Frostex®
Pipe Freeze Protection System

Installation Instructions and User Guide for the Frostex Pipe Freeze Protection System Using the 9800 FlexFit Plug Kit

Directives d'installation et Guide de l'Utilisateur du Système Frostex de Protection Anti-gel des Tuyaux Utilisé avec le Kit Frostex 9800 FlexFit

Keep pipes from freezing
Protection anti-gel des tuyaux

tyco
Thermal Controls

60J9 Residential
and Mobile Home
Pipe Heating Cable

ENGLISH

FRANÇAIS

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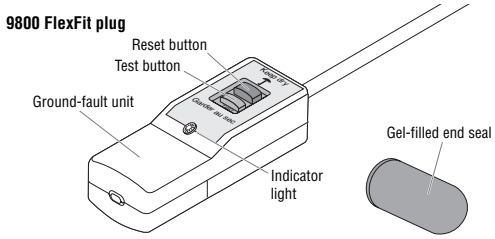
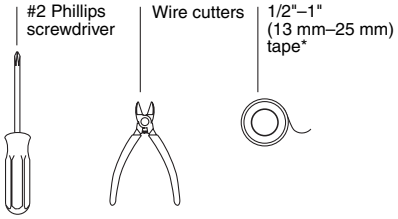


Before You Begin

Make sure your 9800 FlexFit Plug Kit is complete. It should contain:

- 1 9800 FlexFit plug
- 1 Push-on end seal
- 2 Orange warning labels in English
- 2 Orange warning labels in French
- 1 White tape strip
- 1 Installation instruction

Make sure you have sufficient braided Frostex heating cable for the job. **Do not use earlier versions of Frostex heating cable that have no braid.** Also make sure you have the following items:



*Frostex 9610 application tape is recommended.

Two 10" (25 cm) plastic cable ties (not included) may be used to secure ground-fault unit to pipe insulation.

If you have any questions after reading this guide, call this toll-free Tyco Thermal Controls number: (800) 545-6258.

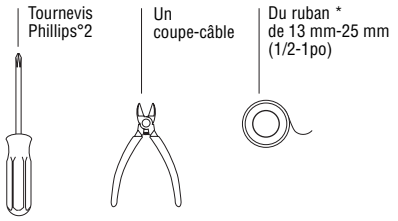
Save this installation instruction and user guide. It contains important safety warnings and maintenance information.

Avant de débuter

Assurez-vous que votre kit 9800 FlexFit contient tout ce qui suit:

- 1 Fiche 9800 FlexFit
- 1 Obturateur à pousser
- 2 Étiquettes oranges d'avertissement en anglais
- 2 Étiquettes oranges d'avertissement en français
- 1 Bande de ruban blanc
- 1 Manuel des directives d'installation

Assurez-vous d'avoir suffisamment de câble chauffant tressé Frostex pour effectuer le travail. **N'employez pas les versions antérieures des câbles chauffants Frostex sans tresses.** Ayez également les articles suivants en main:



*Le ruban de fixation Frostex 9610 est recommandé.

Deux colliers de serrage en plastique de 25 cm (10 po) (non inclus) peuvent être utilisés pour fixer le disjoncteur différentiel à l'isolant de tuyaux.

Si vous avez des questions après la lecture du présent guide, contactez le numéro sans frais de Tyco Thermal Controls au : (800) 545-6258.

Conservez ces directives d'installation ainsi que le guide de l'utilisateur. Ils contiennent d'importants avertissements de sécurité et une notice d'entretien.

⚠ Five Important Safety Warnings

Follow all five of these instructions to prevent fire or shock:

1. Use the correct heating cable.

- Use only braided versions of Frostex heating cable.
- Earlier versions of Frostex heating cable with no braid are not compatible.

2. Use the right end seal and plug.

- Seal the heating cable only with the end seal provided; do not use electrical tape.
- Use the 9800 FlexFit plug contained in this kit. It has special safety features.
- Use the 9800 FlexFit Plug Kit only with Frostex heating cable.

3. Do not twist wires together or allow them to touch each other.

- Do not strip the heating cable. If wires touch, the nonreplaceable fuse will blow and the system will not work.

4. Keep the entire Frostex system dry. This includes the insulation.

If the system gets wet, pipes may freeze.

- Use the system only on insulated residential pipes carrying water.
- Do not use the system on buried pipes.
- Do not use the system to de-ice roofs or gutters.
- Do not install any part of the heating system where it would be under water.
- Do not use where water is likely to enter the plug.

5. The blue plastic heating cable and the metal braid must not be cut or damaged.

- Before you begin, inspect the pipe. File and remove any sharp edges. Make sure the heating cable crosses only smooth, nonabrasive surfaces.
- Where the system might be damaged by animals or objects, protect the complete system with a solid cover, such as sheet metal or additional pipe insulation.
- Do not use any wire or clamps to attach the heating cable to the pipe. Instead, use the Frostex 9610 application tape, or equivalent 1/2"–1" (13 mm–25 mm) tape, or plastic cable ties.
- Inspect the heating cable periodically for damage. If you discover broken braid or other damage, immediately disconnect the system and replace the heating cable. Do not splice or repair a damaged heating cable. You must replace any damaged insulation or waterproof covering.

6. Do not install Frostex heating cable close to flammable materials, liquids, or fumes.

Use only 1/2" (13 mm) or thicker fire-retardant and waterproof pipe insulation, in accordance with Table 1 or 2.

⚠ Cinq avertissements de sécurité importants

Veuillez suivre les cinq directives suivantes afin de prévenir les risques d'incendie ou de choc électrique:

1. Utilisez le câble chauffant adéquat.

- Employez uniquement les versions tressées des câbles chauffants Frostex.
- Les versions antérieures des câbles chauffants Frostex sans tresses ne sont pas compatibles.

2. Utilisez la fiche et l'obturateur appropriés.

- Étanchéifiez le câble chauffant à l'aide de l'obturateur fourni seulement; n'utilisez pas de ruban isolant.
- Utilisez la fiche 9800 FlexFit incluse dans ce kit; elle est dotée de caractéristiques de sécurité spéciales.
- Utilisez le kit 9800 FlexFit uniquement avec le câble chauffant Frostex.

3. Ne torsadez pas les fils ensemble ni ne leur permettez de se toucher.

- Ne dénudez pas le cable chauffant. Si des fils se touchent, le fusible non remplaçable sautera et le système ne fonctionnera plus.

4. Gardez le système Frostex au sec en entier, y compris l'isolant.

Les tuyaux risquent de geler si de l'humidité pénètre dans le système.

- Utilisez le système uniquement sur des tuyaux résidentiels et isolés, transportant de l'eau.
- N'utilisez pas le système sur des tuyaux souterrains.
- N'utilisez pas le système pour dégivrer des toits ou des gouttières.
- N'installez aucun élément du système de chauffage en zones immergées.
- N'utilisez le système pas dans des zones où de l'eau risquerait de pénétrer dans la fiche.

5. Le câble chauffant en plastique bleu et la tresse métallique ne doivent pas être coupés ou endommagés.

- Avant de débuter l'installation, inspectez le tuyau, limez et enlevez les rebords acérés. Le câble ne doit croiser que des surfaces lisses et non-abrasives.
- Si le système risque d'être endommagé par des animaux ou des objets, protégez le en le recouvrant en entier d'un revêtement solide comme une tôle, ou de l'isolant à tuyau supplémentaire.
- N'utilisez pas de fils ou de griffes pour fixer le câble chauffant sur le tuyau. Utilisez plutôt le ruban de fixation Frostex 9610, ou un autre ruban équivalent de 1/2 po-1 po (13 mm-25 mm), ou des colliers de serrage en plastique.
- Inspectez le câble chauffant périodiquement. Si vous décelez la présence de tresses brisées ou autres éléments endommagés, débranchez le système immédiatement et remplacez le câble chauffant. Vous ne devez pas tenter de coller ou de réparer un câble chauffant endommagé. Vous devez remplacer les isolants et recouvrements imperméables endommagés.

6. N'installez pas le câble chauffant Frostex à proximité de matières, liquides ou vapeurs inflammables.

N'utilisez que de l'isolant à tuyau ayant 1/2 po (13 mm) d'épaisseur ou plus, ignifuge et résistant à l'eau, conformément au Tableau 1 ou 2.

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General Instructions

- Observe the safety warnings on page 1. Follow the installation steps (pages 2–7) in the exact order given.
- To ensure the plug is properly connected, do not assemble at temperatures below 0°F (–18°C).
- The Frostex system can be left plugged in all year, but you will save energy by unplugging the system when there is no risk of freezing.
- Use a properly grounded, 3-prong, 120-volt outlet. If you are not sure if your outlet is properly grounded, call a professional service person.
- In manufactured housing installations, use the electrical receptacle on the underside of the home. Do not use an extension cord or there may be danger of fire or shock. Using an extension cord is not in compliance with national electrical codes.
- Frostex heating cable may be used on metal or plastic pipes and tubing. Do not install on garden hoses or in applications with tubing that is flexed frequently.
- Exposure to temperatures above 150°F (65°C) will shorten the life of your Frostex heating cable. Before installing the heating cable on hot water pipes, set the water heater thermostat below 150°F (65°C), low to medium on most thermostats.
- Remove any old heating tapes and insulation before you install the Frostex heating cable.
- Do not use more than 50 feet (15 meters) of Frostex heating cable with each 9800 FlexFit plug. Longer lengths will blow the nonreplaceable fuse in the plug.
- The homeowner will need to keep these instructions for future reference. It contains important safety warnings and maintenance information.
- If you have any difficulty installing the system, please contact Tyco Thermal Controls for information at (800) 545-6258, or call a professional service person for help.
- Remove the clear label that covers the test and reset buttons after installation.

Installation Instructions

Step 1. Determine the length of heating cable you need.

1A. Collect the necessary information.

You will need to know the following:

- Type of pipe (plastic or metal).
- Length and diameter of pipe.
- Lowest expected air temperature (disregard windchill).
- Number of valves and spigots (requires additional heating cable).
- If there is a crock (typically used for manufactured housing applications).

1B. Determine the amount of Frostex heating cable you will need.

How to use the tables:

- Decide on the lowest temperature you can expect in your area, down to –40°F (–40°C).
- Measure the diameter of your pipe in inches.
- Using Table 1 or 2 depending on pipe material, determine how many straight runs of Frostex heating cable required to protect the pipe. One run is equal to the length of the pipe.
- To minimize the amount of heating cable required, select the optimal insulation thickness from Table 1 or Table 2.

Cable Length Selection Tables

Table 1. Metal Pipe
Number of heating cable runs required

Metal Pipe		Lowest Expected Temperature			
Insulation Thickness	Pipe Size	20°F (–10°C)	0°F (–20°C)	–20°F (–30°C)	–40°F (–40°C)
1/2"	1/2"	1	1	2	2
	3/4"	1	1	2	2
	1"	1	2	2	2
	1 1/4"	1	2	2	3
	1 1/2"	1	2	3	3
3/4"	1/2"	1	1	1	2
	3/4"	1	1	2	2
	1"	1	1	2	2
	1 1/4"	1	2	2	2
	1 1/2"	1	2	2	3
1"	3/4"	1	1	1	2
	1"	1	1	2	2
	1 1/4"	1	1	2	2
	1 1/2"	1	1	2	2
	2"	1	2	2	2
1 1/2"	3/4"	1	1	1	1
	1"	1	1	1	1
	1 1/4"	1	1	1	1
	1 1/2"	1	1	1	2
	2"	1	1	2	2

Table 2. Plastic Pipe
Number of heating cable runs required

Plastic Pipe		Lowest Expected Temperature			
Insulation Thickness	Pipe Size	20°F (–10°C)	0°F (–20°C)	–20°F (–30°C)	–40°F (–40°C)
1/2"	1/2"	1	2	2	
	3/4"	1	2	2	3
	1"	1	2	3	3
	1 1/4"	2	2	3	
	1 1/2"	2	3	3	
3/4"	1/2"	1	2	2	2
	3/4"	1	2	2	3
	1"	1	2	2	3
	1 1/4"	1	2	3	3
	1 1/2"	2	3	3	
1"	3/4"	1	1	2	2
	1"	1	1	2	2
	1 1/4"	1	2	2	3
	1 1/2"	1	2	3	3
	2"	1	2	3	3
1 1/2"	3/4"	1	1	1	2
	1"	1	1	2	2
	1 1/4"	1	1	2	2
	1 1/2"	1	1	2	2
	2"	1	2	2	3

= Increase insulation thickness

1C. Calculate the total length of heating cable required.

Multiply the number of heating cable runs by your pipe length. Add one extra foot (30 cm) for each valve in your line. Add one extra foot (30 cm) for the distance to the power connection. For installations in a crock, add an additional 2 feet (60 cm) of heating cable. After cutting the Frostex heating cable to the length you need, proceed to Step 2.

Example:

Pipe size and material: 1 inch diameter, plastic

Lowest ambient temperature: -20°F (-30°C)

Pipe length: 16 feet (5m)

Valves: 1 ball valve is used

The water connection is in a crock.

From Table 2, Plastic Pipe, for -20°F (-30°C), either two or three runs of Frostex heating cable is required depending on pipe insulation thickness.

Optimal Pipe insulation thickness: 3/4"

Selecting 3/4" thick insulation requires two runs of Frostex heating cable installed along the entire length of the pipe (Table 2).

The total length of heating cable equals:

32 ft (10 m) 2 runs x 16 ft (5 m) of pipe
+ 1 ft (0.3 m) for one ball valve
+ 1 ft (0.3 m) for one power connection
+ 2 ft (0.6 m) for installing in a crock

Total length = 36 ft (11 m)

Note: Do not use more than 50 feet (15 meters) of heating cable per plug. If the total calculated length exceeds 50 feet (15 meters), you will need additional 9800 FlexFit plugs and outlets. Longer circuit lengths will blow the nonreplaceable fuse in the 9800 FlexFit plug. If you require more than 50 feet per length (15 meters), call Tyco Thermal Controls for information on other products.

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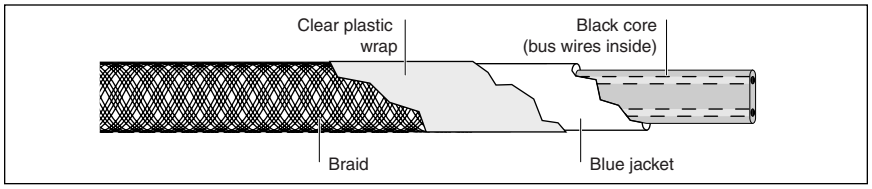
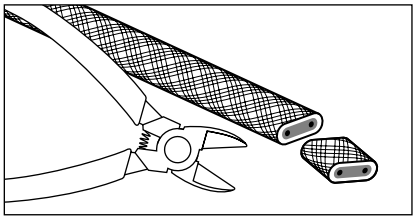
Step 2.
Install the end seal.

Note: The end seal can only be used once, so do not install it until step 2D.

Heating Cable Construction

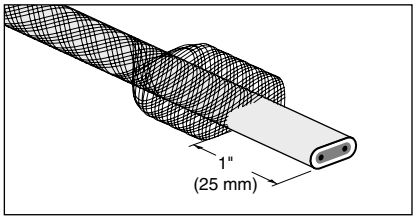


2A. Prepare the heating cable.



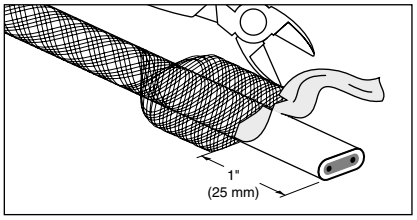
Cleanly cut off one end of the heating cable.

2B. Push the braid back.



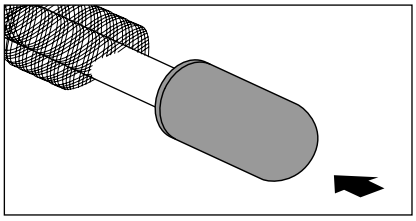
Push the braid back 1" (25 mm) from heating cable end.

2C. Remove the plastic wrap.



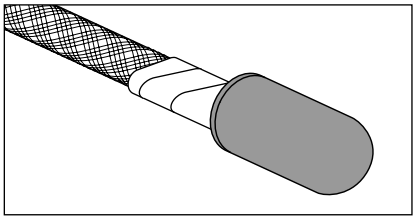
Cut and remove the clear plastic wrap. Do not cut into the blue jacket.

2D. Install the end seal.

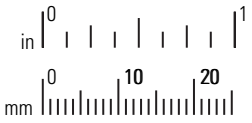


Firmly push the end seal at least 3/4" (2 cm) onto the heating cable. Some gel may ooze out.

2E. Secure the braid.



Slide the braid up against the end seal and wrap it securely with a 4" (10 cm) strip of glass fiber or vinyl tape.



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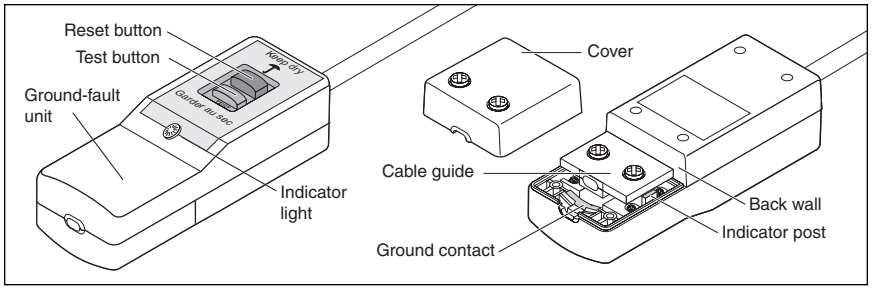
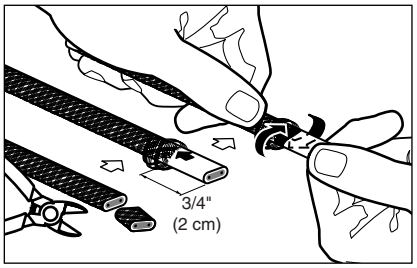
Step 3.
Install the 9800 FlexFit plug.



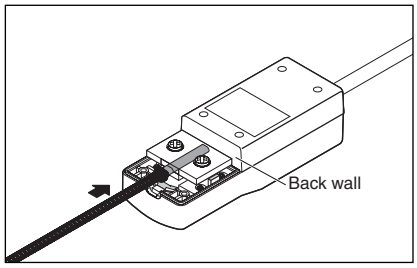
3A. Prepare the cable.



Cleanly cut off the end of the cable. Push back the braid 3/4" (2 cm) and then twist the end of the braid around the cable to ensure the braid strands are not sticking up.

Note: The clear plastic wrap does not need to be removed.

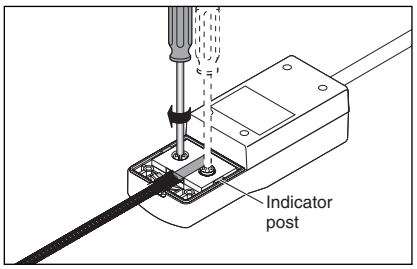
3B. Insert the cable.



Insert the heating cable all the way into the cable guide until the cable hits the back wall.

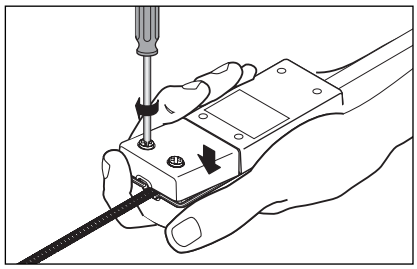
⚠ **Be sure no braid wire strands enter cable guide.**

3C. Complete the connection.



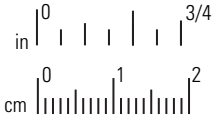
Screw down the cable guide, alternating between the two screws, until the cable guide is flush with the indicator posts and the screws bottom out.

3D. Install the cover.



Install the cover by tightening the screws completely.

Note: The screws will require many turns before the cover starts to close.



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Step 4. Attach the heating cable to the pipe.

4A. Prepare to install the heating cable.

Begin the installation at the electrical outlet. Leave at least 1 foot (30 cm) of extra heating cable so the ground-fault unit can be secured to the outside of the thermal insulation, as shown in Figures 1 and 2. This will relieve any strain on the heating cable or plug. However, be careful not to leave heating cable hanging in a loose loop where it could be accidentally snagged and pulled out.

Make certain you have removed any old heating tapes and insulation.

Important: The ground-fault unit and plug must be kept dry. It is important to include the drip loop to prevent water from getting into the ground-fault unit.

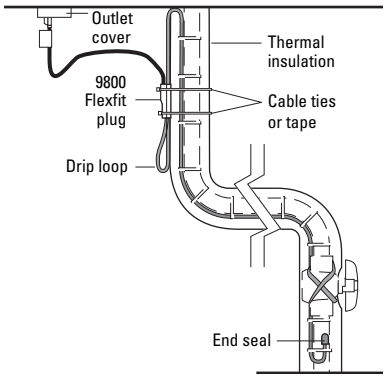

Figure 1. Typical manufactured housing installation.

Figure 2. Typical installation.

4B. Install the heating cable.

Single run method

Run the heating cable in a straight line approximately a third of the way up from the bottom of the pipe, as shown in Figure 3.

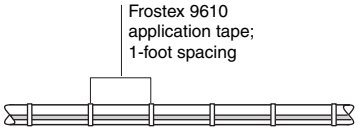

Figure 3. Single run method.

Multiple run method

When two or more runs are required, install the heating cable in the 4 o'clock and 8 o'clock positions as shown in Figure 4. When three runs are required, install the heating cable as shown in Figure 5.

Figure 4. Double runs.

Figure 5. Triple runs.

4C. Tape the heating cable and end seal to the pipe.

- Fasten the heating cable to the pipe at 1-foot (30-cm) intervals, using two or three thicknesses of 9610 application tape or equivalent.
- Provide extra heat at valves and spigots by wrapping each with 1 foot (30 cm) of additional heating cable, overlapping as required.
- If you have excess heating cable at the end of your pipe, double it back along the pipe where the insulation will completely cover it as shown in Figure 6. Using 9610 application tape or equivalent, tape the end seal to the pipe as shown in Figures 1, 2, and 6.

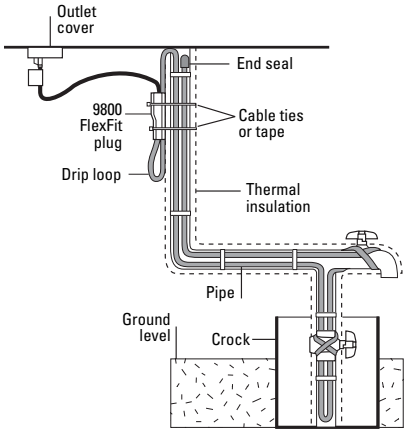

Figure 6. Multiple run installation.

Important: In a crock or standpipe, run the Frostex heating cable down and back up the pipe (as shown in Figure 6), so that the **end seal is well above the ground level and will not be sitting in water.**

Step 5.
Install the insulation.

Thermal insulation must be used. It protects the Frostex heating cable from damage and helps keep the pipes from freezing. Before you insulate, be sure the Frostex heating cable is undamaged—no nicks or cuts—and the braid is intact. Replace the heating cable if necessary.

5A. Cover the system with the insulation.

Cover the pipe, heating cable, connections, valves, and spigots with clean, dry, waterproof, fire-retardant thermal insulation, such as closed-cell foam insulation, as shown in Figure 7. The insulation must be at least as thick as selected in Table 1 or 2.

Secure the 9800 FlexFit plug to the insulation with tape or plastic cable ties, being careful not to cover the light or test buttons.

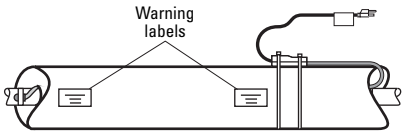

Figure 7. Thermal insulation.

- Do not leave the heating cable exposed, except for the short distance from the pipe to the power connection.
- Fully insulate and weatherproof all exposed piping. Put additional insulation on areas that cannot be heat traced.

5B. Waterproof the insulation.

Make sure the thermal insulation is waterproof and stays dry. Install a watertight sleeve and a solid cover or a barrier such as polyethylene sheeting around the insulation wherever there is any chance that the insulation might get wet.

5C. Install the warning label.

Install the orange warning labels on the insulation with one near the electrical outlet, as shown in Figure 7.

Additional labels and installation tape are available from Tyco Thermal Controls in the Frostex 9610 kit.

Step 6.
Start up the system.

6A. Plug in the heating cable.

After installing the heating cable and insulation, remove the clear label that covers the test and reset buttons. Then, plug the 9800 FlexFit plug into a grounded and properly installed outlet.

- If the Frostex heating cable length is longer than 40 feet and the air temperature is lower than 30°F, run water through the pipe before plugging in the unit. This will warm up the pipe and help avoid blowing the nonreplaceable fuse in the 9800 FlexFit plug.
- The signal light will go on indicating that the ground-fault protection device and the fuse are working properly. However, the light does not confirm that the heating cable is properly connected. See Step 7, "Test the System."

6B. Test the plug.

- Press the white test button. The red reset button should pop out from the surface of the plug and the signal light should go out.
- When the red reset button pops out, push it in to restore power and proceed to Step 7.

  If the red reset button fails to pop out, skip to "Troubleshooting."

  If the red reset button pops out immediately but cannot be reset, skip to "Troubleshooting."

  If the signal light does not light, skip to "Troubleshooting."

Step 7.
Test the system.

Test the system using one of the two following procedures.

7A. Test the water temperature.

After plugging in the system, wait about an hour. Turn on a water tap on the Frostex-protected pipe and test the temperature of the water. It should feel warm almost immediately because the water heated by the Frostex heating cable will be briefly running through the pipe.

If the water is warm, you have completed the installation.

If the water is not warm, skip to "Troubleshooting."

7B. Test the heating cable's resistance.

It is possible to test the resistance of Frostex heating cable using a multimeter. Follow these steps:

- Be sure the 9800 FlexFit plug is unplugged.
- Push in the red reset button on the plug.
- Connect the two lead wires on the meter to the two flat prongs on the plug. The meter reading should be between 2 and 20,000 ohms.

  If your reading is within this range, you have completed the installation.

  If your reading is not within this range, repeat Step 3, "Install the 9800 FlexFit plug" and retest.

  If your reading is still not within this range or you have questions, call Tyco thermal controls for technical support at (800) 545-6258.

ENGLISH

Periodic Inspections

Each month

- Test the 9800 FlexFit plug as described in Step 6B.

Periodically

Each time you plug in the system, and at least once a year, do the following:

- Check the entire Frostex system for signs of damage.

  Inspect any exposed portion of the heating cable for evidence of cuts, nicks, abrasions, gnawing by animals, and any other physical damage.

  If there is damage, immediately replace the damaged heating cable system and thermal insulation. Do not attempt to repair any part of the heating cable system.
- After a thorough inspection, start up the system and test the 9800 FlexFit plug and system as described in Steps 6 and 7.

Troubleshooting

Problem: The red button pops out immediately when the plug is plugged in, or the button will not reset.

What to do: A strand of braid may have entered the heating cable guide during Step 3B.

- Unplug the 9800 FlexFit Plug.
- Remove the cover (the reverse of Step 3D).
- Unscrew the two screws of the heating cable guide (the reverse of Step 3C).
- Using a flat blade screwdriver, gently pry the heating cable guide up until the heating cable can be removed.
- Reinstall the screws completely into the heating cable guide before re-attaching.
- Repeat installation steps 3A–3D, ensuring no braid strands enter the heating cable guide during Step 3B.
- Repeat Step 6, "Start up the system."

Note: If the 9800 FlexFit Plug red test button continues to pop out, your system is damaged and must be replaced.

Problem: The signal light does not light up.

What to do: Check to be sure the outlet has power. If you are not certain how to do this, call a professional service person.

If the outlet has no power, correct the problem, then follow Step 6, "Start up the system."

If the outlet has power but the signal light still does not light up after you conduct the test described in Step 6B, "Test the plug," the internal nonreplaceable fuse is blown. This means the Frostex system is damaged and must be replaced.

Problem: The 9800 FlexFit plug does not trip (red button does not pop out).

What to do: Check to be sure the outlet has power. If you are not certain how to do this, call a professional service person.

If the outlet has no power, correct the problem, then follow the instructions in Steps 6 and 7.

If the outlet has power but the 9800 FlexFit plug still fails to trip, the Frostex system is damaged and must be replaced.

Problem: The heating cable fails to warm up or water is not warm after testing the system.

What to do: The heating cable may not be fully inserted into the heating cable guide, or the guide may not be screwed down completely.

- Unplug the 9800 FlexFit Plug.
- Remove the cover (the reverse of Step 3D).
- Unscrew the two screws of the heating cable guide (the reverse of Step 3C).
- Using a flat blade screwdriver, gently pry the heating cable guide up until the heating cable can be removed.
- Reinstall the screws completely into the heating cable guide before re-attaching.
- Repeat installation steps 3A–3D, ensuring no braid strands enter the heating cable guide during Step 3B.
- Repeat Step 6, "Start up the system."

Limited Warranty

Tyco Thermal Controls warrants all Frostex self-regulating heating cables and components against faulty workmanship and use of defective materials for two (2) years from the date of purchase. This warranty can be amended only by a written instrument signed by a duly authorized officer of Tyco Thermal Controls. Buyer's exclusive remedy under this warranty shall be to have Tyco Thermal Controls, within a reasonable time, repair such goods or supply replacement goods or credit Buyer's account for such goods and accept their return whichever Tyco Thermal Controls may elect at its sole discretion. Tyco Thermal Controls shall in no event be liable for the cost of removal or installation, for loss or damage to or loss of use of facilities or other property, loss of revenue, loss of use of revenue, loss of anticipated profits, or other damages or costs of any kind whatsoever, whether direct, indirect, incidental, or consequential.

Notwithstanding the foregoing, Tyco Thermal Controls shall have no liability whatsoever unless: (a) Buyer promptly notifies Tyco Thermal Controls in writing after discovery of an alleged nonconformity and includes a detailed explanation of the alleged nonconformity; (b) Buyer promptly returns the goods to Tyco Thermal Controls postage prepaid, at 300 Constitution Drive, Menlo Park, California 94025-1164, USA; and (c) Tyco Thermal Controls examination of such goods establishes to Tyco Thermal Controls satisfaction that such alleged nonconformities actually exist and occurred in the cause of proper and normal use and were not caused by accident, misuse, neglect, alteration or improper installation, repair or testing or such other cause outside of the responsibility of Tyco Thermal Controls under this Limited Warranty.

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