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TRM IN-PIPE

Freeze protection heating cable for potable water supply lines

To be installed inside the pipe

3 W/ft (10W/m)

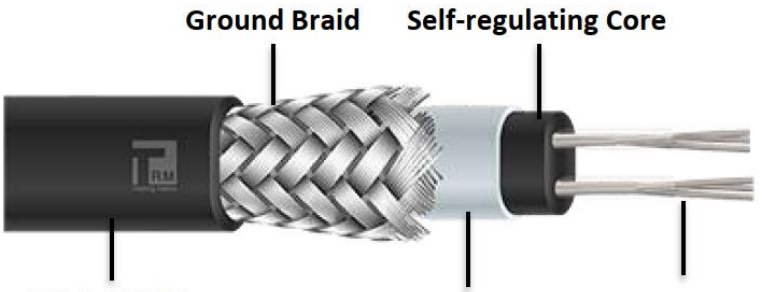
INSTALLATION AND MAINTENANCE GUIDE

TRM IN-PIPE SR HEATING CABLE

TRM brand in-pipe self-regulating heating cable is specifically designed and approved for internal heat tracing of residential and commercial potable water lines, as well as other approved internal pipe tracing applications up to 0.5 MPA (70 PSI). The heating cable provides maximum performance in a compact design, outputting 3 watts per linear foot of cable (10 watts/meter) in water that is 32°F (0°C).

This versatile heating cable comes with an NSF61 compliant fluoropolymer outer jacket for installation inside of potable water pipelines between 0.75" - 2" (19mm-50mm) in diameter and is suitable for small metal or plastic pipes rated up to 140°F (60°C) exposure; insulation may be required for pipes which are directly exposed to wind/ low ambient temperatures, contact TRM for design assistance.

For use in pipes transporting clean water or grey water only; pipes carrying blackwater cannot be internally traced.



TECHNICAL SPECIFICATIONS	
Cable Construction:	*11mm, Self-Regulating parallel heating cable*
Outer Jacket:	*Fluoropolymer Jacket (NSF61 compliant)*
Bus wire:	*16 AWG; Nickel plated copper*
Cold lead:	*14 AWG*
Nominal Voltage:	*120V or 208V/240V*
Output:	*3W/ft (10W/m) in water at 32°F (0°C)*
Maximum exposure temp: (Power off)	*185 °F (85 °C)*
Bending radius:	*1.25" (32mm)*
Maximum maintain temperature:	*140 °F (60 °C)*
Min. Installation Temp.:	*32 °F (0 °C)*
Maximum rated system pressure:	*0.5 MPA (70 PSI)*

Cable and Accessories

TRM In-pipe SR heating cable
(Part# TRM-SR-IP-3-1 or TRM-SR-IP-3-2)

NSF61 compliant, 11mm fluoropolymer jacketed SR heating cable for potable and ordinary area in pipe tracing applications; available in 120V and 208V/240V.

120V (Plug-in) Power Connection Kit with GFI plug
(Part# TRM-SR-IP-ACC-GFI PWR KIT)

Includes: *(1)Heat shrink termination kit and (1) 15A 120V rated GFI power cord end.*

120V/240 (Hard-wire) Power Connection Kit with 30" 14AWG Cold Lead
(Part# TRM-SR-IP-ACC-HW PWR KIT)

Includes: *(1)Heat shrink termination kit and (1) 30" 14 AWG cold lead wire with strain relief gland.*

Brass Fitting
(Part# TRM-SR-IP-ACC-BRASS NUT)

Includes: *(1) ¾" NPT Brass coupling, (1) Compression fitting and strain relief, (1) Silicon rubber grommet, (1) compression cap.*

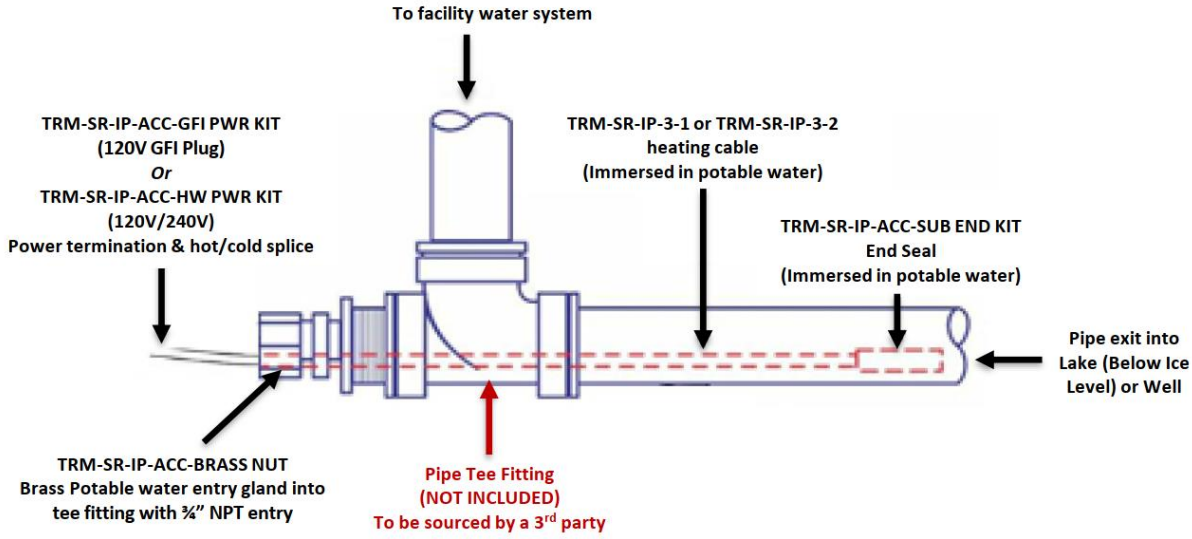
Submersible end seal kit
(Part# TRM-SR-IP-ACC-SUB END KIT)

Includes: *(1) 7" long ¾" diameter heatshrink tube, (1) 5" long ¾" diameter heatshrink tube, (1) 4" long ½" diameter woven braid, (1) pc of mastic 5/8" wide, and (1) ½" diameter heat shrink end cap.*

Optional: Silicone Pulling Sleeve
(TRM-SR-IP-ACC-Pulling Sleeve)

Includes: (1) 2" long, food safe, silicone sleeve for attaching a fish tape to the end of a TRM In-pipe SR heating cable system; may be required for longer pipe runs or pipes with bends.
~6' piece of masonry string (not included)

TYPICAL LAYOUT OF AN INTERNALLY HEAT TRACED PIPE:



TRM-SR-IP-ACC-Pulling Sleeve

12/16" Silicone Sleeve
In-pipe HT Accessories

Only Required if a fish tape is needed to 'pull' the heating cable into the pipe.
Contact TRM if you have any questions or concerns.

Attention!!

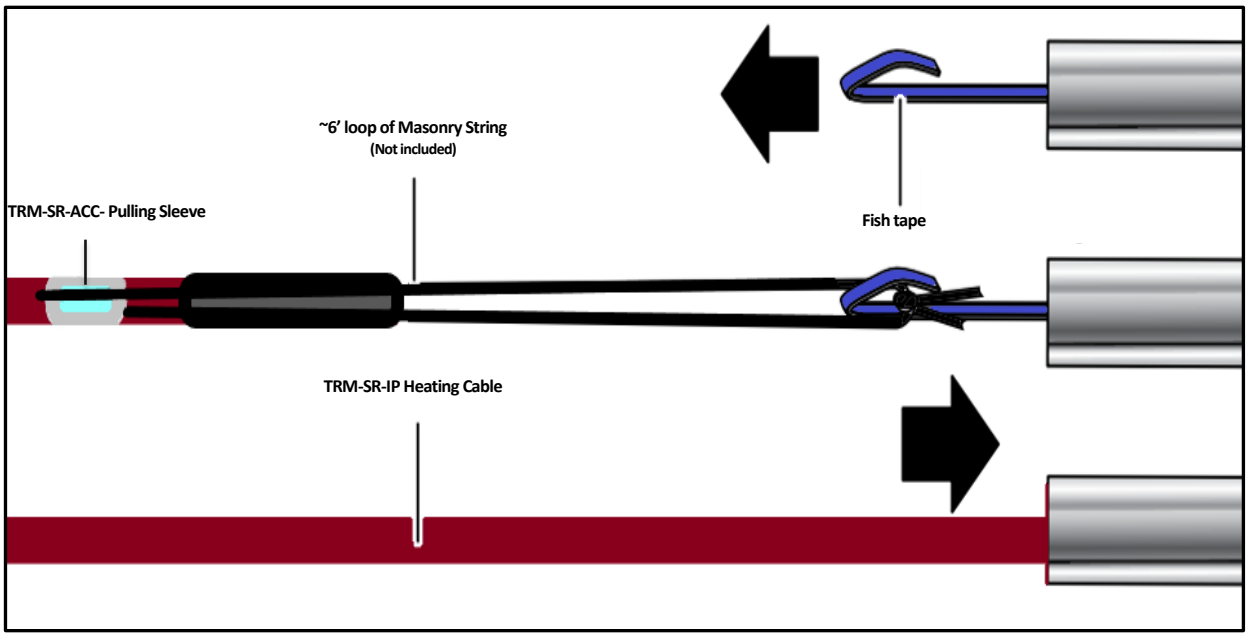
The TRM-SR-IP-ACC-Pulling Sleeve must be installed over the heating cable prior to terminating the power connection and end seal; otherwise, the heater will only be able to be pushed into the pipe.

DESCRIPTION

The TRM-SR-IP-ACC-Pulling Sleeve is a 2" long, food safe, silicone sleeve for attaching a fish tape to the end of a TRM In-pipe SR heating cable system; may be required for longer pipe runs or pipes with bends.
A ~6' piece of masonry string (not included) can be fed between the pulling sleeve and outer cable jacket prior to being tied off in a loop and secured to the fish tape.
Once the heating circuit has been push/pulled into place, the masonry string is then cut, allowing easy removal of the fish tape, while the sleeve remains in place just above the heating cable end seal.

Please note:

- ***If an excessive pulling force is applied by the installer the heating circuit may be compromised or the pulling sleeve may fail resulting in a cable that can no longer be installed.***
- ***A simple mixture of water and biodegradable dish soap can be squirted into the pipe to lubricate the interior prior tor cable insertion.***
- ***Contact an installation professional if you have any questions or concerns about your project prior to proceeding.***



PRINCIPLE OF OPERATION:

The parallel bus wires apply voltage along the entire length of the heater cable, while the conductive core provides an infinite number of parallel conductive paths. The heater cable derives its self-regulating characteristic from the inherent properties of the conductive core material; as the core material temperature increases, the number of conductive paths in the core material decreases, automatically decreasing the heat output. As the temperature decreases, the number of conductive paths increases, causing the heat output to increase. This occurs at every point along the length of the cable, adjusting the power output to the varying conditions along the pipe. The self-regulating effect of these cables prevents damage to empty pipes, as the cable self-regulates its heat output, and saves energy.

INSTALLATION INSTRUCTIONS:

WARNING:

A. Read these rules and instructions carefully. Failure to follow them could result in serious personal injury and/or property damage.
B. Check local building, plumbing and electrical codes before proceeding with the installation. You must respect their rules.
C. The "In Pipe" heating cable must be installed in accordance with the National Electrical Code (NEC) or the Canadian Electrical Code (CEC).
D. Before installing this product, have the electrical outlet checked by an electrician to ensure that it is properly installed with grounding protection.
E. Before installing the heating cable, make sure that the power source is disconnected.
F. For all installations where the pipes are exposed to the weather, it is imperative to use adequate insulation, thickness 1" (25 mm) minimum.
G. The use of an extension cord is not recommended. If an extension cord is absolutely necessary, use only a properly sized, grounded cord as approved by an electrician.
H. Handle the cable carefully, do not damage the outer jacket.
I. Never bend the spice joint of any electric heating cable.
J. Never modify the cable or electrical device associated with your system.
K. It is recommended to inspect the heating cable at the beginning of the season and once a month during use. Inspect the cable and its connections to the power source.

Note: Self-regulating heating cable "in pipe" will not melt your water pipe even if it is empty.

WHEN WORKING OR REPAIRING YOUR SYSTEM, BE SURE TO DISCONNECT YOUR IN-PIPE HEATING CABLE FROM THE POWER SUPPLY.

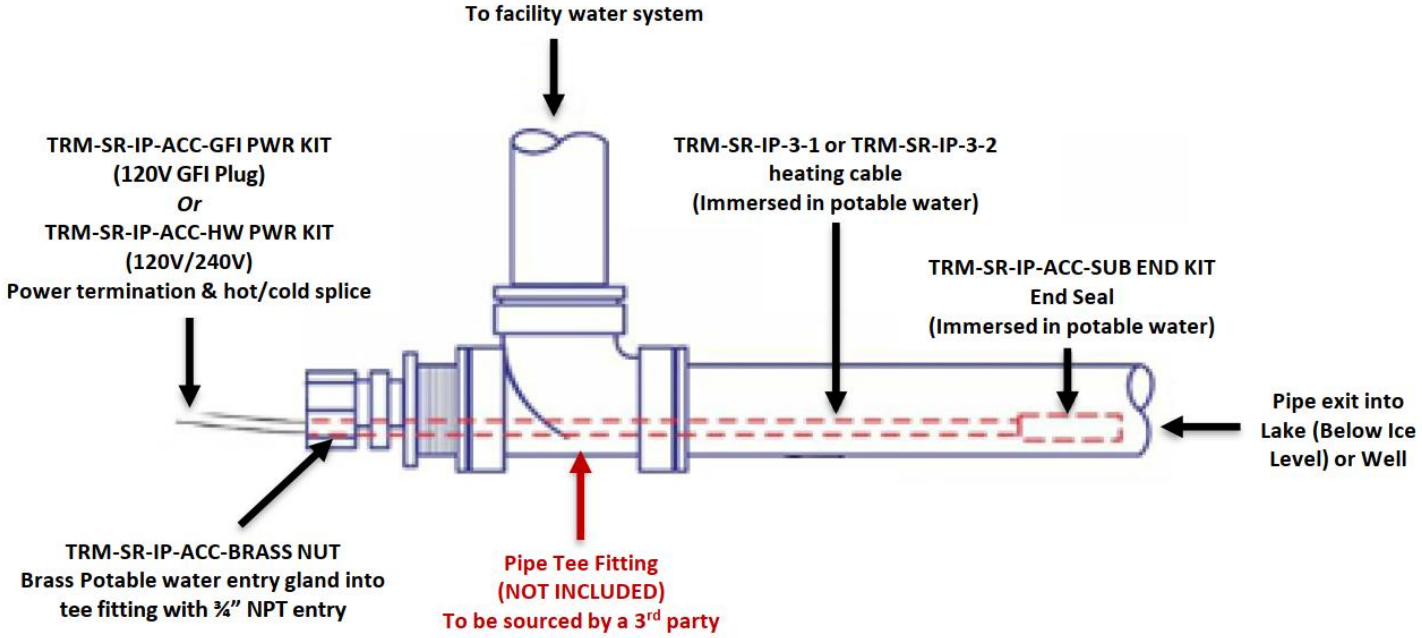
STEP 1:
The TRM IN-PIPE heating cable comes complete with all the parts required for termination of the heating circuit.
A qualified electrician must install a single circuit (15 A) for the exclusive use of the IN-PIPE cable.

Extension cords are not suitable for extending heat tracing circuits.

STEP 2:
Determine the point of entry (installation of the "T" fitting) into the pipe, preferably inside the building and near your power supply.
The Tee fitting is NOT INCLUDED and must be supplied by a 3rd party to fit the existing pipes sizes.

STEP 3:
Cut out the section of pipe in order to install the "T" fitting on which a 3/4 "(19mm) adapter with NPT thread will be placed at one end of the "T " fitting as shown in the illustration.

TYPICAL LAYOUT OF AN INTERNALLY HEAT TRACED PIPE:



NOTE:
It is easier to push the cable straight (see above).
STEP 4:
Normally the "In PIPE" heating cable can be pushed into the inside of the pipe without the aid of a fish tape or rope over a length of 150ft (46m). In some cases, the use of a fish tape may be appropriate. For longer pipes, the use of a TRM-SR-IP-ACC-Pulling sleeve, or vacuum and a sponge attached to the end of a masonry rope is recommended.
For extra-long systems, you may need to "cut" the pipe to install a series of fittings to provide access points for pulling the IN-PIPE cable.
A nontoxic (potable) water-based lubricant (soapy water solution) can be used to facilitate insertion of the cable
Ensure the TRM-SR-IP-ACC-Pulling sleeve is installed over the heating cable prior to termination of the power and end seal, if a fish tape will be required for the installation; contact TRM if you require a TRM-SR-IP-ACC-Pulling sleeve
STEP 5:
Gently push/pull so that the entire cable fits into the pipe until the 3/4 "brass adapter is at the" T" fitting.
STEP 6:
Make sure the brass adapter is tightly screwed to the "T" fitting and the compression ring securely squeezes the rubber grommet.
STEP 7:
Once all the plumbing fittings are installed, it is strongly recommended to test the pressure inside the pipe to ensure that the system is watertight. If there is no leak, it is time to turn your cable on.

NOTE:
Insulation is recommended for all new piping installations, even if the pipe is buried.
For existing pipes, insulation is only required when the pipe is exposed to the weather or when the pipe is above the ground. The insulation facilitates heat retention, making the heating cable more energy efficient and more efficient in cold weather.

INSTALLATION RELATED ISSUES:

1) SITUATIONS TO BE AVOIDED

A. Allowing a pipe to freeze and use the heater to unfreeze it.
This imposes harsher conditions on the heater such as higher wattages for an extended period and pressure on the heater and pipe due to the expansion of ice.

B. Connecting the heating cable to an incorrect voltage.
This drastically effects the cable performance and either decreases or increases the amperage which could in damage the heating cable or leave the pipe exposed to freezing temperatures.

C. Having the heater and pipe go through the ice at the lake level instead of under it.
This makes the heater go through the ice at potentially very low temperatures down to –40^{0}F(C) and literally attempt to unfreeze the lake versus going under the ice at 0^{0}C (32^{0}F).

These conditions can rapidly deteriorate the cable and reduce its effective life.

2) WATER LEAKAGE

Problem:

A. Water comes out of the plug or the splice, either immediately after installation, or during its operating life. Hole in the outer jacket of the cable – the cable has been nicked during installation or handling, or the end seal is not properly terminated.

SOLUTION:

Remove the cable and replace it.

3) INSULATION

PROBLEM:

A. Little or no insulation or lack of waterproofing over insulation.

B. Use of insulation that does not completely cover the pipe leaving an open crack or slot with direct access to the pipe which could cause a freeze-up.

SOLUTION:

For an above ground installation, the equivalent of 1” (25 mm) of fiberglass (R4) is required. This needs to be waterproofed. Insulation and waterproofing may also be required even if the pipe is underground, depending on circumstances such as: depth, water in the soil, type of soil, snow cover, etc.

4) SURGE SUPPRESSION

The installation of a surge protection system is becoming more and more common and is not only recommended but required in numerous circumstances. This will protect the cable against high voltage surges which could damage the interface between the bus wires and the conductive core. Damages to the interface can affect the power output of the cable and may eventually render the cable inoperative.

APPROVALS

Certified to NSF 61

CAUTION:
National and Canadian Electrical Codes require the use of a Ground Fault Protection Device (GFPD) at all times in conjunction with the installation of all heat tracing cables.

WARRANTY

We believe in the superior quality of our TRM in-pipe heating cable products. Our standard warranty is 2 years from the date of purchase. Contact us regarding extended warranty terms and conditions.
TRM is a Canadian-owned leading designer, and manufacturer of premium heating cable and systems in the commercial, industrial and residential sectors.

General Note:
The above are general suggestions for applications of our cables and are not meant to replace the normal requirements of local, construction, electrical, or other codes. The installer must verify the conformity to all applicable codes and standards.

We are pleased to offer suggestions on the use of our various products, nevertheless, there are no warranties given except such expressed warranties offered in connection with the sale of a particular product. There are no implied warranties of merchantability or of fitness for a particular purpose given in connection with the sale of any goods. In no event shall TRM Heating Cables be liable for consequential, incidental, or special damages. The buyer's sole and exclusive remedy and the limit of TRM Heating Cables liability for any loss whatsoever shall not exceed the original purchase price paid to TRM Heating Cables for the product or products for which a claim is made.

TRM IN-PIPE SR Heating Cable

For use with TRM-SR-IP-3-1/2 SR heating cables

INSTALLATION INSTRUCTIONS

Description:

This kit is for use with TRM-SR-IP-3-1/2 type heating cable for in-pipe applications. **The system can be used in potable water pipes.**

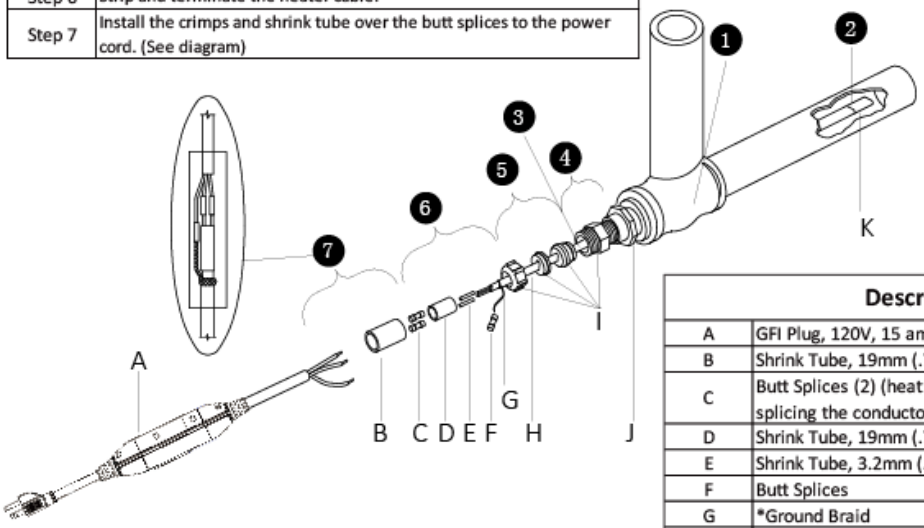
Installation Instructions:

Brass Fitting Kit
TRM-SR-IP-ACC-BRASS NUT

Power Termination Instructions
Splicing Kit c/w GFCI
(120V plug-in) TRM-SR-IP-ACC-GFI PWR KIT
or
Standard Hardwired kit
(120V/240V hard-wire) TRM-SR-IP-ACC-HW PWR KIT

End seal Kit
TRM-SR-IP-ACC-SUB END KIT

Installation Steps	
Step 1	Install the tee* into the water line.
Step 2	Strip and seal the end of the cable.
Step 3	Push/pull the cable into the pipe.
Step 4	Install the seal fitting into the tee* or the reducers*.
Step 5	Slide the grommet, compression fitting, and compression cap over the cable (torque the cap to 2.7 Nm, 24 in-lbs.).
Step 6	Strip and terminate the heater cable.
Step 7	Install the crimps and shrink tube over the butt splices to the power cord. (See diagram)



Description	
A	GFI Plug, 120V, 15 amp with Power Cord, 14 GA wire
B	Shrink Tube, 19mm (.75") ID
C	Butt Splices (2) (heat shrink the nylon jacket after splicing the conductors)
D	Shrink Tube, 19mm (.75 ") ID
E	Shrink Tube, 3.2mm (.125") ID
F	Butt Splices
G	*Ground Braid
H	*Heating Cable
I	Brass Fitting Kit
J	*Coupling plastic pipe to .75 NPT
K	End Seal Kit

** ITEMS NOT INCLUDED IN KIT*

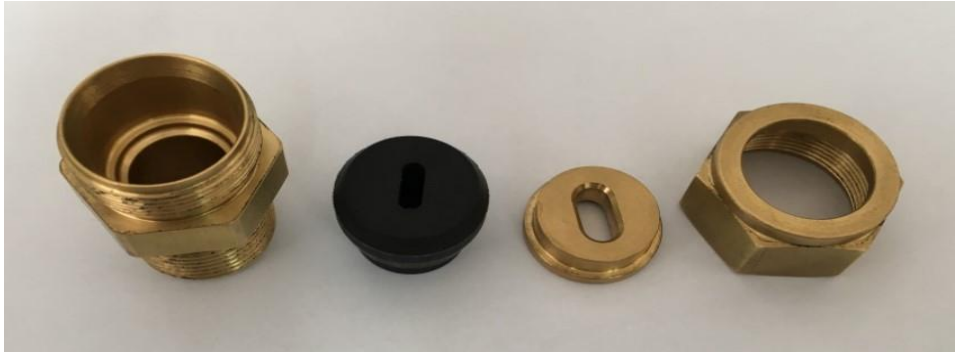
Brass Fitting Kit Instructions:

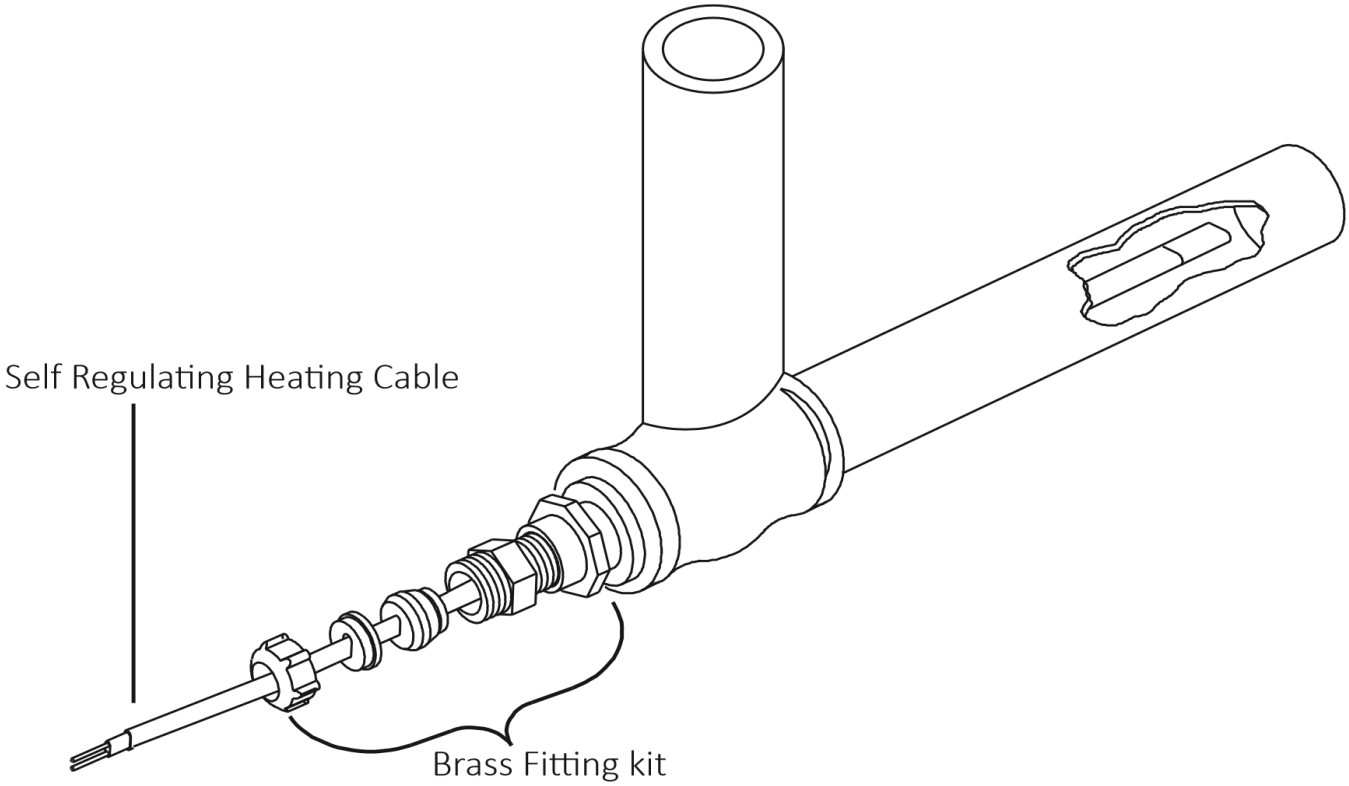
TRM-SR-IP-ACC-BRASS NUT

(1) Brass coupling:

Includes:

(1) Compression fitting and strain relief
(1) Silicone rubber grommet
(1) Compression cap



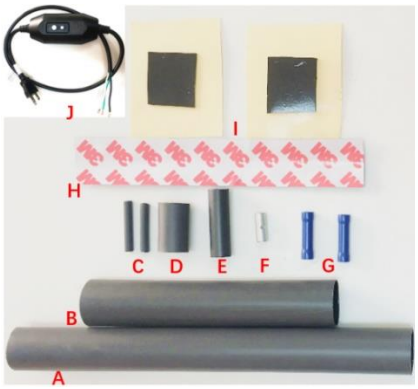


Power Termination Instructions:

(120V plug-in) TRM-SR-IP-ACC-GFI PWR KIT

Or

(120V/240V hard-wire) TRM-SR-IP-ACC-HW PWR KIT

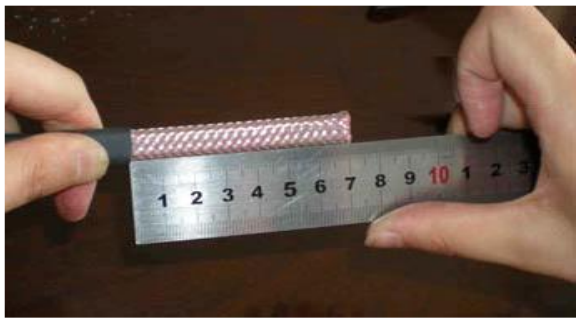


Kit Contents		
Item	**Qty.**	**Description**
A	1	Black heat shrink tube 203mm long x 19mm dia. (8" long x 3/4" dia.)
B	1	Black heat shrink tube 125mm long x 19mm dia.(5" long x 3/4" dia.)
C	2	Black heat shrink tube 25mm long x 3mm dia. (1" long x 1/8" dia.)
D	1	Black heat shrink tube 25mm long x 13mm dia.(1" long x 1/2" dia.)
E	1	Black heat shrink tube 38mm long x 7.4mm dia.(1 1/2" long x 1/3" dia.)
F	1	Uninsulated braid crimp
G	2	Insulated bus wire crimps
H	1	Black cloth tape 152mm long x 25mm width (6" long x 1" width)
I	2	Mastic strips
J	1	GFCI Power supply cord

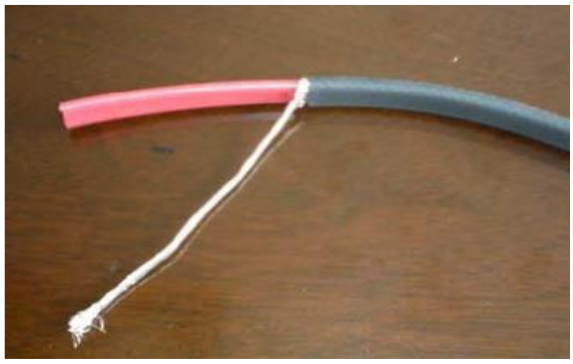
1. Slide 125 mm (5”) tube and 203 mm (8”) black heat-shrinkable tube over the end of the plug-in cord.

2. Cleanly cut off the end of each cable. Lightly score completely around and then down the outer jacket for a length of 70 mm (2-3/4").
Do not cut the braid or the inner jacket.

3. Bend the heating cable to break the jacket at the score, then peel off the outer jacket

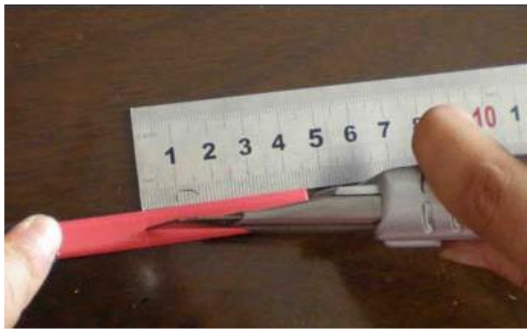


4. Straighten the braid and twist into a “pigtail”

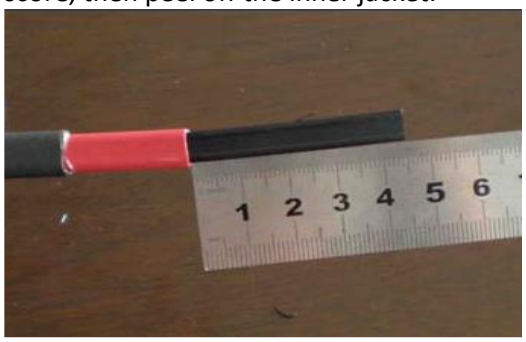


5. Lightly score completely around and then down the inner jacket for a length of 45mm (1 4/5'').

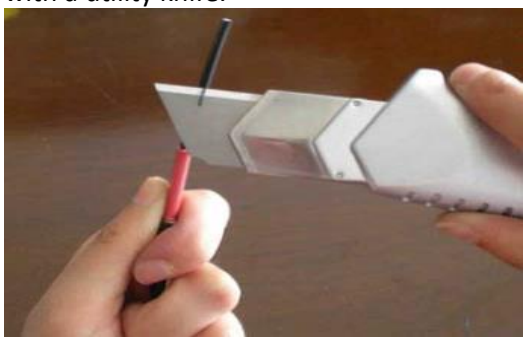
Do not cut the bus wires!



6. Bend the heating cable to break the jacket at the score, then peel off the inner jacket.

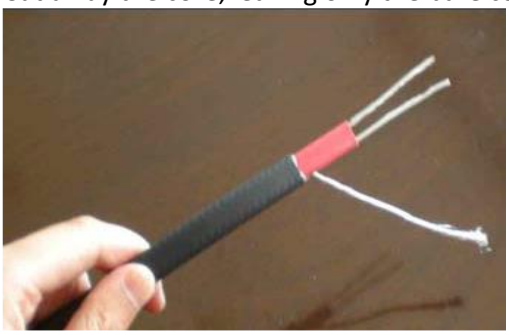


7. Remove the outer core material from the conductors with a utility knife.

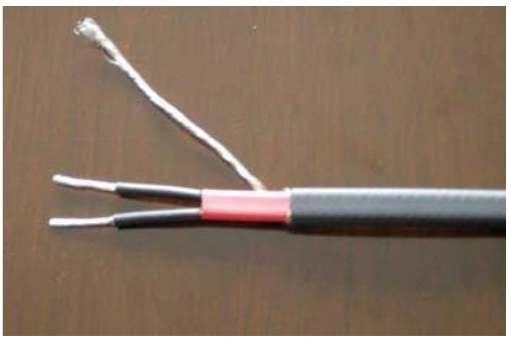


8. Peel the exposed wires back from the core.

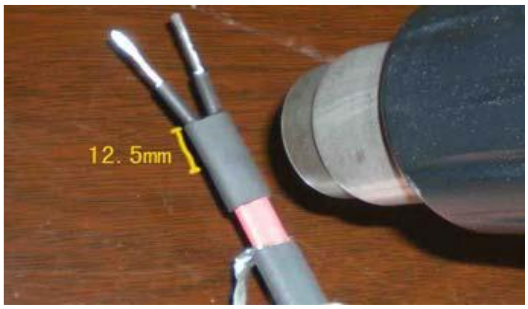
9. Cut away the core, leaving only the bare conductors

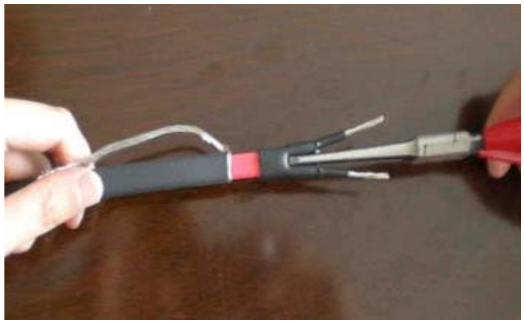


10. Slide the 3.2 mm (1/8") x 25 mm (1'') shrink tubes over the bus wires. To shrink the tubing, move the heat source continuously from side to side. While shrinking, ensure that the tubes remain up against the black core.



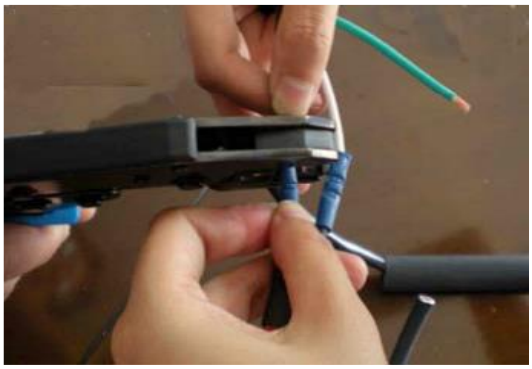
11. Center the 13 mm (1/2”) × 25 mm (1”) heat shrinking-tube over the end of the heating cable as shown. Heat the tube evenly until it shrinks and adhesive flows out both ends. Shrink the tube completely. Immediately after shrinking, pinch with pliers between the wires while the tube is still hot. Hold for 10 seconds to ensure seal.



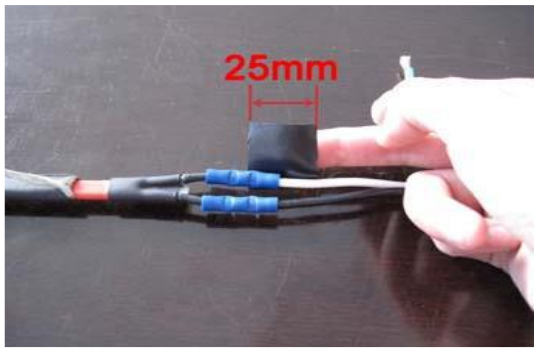


12. Trim the bus wires to 7 mm (1/4”).

13. Use the insulated bus wire crimps and the crimp tool to connect the black and white wires to the bus wires of the heating cable.

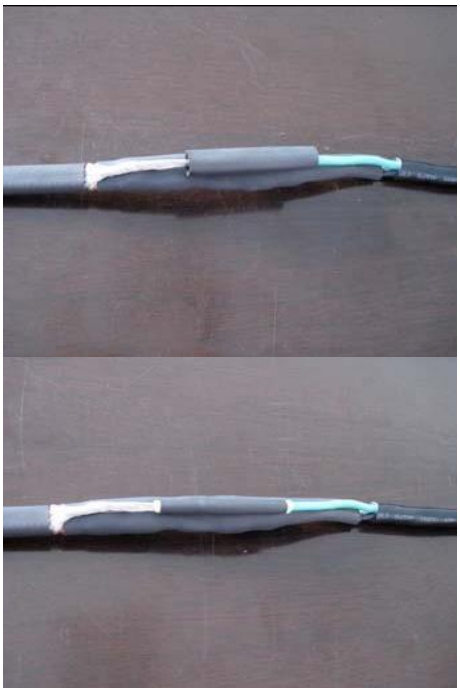


14. Remove the release paper from the mastic strips. Wrap one strip of mastic around the black wire against the end of the splice to provide a water block, then repeat for the white wire.

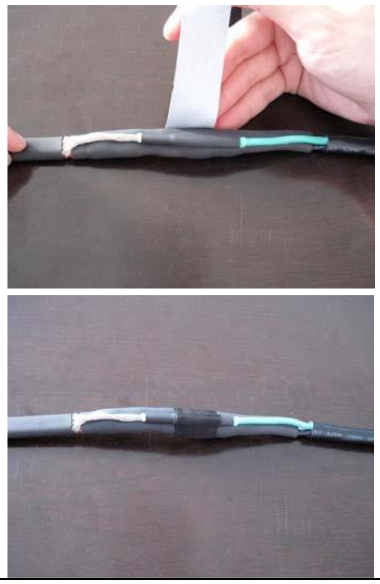


15. Squeeze the mastic together.

16. Center the heat-shrink tube over the uninsulated crimp connector. Shrink the tube completely. Start at the middle and work towards each end. Keep heating after the tube has shrunk, to melt adhesive inside the tube. Make sure the ring of adhesive appears at both ends of the heat shrink tube.



17. Wrap the black cloth tape evenly around the crimp and splice. Cover the crimp completely.

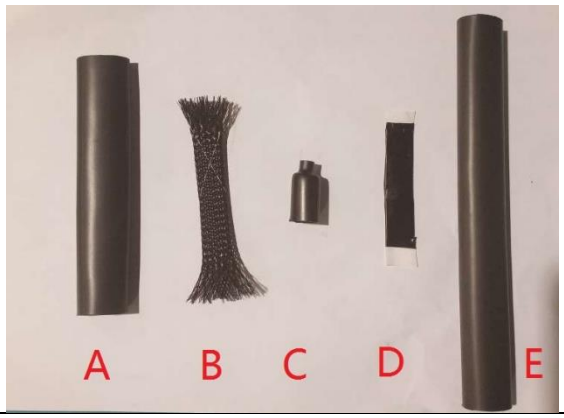


18. Center the 203mm (8") heat shrink tube over the splice, making sure the tube extends over the end of the heating cable and the cord. Shrink the tube completely. Start at the middle and work towards each end. Keep heating after the tube has shrunk, to melt mastic and adhesive inside the tube. Total heating time should be about 5 minutes.

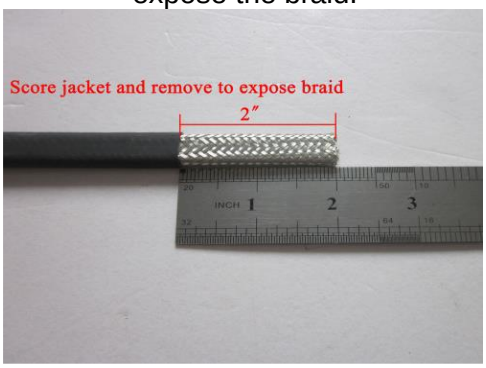
End Seal Kit Instructions:

TRM-SR-IP-ACC-SUB END KIT

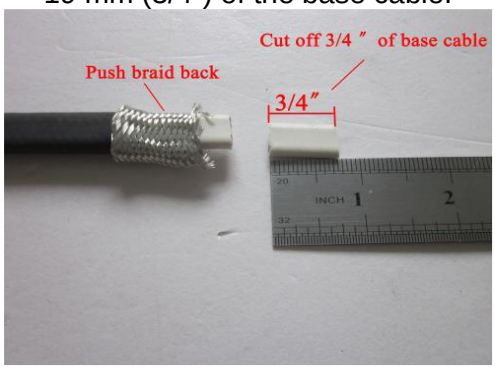
Kit Contents		
Item	Qty.	Description
A	1	Heat shrink tube 125mm long x 19mm dia. (5" long x 3/4" dia.)
B	1	Woven braid sleeve 100mm long x 13mm dia. (4" long x 1/2" dia.)
C	1	Heat shrink cap 12.5mm dia. (1/2" dia.)
D	1	Mastic strips 15mm wide. (5/8"wide.)
E	1	Heat shrink tube 180mm long x 19mm dia. (7" long x 3/4" dia.)



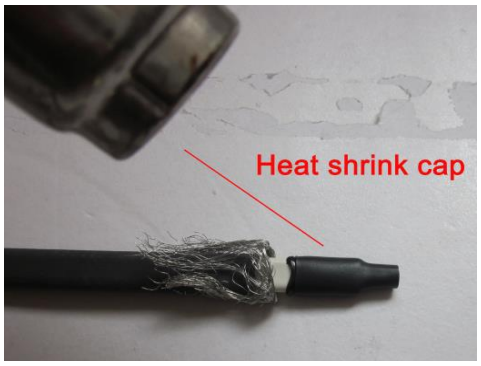
1. Score the outer jacket 50 mm (2") from the end of the cable. Remove the jacket to expose the braid.



2. Push the braid back, and cut off the end 19 mm (3/4") of the base cable.

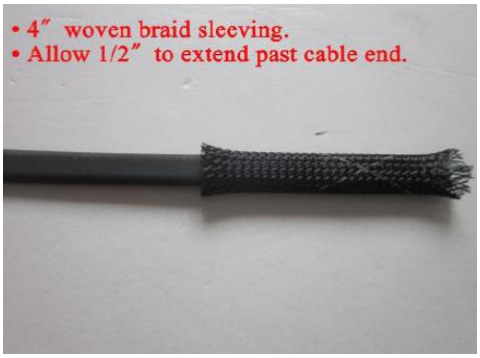


3. Slide the heat shrink cap over the end of the cable. Apply heat evenly until it shrinks around the cable.

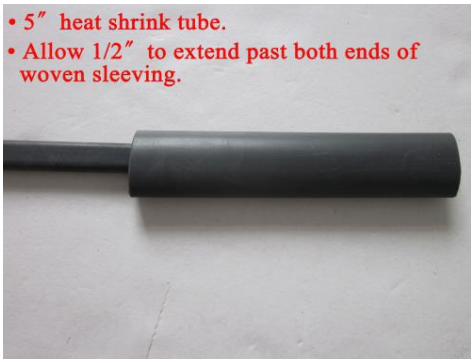


4. Pull the braid over the sealed end cap-and twist the braid ends together.

5. Slide the 100 mm (4") woven braid sleeve over the end of the cable, allowing at least 3 mm (1/2") to extend past the end of the cable.

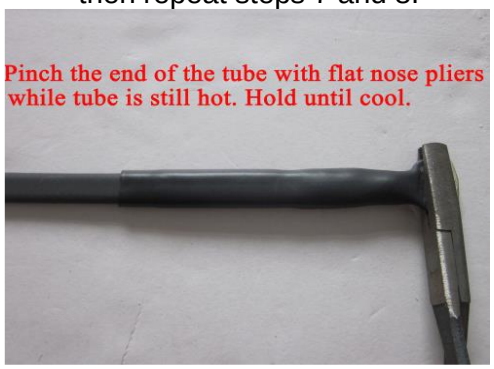


6. Slide the 125 mm (5") heat shrink tube over the woven braid sleeve, allowing 13mm (1/2") to extend past the each end of the woven sleeve.

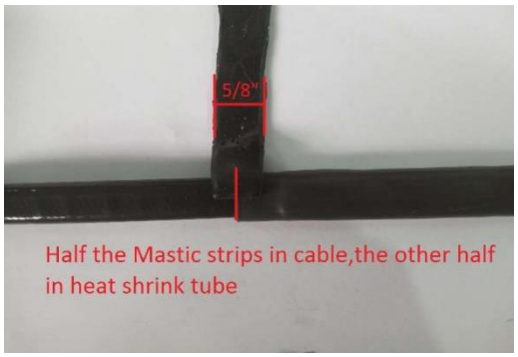


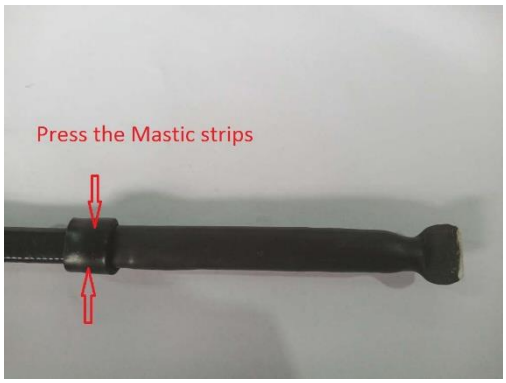
7. Apply heat evenly to the heat shrink tube until it shrinks around the cable.

8. While the shrink tubing is still hot, gently squeeze the end of the shrink tube with pliers and hold until cool. The end must remain visibly sealed when the pliers are removed. If the tube does not remain sealed, then repeat steps 7 and 8.

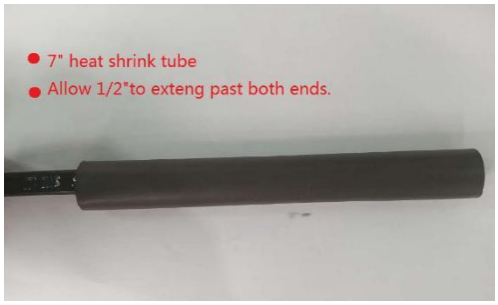


9. Wrap the Mastic strips (5/8” wide) evenly around the junction of the tube and cable, half on the tube and half on the cable. And press the Mastic strips to the cable.



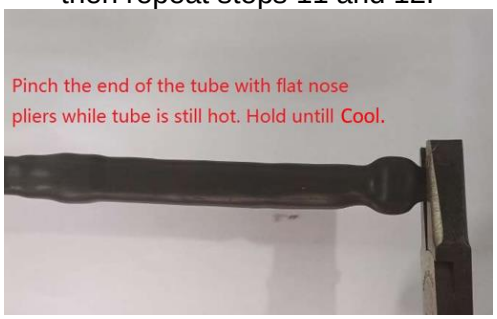


10. Slide the 180 mm (7") heat shrink tube over, allowing 13 mm (1/2") to extend past each end of the tube.



11. Apply heat evenly to the heat shrink tube until it shrinks around the cable.

12. While the shrink tubing is still hot, gently squeeze the end of the shrink tube with pliers and hold until cool. The end must remain visibly sealed when the pliers are removed. If the tube does not remain sealed, then repeat steps 11 and 12.



APPROVALS

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Certified to NSF 61