Introduction

Thank you and Congratulations on your decision to convert your 60 gallon pasteurizer from its current direct drive system to our newer offering. The chain drive system offers a number of benefits over the direct drive. By carefully following these instructions you will soon have your pasteurizer upgraded to the best, deep reach stirring system available from Dairy Tech.

Please fully read and understand all of these instructions before you begin any part of the conversion. Have all tools ready and on hand. Tools needed are listed on the following page.

A list of parts that are included in your kit can be found on the last page of this document.

When you have completed the conversion, your drive system will look like this. Yours will have wires and other things not shown in this image.
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Instructions for converting a 60G direct drive pasteurizer to a chain drive

Tools you will need

- 3/32” Allen wrench
- 1/4” socket or nut driver
- Pencil and marker
- 1 or 2” wide soft bristle brush
- Shop vacuum cleaner
- Straight edge rule reading in 64ths
- Center punch
- Power drill
- 82 degree countersink
- Drill bits in 1/16” 11/64”
- #2 Philips screwdriver
- 5/16” open end wrench
- 5/32” ball Allen wrench
- 2.5mm flat cut Allen wrench
- 3mm flat cut Allen wrench
- 4mm Allen wrench
- Pliers (Lineman’s or large slip joint)
- Side cutters for wire
- Crimping tool for solderless conn.
- Masking and electrical tape
- Hacksaw and file
- Scissors

Before you begin

You will need to make sure you have enough working room behind, and to the sides of the pasteurizer.

You should double check that the power is disconnected and locked out before you begin.

The pasteurizer should not have any milk product or water in the inner tank during this service.

Getting started

Remove the threaded stirring shaft and the set screw coupling from the gear motor currently on the machine. This should require the 3/32 Allen wrench.

Remove the top cover from the control panel and position it securely so it doesn’t fall. For this service, you may want to disconnect the fan wires from the terminal strip. Mark them clearly before removing them so you are sure to return them to the correct place.

Mark the location of the connection for the motor wires and then remove them from the connections. Pass the motor wires through any grommets or wire ties that were used to bundle wires together.

If your pasteurizer motor has a ground wire on it, remove the fastener making that ground and remove the grounding wire. Return the fastener to the same location immediately.

DO NOT REMOVE the gear motor until you have placed some masking tape in locations shown below. This will keep the air wall in position while you perform some other operations on the motor and the control panel.
Removing the motor

The locations for the masking tape are shown in the image on the left. Use more or less as you determine will serve the purpose.

After the tape is in place you can remove the screws from the underside of the control panel that are keeping the motor in place.

When you remove the screws you may have a flat piece of white aluminum come away from the underside of the control panel also. This part will not be returning to the control panel and can be discarded now if you like.

Lift out the motor. Do not discard the screws that were holding the motor in place. You will need them again to mount the motor to the bracket in a later step. You may want to thread them into the motor threaded holes.

Your control panel should look about like this now. Your will of course have wires and connections in it. These are not shown here for clarity.

Drilling the control panel

Next you will be marking and drilling holes in the aluminum control panel. The process of drilling will create chips and scraps of aluminum. It is very important that you take care and precautions to avoid getting these scraps into any of the electrical components or circuits within the pasteurizer. It is best to have the lower enclosure back cover panel on the pasteurizer at this time. This is the panel that covers up the back side of the tank and the heating elements. It is also a good idea to place a clean rag over the ProVu controller during the drilling so that chips don’t get into it. It is not good practice to use compressed air to remove metal chips from the area after drilling. They can be forced into places where they do not belong. These are places such as electrical circuits, eyes, skin and so on. It is more advisable to remove the scraps with a soft bristle brush and/or a shop vacuum cleaner using a crevice tool.

Another note about drilling the control panel: If you care at all about the appearance of your pasteurizer then we advise that you look at the approximate areas where the drilling will be done and protect the painted surfaces there. This is most easily done by covering the entire surface with masking tape. This should be done to a distance of at least 3 inches radiating outward from any hole you plan to make. Strands of aluminum can swing a long way out from the drill if you don’t break the chips. These strands will make ugly and permanent swirl marks on your control panel. The masking tape will prevent this.
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Instructions for converting a 60G direct drive pasteurizer to a chain drive

Drilling template usage

The drilling template is on the last page. You must remove it from this document and carefully cut it out with scissors. Fold exactly on the line shown and apply it as shown in the images on the left and right here. The front side holes are shown on the left and the side panel holes are shown on the right. The more care you take at this step, the better the overall installation will go for you. Take your time, read ahead and do not drill until you are certain you have located the correct place for the new hole.

Drilling of the side panel

Dimensions are given for the hole locations in the drawing above. If you prefer, you can take advantage of the template that is included with the conversion kit. If the template is improperly folded or improperly used, the hole locations will not be accurate. For this reason it is recommended that you double check the locations before drilling, even if you make use of the template. This will ensure that the motor bracket will fit exactly where it is meant to go.
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Instructions for converting a 60G direct drive pasteurizer to a chain drive

We advise using a pencil to mark the first location of the hole center. When your measurements are double checked, use a center punch to form a dimple into the aluminum. If you use an automatic center punch, you can do this alone. If you will use a punch and hammer, you will need someone to support the aluminum for you so that you don’t do any damage to the control panel or break any welds.

Make the hole with a 1/16” drill bit first. Then allow the 11/64” bit to follow that hole and make the correct size.

Be sure to remove the burrs from both sides of all holes you drill. The counter sink tool is useful for this when turned by hand.

Drilling of the front panel

Follow all the recommendations offered on the previous page regarding marking, placement and drilling of the holes.

For the front panel of the control panel you will need to countersink the holes. This should be done a little at a time so that the supplied screws just sit into the countersinks until they are flush with the outside painted surface of the front panel. If they are sticking out too far, they can interfere with the fit of the top cover. If they are too deep, they can interfere with the proper tightening of the motor bracket.

When these 4 holes are all drilled, with the two in the front having their countersinks, and all the burrs are trimmed from the holes, you can gently remove the masking tape from the control panel.

Use the brush and the shop vacuum to remove all the burrs and other debris from the inside of the control panel.

The control panel housing is now ready to receive the motor mount and motor. In the next steps we will make them ready for installation.
Reversing the direction of motor rotation

NOTE: If your kit came with a motor already installed, you must now turn to page 10 and proceed from there.

The motor you removed is set up to turn in the CCW direction. That worked fine when the motor faced downward. But now it will face upward so the direction needs to be reversed. If this step is not done, the stirring shaft will not stay threaded into the coupling, the propeller will remove itself from the bottom of the shaft, and the milk in the tank will be stirred in a way that is harmful to the heating elements and causes more cleaning effort at the bottom of the tank.

Your motor should have a black and a white wire coming out of the cord grip on the joint box. The black will remain, but the white will be replaced by a red wire that will connect to a different place than the white wire.

Lay the motor on its side with the joint box facing up. Remove the 4 screws that secure the box to the motor and set aside. With a twisting and prying motion, persuade the plastic box to come free from the motor.

Where you see wires exit the motor, you should see a red wire. This is the wire we will connect to in order to change rotation.

Slide the fiberglass sleeve away from the motor to reveal the red wire. This is where we will make a connection to a new length of red wire that you should find inside your kit. Do not strip any insulation off of the wire from the motor or the wire in the kit. This will be done for you by the kind of connector you will be using.

Gently move the wires around so that you have as much working room around the red wire as possible without straining the other wires excessively.

Locate the wire connector in your kit that looks like the one shown in the photo. The color may not be the same. Look at the connector closely. Notice that it has one passage that allows a wire to go right through it. There is another blocked passage that will only allow a wire to enter to a stopping point. The complete passage is where you will place the red wire that comes out of the motor. You also want the shallowest part of the blocked passage to be closest to the motor case. The reason for this will be more evident in the next step. Slide the connector on using a back and forth motion if needed, until the red motor wire is fully contained by the passage of the connector.
Since the shallow end of the blocked passage is closest to the motor case, the deepest end of the blocked passage is facing away from the motor. This makes it easy for you to insert the red wire in your kit, down into the full depth of the blocked passage. You MUST get the end of the new red wire in far enough to go past the little metal comb that is sticking out of the connector. If you aren’t sure it’s in far enough, mark it with your fingernail and pull it out to compare to the location of the comb. Sometimes the comb will sit low and block the wire from entering far enough. If this is happening you need to pull the comb out just a little with the pliers. If you don’t get the new red wire in far enough, your connection will fail and your motor will not work when you are finished. You will also have to pry the connector off the wires and then find another way to make the connection.

When you are satisfied that the new red wire is inserting to the full depth of the blocked passage, and when the old motor red wire is fully contained by the through passage, it’s time to make the connection.

Do this by pressing slowly but firmly on the top edge of the comb and the bottom of the connector. This will drive the comb into the insulation of the wires and the comb will find the copper wire inside and make the connection.

Squeeze the pliers until the comb is fully buried and is flush with the top surface of the connector.

While keeping pressure on the pliers, grab the L shaped tab hanging off the connector and fold it toward the pliers as far as possible in the direction shown.

Release the pliers grip and snap the L shaped tab onto the connector until it clicks fully closed.

Give another squeeze with the pliers if needed, to be sure the tab snapped fully over the connector.

Gently tug on the new red wire to make sure it is captured by the comb. If it is loose or comes right out when you gently tug on it, you must remove the connector and make the connection another way. Solder and electrical tape is the next best thing. Or you can use a small wire nut if you can prevent the short wires from twisting under the torque of the nut cutting into the wires. If the wire into the motor twists you may destroy the motor.
Instructions for converting a 60G direct drive pasteurizer to a chain drive

Shown here is the finished result of the wire connector operation. You can see that the new red wire now comes from the original red motor wire. You can also see the importance of getting the deep end of the blocked passage of the connector pointed away from the motor. This is where the new red wire resides.

For the treatment of the original white wire, cut the white wire where it exits the joint and cover the cut with a few wraps of electrical tape.

Pass the other end of the new red wire out through the gasket and then the cord grip of the joint box.

Neatly tuck all components inside the joint box. If more space is needed and there is a screw mounting tab on the capacitor, you can cut it off close to the capacitor. Careful arrangement of the parts should result in all of it fitting.

The cord grip must face in the direction shown in the photo when you are finished. Install the box screws being careful not to over tighten them, since they do not penetrate very far into the wall of the motor.

Lengthen the black wire by sliding the butt connector of the new black extension wire over the stripped end of the old black wire. The stripped length should be about ¼”. Crimp with a wire crimper. Do not cut through the butt connector.

Mark the shaft of the motor 1” up from the mounting surface of the motor, where the 4 threaded holes are. This should be about ¼” from the end of the shaft. Have a helper hold the motor steady while you use a hacksaw to slowly remove the marked length from the shaft. A vise can be used if a thick rag is wrapped around the gearbox and the vise is only made tight enough to hold, and no more.

Try to keep the cut parallel to the mounting face of the motor. When the cut is complete, use a file to remove any burrs that have formed, especially those that will not allow the driving sprocket to install easily. The motor conversion is now complete.
Mounting the motor and chain to the bracket and shaft

Gather the bracket and tower assembly, the chain and sprocket bag, the modified gear motor and the flat and lock washers. Don’t open the chain bag until needed. The chain must be kept clean.

Place the motor in position as shown. Use the screws you took out of the motor when removing it from the pasteurizer to mount the motor to the bracket. Also use lock and flat washers with the flat washers resting on the bracket. Leave the screws finger tight at this time.

Before proceeding, check to be sure the cord grip for the wire exit is facing in the direction shown. If it is not, correct it now.

Slide the motor all the way toward the shaft tower. Back the set screws out of the sprockets enough to pass the shaft of the motor. Line one set screw up with the key cut of the gear box shaft. Press the sprocket onto the shaft with the hub of the sprocket facing the gear box. Place a straight edge on the top surface of the sprocket which is installed on the tower, and slide it onto the sprocket you just put onto the gear box shaft. Adjust the height of the sprocket on the gear box shaft until its top surface also comes into parallel contact with the straight edge. Tighten the set screws of the sprocket using a 2.5mm Allen wrench.

Place the chain over the motor sprocket and then the other. Slide the motor away from the tower to cause the chain to become tight. Temporarily tighten 2 motor mounting screws that are diagonal to each other.

Look at the assembly from the point of view shown to the left. You should see the chain looking parallel to the top edge of the bracket. Adjust the DRIVING sprocket on the motor until the parallel condition is achieved.

Make sure all set screws in all sprockets are tight. Loosen the motor mounting screws back to
Installing the assembly into the control panel

A FINAL CHECK BEFORE INSTALLING THE CHAIN DRIVE

As a final check before proceeding, please check the following things:

The three screws at the base of the tower need to be tight.

The 4 motor mounting screws should be loose enough to permit the motor to move if firm pressure is applied.

The cord grip should be facing as shown.

Take this time to thread your stirring shaft into the side entry drive shaft and see that it threads into the drive shaft as it should. If it does not, you may have to purchase a new stirring shaft for the conversion.
Instructions for converting a 60G direct drive pasteurizer to a chain drive

At this time the control panel should have the holes drilled into it. The metal debris should be cleaned out of the interior.

Slowly and carefully remove the masking tape from the outside of the control panel. Do this with caution to avoid doing any damage to the silk screen or to the paint.

Remove the 4 screws from the bottom of the tower platform.

Hold the chain drive assembly relative to the control panel as shown at the left.

Carefully slide the drive assy down into position until the bottom of the tower platform is making contact with the surface the motor originally sat on before you removed it.

Make sure the wires that come out of the cord grip are not pinched under the tower platform. Make sure all other wires are not disturbed by the installation of the chain drive assembly.

Install the 4 screws that came with the bottom of the tower, through the bottom holes of the control panel and then into the threaded holes in the bottom plate of the tower. Do not tighten beyond finger tight at this time.

Locate the two 6-32 x 1/2” flat head, two 6-32 x 1/2” pan head, and four 6-32 flange hex nuts. Pass the flat head bolts through the front panel, through the elongated holes in the bracket. Install a flange hex nut onto each bolt, finger tight at this time. Pass the pan head bolts into the side panel holes and through the tab of the motor mount bracket. Loosely install a flange hex nut onto each bolt.

Find the natural settling point for the assembly by jostling it in its new position. Check to make sure the top front edge of the bracket is flush with the top front edge of the control panel. Then fully tighten the front bolts with a #2 Philips. Fully tighten the bottom bolts that go into the platform base. Fully tighten the side bolts.
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Instructions for converting a 60G direct drive pasteurizer to a chain drive

Momentarily fit the top cover onto the control panel. Press it fully into position. Check to see if there is good alignment where the rim of the top cover fits over the side of the control panel near where you drilled the side holes. Look at the hole in the upper right corner where the sheet metal screw should go. If it does not line up, you will need to install some shim washers. These are supplied in the kit but should only be used if these holes are misaligned. They are to be placed between the side wall and the tab on the side of the bracket. Then reinsert the two 6-32 x 1/2" pan head bolts and nuts. Tighten the side pan head bolts fully. The sheet metal hole should line up better now.

**WHERE EVERYTHING GOES**

![Diagram showing where everything goes](image)

Shim washers under here if needed

- 6-32 x 1/2" flat head screws on the front.
- 6-32 serrated flange nut in all 4 places where you drilled holes.
- Check hole for alignment
- Use care to avoid pinching wires under the bracket.
- 6-32 x 1/2" truss head screws on the side.
- Longer motor wires can be routed through this grommet if one is on your machine. Otherwise follow the path of the other wires to get around the air wall.
- Internal masking tape can be removed after the motor assembly is in place and all fasteners are tight.

At this point your control panel should look something like this.

There are wires not shown which need to be cared for and avoided.

You can remove the internal masking tape at this time.

Run the new red motor wire in the path that follows the other bundle of wires over to the controller side and up to the place where the motor was originally connected. Connect the black motor wire to the fuse tab where it was originally and the red motor wire where the white motor wire was.

Install the ground wire from the location shown to the grounding stud at the side of the control panel where the terminal strip is supported.
Instructions for converting a 60G direct drive pasteurizer to a chain drive

Setting chain tension and shaft speed

The speed of the stirring shaft in the tank is determined by only 2 things. The frequency of the supply power to the pasteurizer and the ratio of the pulleys.

One pulley is a 16 tooth type and the other is a 17 tooth sprocket. This ratio allows a consistent stirring speed regardless of the frequency of line supply.

If your pasteurizer is installed in a 60 Hz country then the 17 tooth sprocket should be on the DRIVEN side of the system. The opposite is true if you are in a 50 Hz country. This should have been checked in earlier steps but it is good to verify it now before moving on to chain tensioning.

All fasteners must be tight at this time except the 4 screws that hold the motor onto the bracket. Those 4 should be loose enough to allow the motor to slide under firm pressure.

With the motor slid away from the tower and the chain tight, squeeze the chain in the mid-section until the measurement between the points of force is 1.4 inches or about 29mm. When you remove the squeeze pressure from the chain the motor should stay in the position it slid to, and the chain should feel a little loose.

Tighten the 4 screws holding the motor to the bracket.

Remove the towel or rag that has been covering the ProVu and make certain the ProVu is free of metallic particles. This will make it ready for the next step.
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Instructions for converting a 60G direct drive pasteurizer to a chain drive

Route the red wire of the motor in a manner as shown here. If you choose you may route the red and the ground wire down to the main wire bundle behind the air wall instead of going over the air wall.

In this case, run the red wire between the air wall and the ProVu controller and then up to the point of connection on the terminal strip. Run the ground wire to the same threaded lug where you see a ring terminal already in place on the side wall. Use the included wire ties to make neat work of the routing and to ensure that the new wires cannot become caught up in the chain as it moves.

Connect the red motor wire where it is shown in this picture. Be sure the connection is tight.

Fan wire connection points are shown for later convenience.

The black wire connects to the center fuse side tab as shown here. Route this wire under the bracket to avoid contact with the chain.
Instructions for converting a 60G direct drive pasteurizer to a chain drive

Conclusion

At this point, your control panel should look like the one shown on page 1. It is ready for testing. This part will be done with the cover off. If you disconnected the fan wires from the terminal strip, there is no need to reconnect them for this test.

ANY TIME THE MOTOR IS TURNING, THE CHAIN WILL BE IN MOTION.

RUNNING THE MOTOR WITH THE COVER REMOVED REQUIRES EXTREME CARE AND CAREFUL MOVEMENT OF HANDS, FINGERS AND TOOLS.

DO NOT WORK ON THIS EQUIPMENT WHILE WEARING WRIST OR FINGER JEWELRY.

DO NOT WORK ON THIS EQUIPMENT WITH LONG SLEEVES THAT ARE UNBUTTONED OR PRESENT AN ENTANGLEMENT RISK.

DO NOT WORK ON THIS EQUIPMENT WITH LONG HAIR UNLESS IT IS TIED BACK BEHIND YOUR HEAD.

DO NOT WORK ON THIS EQUIPMENT WITH ANY SORT OF HANGING APPAREL SUCH AS HOOD PULL STRINGS, EAR BUD OR HEADPHONE WIRES, LONG HANGING NECK JEWELRY.

AVOID DISTRACTIONS WHEN WORKING AROUND THE MOVING CHAIN AND SPROCKETS.

DO NOT INSTALL THE MILK STIRRING SHAFT AT THIS TIME.

Reconnect the power to the pasteurizer and make sure the circuit breakers are turned on.

Connect and turn on the water supply to the pasteurizer.

Turn the pasteurizer on and direct the controller to go into the colostrum cool mode. Soon after, you should see the motor start turning. You should see the direction of rotation of the gear motor is clockwise when viewed from the top.

With the chain properly tensioned and lubricated, there will be a small amount of noise from the chain. There will be some of the lubricant thrown off of the chain as it breaks in with the sprockets. Over the next few batches of milk you process, keep an eye on the chain tension. As the chain and sprockets mesh together over time, there will be some wear that will result in chain slack. This should be taken up and maintained at the 1.4” or 29mm mid-span measurement originally set. After the break in period, the chain should require significantly less attention.

The chain is pre-lubricated at Dairy Tech. We prefer to use a motor oil additive rather than plain oil. If you feel the chain requires additional lube over time, please do so when the machine is not running. Use a clean cloth to wipe away as much of the old lubricant as you can. Reapply a lubricant such as STP oil treatment, Motor Honey, Motor Medic or similar. Do not use a product that contains particles. If you like you may also use 90W gear oil.
Instructions for converting a 60G direct drive pasteurizer to a chain drive

IN ALL CASES, YOU MUST USE LUBRICANT VERY SPARINGLY. Overuse of lube will lead to excessive throw off of oil from the chain and sprockets. This can get into the other components in the control panel. It can also find its way down into your milk or colostrum product if a drip forms above the open milk tank.

After application of new lubricant, operate the pasteurizer and watch for the throw off of the lubricant. After 10 minutes of running, turn the pasteurizer off and wipe up the spatter with a cloth.

Place the ends of the fan wires back in the place where you found them when you disconnected them. You will need to connect one wire to the same electrical node where the new red motor wire went. The other fan wire will connect to the node where you see the black wires and the label “LINE” is on the aluminum. Refer to the second photo on page 14 for better understanding. The wires can be swapped so don’t worry about which one goes to which terminal.

Mount the top cover onto the control panel being certain that the top cover closes without bringing any of the fan wires near or into contact with the chain or sprockets. Secure it with the sheet metal screws you removed at the beginning of the conversion.

This concludes the conversion of the pasteurizer from direct drive to chain drive. You can now enjoy the benefits of this new drive system.

Troubleshooting

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>The motor fuse blows as soon as the power is turned on.</td>
<td>Chain may be too tight. Sprockets may be out of alignment. A wire may be pinched. Something caught in the chain.</td>
</tr>
<tr>
<td>The chain is making a lot of noise.</td>
<td>Sprockets may be misaligned. Chain may be too tight or too loose. Chain may have dried out. Sprockets may have come loose from shafts.</td>
</tr>
<tr>
<td>Motor getting very hot</td>
<td>Motor shaft might be touching the underside of the top cover. Fan not connected. Fan filter not clean. Fan has failed. Chain tension too high. Confirm 50Hz vs 60Hz sprocket arrangement.</td>
</tr>
<tr>
<td>Stirring shaft will not thread in easily, or not at all</td>
<td>If available, try running an adjustable ½-20 threading die over the shaft threads. A new stirring shaft may be required.</td>
</tr>
<tr>
<td>Cover does not go all the way on</td>
<td>Distance between side walls is wrong. Motor shaft is too long.</td>
</tr>
<tr>
<td>Oil is getting onto my lid or into my milk/colostrum product</td>
<td>Too much lubricant is being used on the chain. Thrown off oil is not cleaned up with a cloth occasionally.</td>
</tr>
</tbody>
</table>

If further assistance is needed you may call Dairy Tech service at (970) 646-8872 between the hours of 8 am to 4pm US Mountain Time, Monday – Friday.
Dairy Tech, Inc.

Instructions for converting a 60G direct drive pasteurizer to a chain drive

List of parts included in the kit

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor bracket with tower (yours may also have a motor depending on the kit you ordered)</td>
<td>1</td>
</tr>
<tr>
<td>Sprocket (one 16 tooth, one 17 tooth)</td>
<td>2</td>
</tr>
<tr>
<td>Roller chain (pre-lubricated)</td>
<td>1</td>
</tr>
<tr>
<td>6-32 x ½” flat head bolts</td>
<td>2</td>
</tr>
<tr>
<td>6-32 x ½” pan head bolts</td>
<td>2</td>
</tr>
<tr>
<td>6-32 flanged hex nuts</td>
<td>4</td>
</tr>
<tr>
<td>6-32 shim washers</td>
<td>2</td>
</tr>
<tr>
<td>M5 x 14mm Socket head cap screws</td>
<td>4</td>
</tr>
<tr>
<td>M5 flat washers</td>
<td>4</td>
</tr>
<tr>
<td>M5 lock washers</td>
<td>4</td>
</tr>
<tr>
<td>Wire tie</td>
<td>2</td>
</tr>
<tr>
<td>Ground wire</td>
<td>1</td>
</tr>
<tr>
<td>Wire tap connector</td>
<td>1</td>
</tr>
<tr>
<td>Length of red wire</td>
<td>1</td>
</tr>
<tr>
<td>Length of black wire with male ¼” Fast-On and female ¼” Fast-On terminals</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes: