

# MEASURING CABLE REPLACEMENT AND TIMING BELT REPLACEMENT INSTRUCTIONS FOR PT9000 SERIES



For Models

PT9101, PT9150, PT9420, PT9510

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Created 2/22/99 C:PT9man

## MEASURING CABLE REPLACEMENT

1. Remove the three pan head screws that hold the cable cover to the transducer body.
2. Remove the cable cover and set aside.
3. Remove the four bolts holding the sensor endplate (endplate closest to the connector) to the transducer housing and set aside.
4. Remove the endplate and set aside. If the transducer is a PT9101 with a bridge circuit, PT9420, or PT9510, be careful not to pull the wires connected to the electronics circuit board.
5. Remove the two bolts holding the sensor mounting plate to the transducer body and set aside
6. Remove the sensor assembly and set aside.
7. After determining the exact position of the main shaft gear, loosen the allen wrench set screw, remove the main shaft gear and set aside.
8. If there is cable on the spool, pull the cable out to the full extended position.

**IF THE CABLE HAS WRAPPED AROUND THE MAIN SHAFT and/or cannot be extended, go to step 13. If cable can be fully extended, continue with step 9.**

9. With the cable fully extended, hold the spool to keep it from rotating. This is best done by using the cable locking screw that originally shipped with the unit and was removed before operation.
10. Unhook the cable from the spool and discard.
11. Carefully release spring tension by allowing the spool to rotate slowly until all spring tension is released. The best way to do this is to let the spool rotate under your thumb. This will allow “controlled slippage” of the spool to release the spring tension.
12. Remove the cable guide assembly. The assembly may have to be pried off. Take precautions to prevent damage to the parts. Set aside. **SKIP TO STEP 35.**

### CAUTION

13. The spring motor can be dangerous while it has tension. The spring, if allowed to, can suddenly uncoil itself by shooting out of the spring housing. The spring has enough tension to pop off the endplate when unbolted. The spring is sharp and

can cause injuries. Be careful when doing anything with the spring exposed. Wear gloves and safety goggles.

14. Turn the transducer on the open end so spring housing is facing up.
15. WHILE HOLDING THE ENDPLATE SO IT CAN'T MOVE, remove the four pan head screws that hold the spring housing to the body and set aside.
16. Tilt one edge of the end bracket up just enough so you can slide your GLOVED fingers in between the spring housing and endplate.
17. Slide hand all the way in to contain spring while lifting the end bracket off. KEEP PRESSURE ON THE SPRING WITH YOUR HAND.
18. Set end bracket aside.
19. If the cable was broken allowing the spool to spin freely, the momentum of the spool may have wound the spring partially the wrong way. Check spring. **If coils are all going the same direction, skip to step 22. If the spring is partially wound the wrong way, continue with step 20.**
20. Pinch good coils of spring and spring housing together firmly with a gloved hand.
21. With the other hand, pull the backward-wound coils up out of the spring enclosure and rewind that portion of the spring. **Skip to step 23.**
22. While keeping the spring contained with your gloved hand, separate spring housing from body and slowly lift spring housing. ONCE THE SPRING ARBOR DISENGAGES, THE SPRING WILL SUDDENLY LOSE ALL TENSION. It makes a loud noise and you'll feel it slide under your fingers. Keep it contained in the spring housing until its done moving.
23. Remove spring housing, including the spring and arbor.
24. Set aside spring housing.
25. Remove the cable guide assembly. The assembly may have to be pried off. Take precautions to prevent damage to the parts. Set aside.
26. Remove timing belt and set aside.
27. Pull main shaft and spool assembly from the body, remove and discard fouled cable.
28. Replace main shaft and spool assembly.

29. Replace timing belt loosely over the main shaft pulley.
30. Replace spring housing on body.
31. Engage the spring in the spring arbor.
32. If light machine oil was spilled from the spring housing, replace the oil.
33. Replace phenolic disk, end bracket, and bolt down. Make sure the o-ring is seated correctly and that the short bolt goes in the hole closest the cable guide.
34. Rotate spool with fingers to insure spring is engaged. Make sure the spool is rotated clockwise when looking at the spring end. Noticeable tension should buildup.
35. Attach the spring winding tool to the transducer housing and main shaft.
36. Using the spring winding tool, wind the spring as per the table below:

| <u>Range:</u> | <u>Spring winds:</u> | <u>Range:</u> | <u>Spring winds:</u> |
|---------------|----------------------|---------------|----------------------|
| 75 inches     | 25                   | 500 inches    | 45                   |
| 100           | 25                   | 550           | 48                   |
| 150           | 25                   | 600           | 55                   |
| 200           | 25                   | 800           | 69                   |
| 250           | 25                   | 1000          | 84                   |
| 300           | 29                   | 1200          | 101                  |
| 350           | 33                   | 1500          | 124                  |
| 400           | 37                   | 1700          | 140                  |
| 450           | 41                   |               |                      |

37. On the cable guide assembly, position cable guide ¼” from belt pulley on lead screw.
38. Place bushing on cable guide assembly shaft next to pulley.
39. Using an “L” shaped allen wrench or a bent paperclip, hook onto the timing belt and pull it up over the bushing onto cable guide assembly pulley. Make sure belt stays on pulley on main shaft.
40. Snap bushing into groove in transducer housing. If white bushings are used, make sure flange is inside the cable exit. If black bushings are used, secure with Loctite 401.
41. Place second bushing on other end of cable guide assembly and snap into other groove in transducer housing. If white bushings are used, make sure flange is inside the cable exit. If black bushings are used, secure with Loctite 401.

42. Insert bare end of replacement cable through the cable guide.
43. Use crimp to make an approximately ½” diameter loop in the end of the cable.
44. Rotate spring winding tool until slot in spool is visible.
45. Attach cable loop to hook on the inside of the spool. Make sure cable comes up through slot in spool.
46. Hold cable firmly and release spring winding tool.
47. Slowly allow the spring tension to wind the cable onto the spool. **IT IS VERY IMPORTANT TO MAINTAIN CABLE TENSION AT ALL TIMES.**
48. Replace the cable cover.
49. Secure cable cover with the three pan head screws.
50. Fully extend and retract the cable to insure smooth cable travel.
51. Replace main shaft sensor gear at its original position. Make sure the allen screw contacts the flat on the shaft.
52. If unit has a potentiometer, check potentiometer for damage. If cable has been free-released or the cable has been broken, the potentiometer may be broken. Turn the potentiometer shaft all the way both directions. The potentiometer should travel smoothly with no resistance until it suddenly stops. If rough spots, resistance, or “soft” stops are felt, the potentiometer is damaged and must be replaced. Contact Celesco for new pots if necessary. Replace potentiometer in sensor assembly if necessary.
53. Replace sensor mounting assembly, but do not tighten the bolts completely.
54. Check position of the main shaft gear and sensor gear to make sure they line up. If not, adjust the main shaft gear.
55. If your transducer is a PT9150, skip to step 61
56. Connect a 10 VDC power supply to the potentiometer terminals so +10VDC is connected to CCW and –10VDC is connected to CW.
57. Connect a voltage meter to potentiometer terminals so positive lead is connected to S and negative lead is connected to CW.
58. Adjust potentiometer so output is between 0.04 and 0.1 VDC

59. Position the sensor assembly such that the gear teeth mesh but the gears are not forced into each other.
60. Tighten sensor assembly mounting screws.
61. Fully extend and retract the cable to ensure smooth travel.
62. Replace sensor endplate, making sure the gasket is seated correctly.
63. Replace the four endplate bolts and tighten firmly.

## BELT REPLACEMENT

1. Remove the three pan head screws that hold the cable cover to the transducer body.
2. Remove the cable cover and set aside.
3. Remove the four bolts holding the sensor endplate (endplate closest to the connector) to the transducer housing and set aside.
4. Remove the endplate and set aside. If the transducer is a PT9101 with a bridge circuit, PT9420 or PT9510, be careful not to pull the wires connected to the electronics circuit board.
5. Remove the two bolts holding the sensor mounting plate to the transducer body and set aside
6. Remove the sensor assembly and set aside.
7. After determining its exact position, remove the main shaft gear and set aside.
8. If there is cable on the spool, pull the cable out to the full extended position.
9. Hold the spool to keep it from rotating. This is best done by using the cable locking screw that originally shipped with the unit and was removed before operation.
10. Unhook the cable from the spool.
11. Remove the cable guide assembly. The assembly may have to be pried off. Take precautions to prevent damage to the parts. Set aside.
12. Carefully release spring tension by allowing the spool to rotate slowly until all spring tension is released. The best way to do this is to let the spool rotate under your thumb. This will allow “controlled slippage” of the spool to release the spring tension.

### CAUTION

The spring motor can be dangerous while it has tension. The spring, if allowed to, can suddenly uncoil itself by shooting out of the spring housing. The spring has enough tension to pop off the endplate when unbolted. The spring is sharp and can cause injuries. Be careful when doing anything with the spring exposed. Wear gloves and safety goggles.

13. Turn the transducer on the open end so spring housing is facing up.
14. Remove the four pan head screws that hold the spring housing to the body and set aside.

15. Carefully remove the end bracket and set aside.
16. Remove phenolic disk exposing the spring underneath and set aside.
17. Disengage the spring from the spring arbor.
18. After noting orientation of the spring arbor, remove the spring arbor and set aside.
19. Carefully separate the spring housing from the body and set aside, taking care not to spill the light machine oil.
20. Remove the old timing belt.
21. Install a new timing belt on the main shaft pulley.
22. Replace spring housing on body.
23. Replace spring arbor in previously determined orientation.
24. Engage the spring in the spring arbor.
25. If light machine oil was spilled, replace the oil.
26. Replace phenolic disk, end bracket, and bolt down. Make sure the o-ring is seated correctly and that the short bolt goes in the hole closest the cable guide.
27. Rotate spool with fingers to insure spring is engaged. Make sure the spool is rotated clockwise when looking at the spring end. Noticeable tension should buildup.
28. Attach the spring winding tool to the transducer housing and main shaft.
29. Using the spring winding tool, wind the spring as per the table below:

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| 450           | 41                   |               |                      |

30. On the cable guide assembly, position cable guide ¼” from belt pulley on lead screw.

31. Place bushing on cable guide assembly shaft next to pulley.
32. Pull orange timing belt up over bushing and onto cable guide assembly pulley, making sure belt stays on pulley on main shaft.
33. Snap bushing into groove in transducer housing. If white bushings are used, make sure bushing is oriented so flange is inside the cable exit. If black bushings are used, secure with Loctite 401.
34. Place second bushing on other end of cable guide assembly and snap into other groove in transducer housing.
35. Rotate spring winding tool until slot in spool is visible.
36. Attach cable loop to hook on the inside of the spool.
37. Hold cable firmly and release spring winding tool
38. Slowly allow the spring tension to wind the cable onto the spool. **IT IS VERY IMPOTANT TO MAINTAIN CABLE TENSION AT ALL TIMES.**
39. Replace the cable cover
40. Secure cable cover with the three pan head screws.
41. Fully extend and retract the cable to insure smooth cable travel.
42. Replace main shaft sensor gear at its original position.
43. Replace sensor mounting assembly, but do not tighten the bolts completely.
44. Check position of the main shaft gear and sensor gear to make sure they line up. If not, adjust the main shaft gear.
45. If your transducer is a PT9150, skip to step 49
46. Connect a 10 VDC power supply to the potentiometer terminals so +10VDC is connected to CCW and -10VDC is connected to CW.
47. Connect a voltage meter to potentiometer terminals so positive lead is connected to S and negative lead is connected to CW.
48. Adjust potentiometer so output is between 0.04 and 0.1 VDC
49. Position the sensor assembly such that the gear teeth mesh but the gears are not forced into each other.

50. Tighten sensor assembly mounting screws.
51. Fully extend and retract the cable to ensure smooth travel.
52. Replace sensor endplate, making sure the gasket is seated correctly.
53. Replace the four endplate bolts and tighten firmly.