low area.


It may be necessary to re-adjust the diverter motor depending on the spreader pan speed. Adjust the spreader pan speed so that the outside of the low area is filled first.

Once the outside of the low area is filled in, adjust the diverter and spreader pan speed to fill in the inside area of

the low spot. When the grain is again level, turn the diverter back on. Go to the control box and re-set the variable frequency drive to the same setting it was before filling in the low spot, or until some grain hits the bin sidewall 3-5 feet above the top surface of the grain.



Documents / Resources

	<p>shivvers 653E-001A variable-speed controller [pdf] Instructions 653E-001A variable-speed controller, variable-speed controller, 653M-001A</p>
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