

Danfoss



Installation & Operation Manual

Danfoss RX Roof & Gutter De-Icing Kit

Danfoss*RX*
BRINGING WARMTH TO LIFE





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Danfoss RX Roof and Gutter De-Icing Cables



Thank you for choosing the Danfoss RX Roof and Gutter De-Icing Kit as the solution to your roof snow and ice problems. Danfoss is the world leader in electric radiant heating and the RX product has been designed to produce an effective and constant solution to protect your roof from ice dams and the related hazards. The quality engineered RX heating cables provide a safe, flexible and economical solution to your snow and ice protection requirements.

High quality materials and workmanship ensure that Danfoss RX heating cables will bring years of maintenance free service. Consequently, Danfoss RX is backed by a 2 year comprehensive warranty.

If you have any questions or concerns during installation, don't hesitate to contact your local Danfoss Representative or Danfoss Technical Support directly toll-free: 1-866-676-8062.

Don't forget to place the warning labels in the appropriate area.

THIS RX KIT CONTAINS:

- 1) Heating Cable
- 2) Shingle Clips
- 3) Warning Labels
- 4) 6 ft power lead
- 5) Spacer Clips
- 6) Instruction Manual

Skill Level



The installer of the Danfoss RX heating cables should be familiar with installation methods outlined in this guide, as well as electrical wiring conventions. The required outdoor power receptacle should be installed by a professional electrician. National and local electric codes must be adhered to, and inspection may be required during or after installation of the Danfoss RX cables.

Required Tools and Materials



- 1. RX Cable Kit**
2. Tape measure to determine cable length estimate
3. Ladder to access the roof and gutters
4. Putty knife to lift shingles
5. Marking chalk to make cable location/pattern on shingles
6. File to remove sharp edges from gutters and downspouts to protect the cable



RX Cable Specifications

Cable Construction:	Twin conductor
Rated Voltage:	120 V
Output:	5W/ft (16.4W/m)
Heating Element Size:	30' to 265' (9.2 to 80.8 m)
Bending Radius:	Minimum 1.5" (38 mm)
Cable Diameter:	1/4" (6.5 mm)
Power Lead length:	6' (1.82 m)
Wire insulation:	FEP Teflon™ / XLPE Cross linked Polyethylene
Outer Insulation:	PVC
Max. Rated Temperature:	220°F (105°C)
Min. Installation Temp.:	40°F (5°C)

Caution!

It is important that this equipment is installed only by qualified persons familiar with the proper sizing, installation, and operation of electric roof and gutter heating systems. Working on a ladder and roof can be dangerous; care must be observed. The cables are designed for outdoor applications only.

1. Read these instructions carefully before installing RX Cable.
2. **Do not install RX Cable inside the roof or walls of the building, even if gutter passes through an enclosed part of the structure.**
3. **Never cut the black heating cable†.**
4. Plug the RX Cable directly to the power receptacle; to prevent increased fire or electrical hazard do not use an extension cord
5. Ensure the breaker panel is sized appropriately to power the Danfoss RX heating system.
6. **Do not install RX Cable such that two black heating cables touch, overlap or cross each other.**
7. Never energize coiled cable.
8. Before installation, remove all flammable material/debris from the area to be heated, such as leaves, pine needles, paper, or trash. File or bend away any sharp edges along the gutter or downspout.
9. Designed for use only with metal or asphalt roofing; do not use with wooden shingles, gutters or downspouts. Consult your local Danfoss Representative for advice about other roof types.
10. System should be controlled by on/off switch with pilot light, and have ground fault protection (sourced by others) and power connection located in a protected area and grounded.
11. Use with only metal or plastic gutters and downspouts.

Any modification to the Danfoss RX heating cables can result in bodily harm, property damage and fire. Cable modification will render the warranty null and void, and the manufacturer carries no further responsibility for the product.



General Information and Planning



The Purpose of Danfoss RX Heating Cables:

The RX de-icing cable is designed to prevent ice dams from forming on roofs and in gutters and downspouts. When used and installed according to this manual, the RX system provides a path for melted snow and ice to drain from the roof.

The Danfoss RX system is not designed to remove ice dams that have already formed, nor should it be used for clearing the entire roof of snow.

Danfoss RX cables are not designed for anything but roof and gutter ice protection. Danfoss has other products ideal for ground snow melting and pipe tracing. Consult your local distributor, www.DanfossLX.com or call toll-free 1-866-676-8062 for further information.

A Timely Installation:

Do not install the RX heating system during the winter months or when snow or ice is present. As the cables are clipped onto shingles using special clips, care must be taken not to damage the roof shingles.

If ice dams, snow or ice are present, consult a professional roofing company for skilled advice.

Ideal installation temperature range (to prevent damage to shingles from tearing at hot temperatures or cracking at cold temperatures when attaching the clips):
32°F - 80°F (0°C - 27°C).

Where should I heat my roof?

Typically heating cables are installed where ice dams tend to form, such as where snow and/or ice are present below an area with melted snow. These areas are dependant on exposure to sunlight, wind directions, and the shape of the roof. Ice dams may also form in a roof valley, around a dormer, skylight or above the gutter. It may be necessary to only heat the gutter and downspout if no ice dams have formed on the roof.

Cable Sizing



Refer to Appendix A to estimate the required cable length for your application.

Table 2 - Breaker Sizing: Required Current for RX De-icing Kits

Catalog Number:	Required Current (Amps)
088L3500	1.4
088L3502	2.6
088L3503	3.3
088L3504	3.8
088L3505	4.5
088L3508	6.3
088L3510	9.0
088L3511	10.2

Cable Installation



It is important to plan the cable layout before any installation begins. Making a drawing of the roof and then chalking the cable locations on the roof surface may be helpful. Remember to always exercise caution when on a ladder or roof. See Appendix A to determine cable lengths required.

1. Choose your start point:
To protect the cable from damage and to ensure personal safety, do not start the cable layout close to doorways, entrance areas or sidewalks etc.

Your starting point may already be determined depending on the location of the electric supply outlet.

2. Roof Pattern:
Different cable patterns exist for different areas of the roof. Not always will all areas need to be heated in your particular situation. Follow the instructions and illustrations for each area requiring heating.

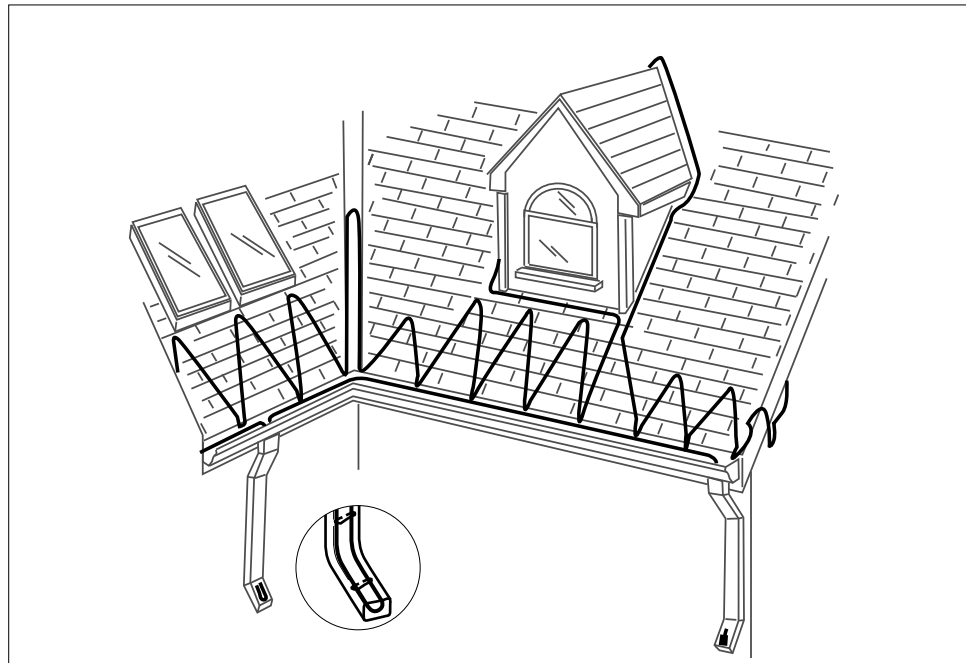


Figure 1. Illustration of roof

Roofline Pattern:

A triangular pattern is used on the edge of the roof (Figure 2). The height of each triangle is dependant on the size of the roof overhang. Refer to Table 3 for triangle heights.

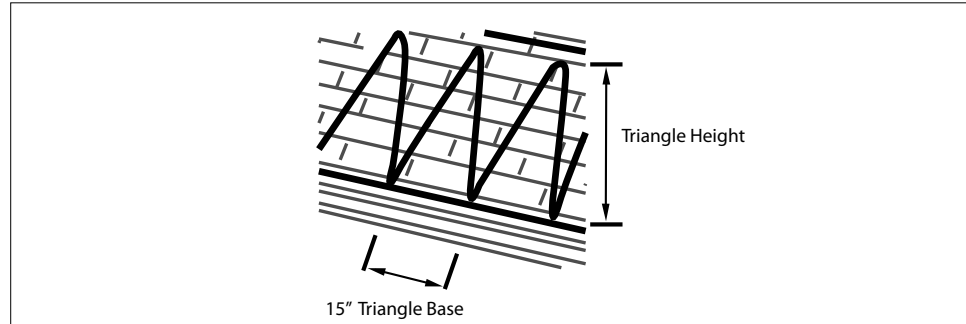


Figure 2. Roofline Pattern

Table 3 - Triangle Heights

Overhang "O"	Triangle Height "H" (Standard Shingle Row)
<12" (30.5cm)	3
12-18" (30.5cm - 45.7cm)	4
18-24" (45.7cm- 61cm)	5
24-30" (61cm- 76.2cm)	6
30-36" (76.2cm- 91.4cm)	7
36-42" (91.4cm-106.7cm)	8
42-48" (106.7cm-121.9cm)	9
48-54" (121.9cm-137.2cm)	10
54-60" (137.2cm-152.4cm)	11
60-66" (152.4cm-167.6cm)	12
66-72" (167.6cm-182.9cm)	13

*Based upon standard shingle row height of 5 1/2" (14cm)

The spacing at the base and top of each triangle should be 15"; point-to-point (Figure 2). Triangle heights must not exceed 20' and should be at least one shingle row above where the warm zone of the roof begins. A warm zone is present when snow and ice melt due to poor insulation or ventilation

Skylight Pattern:

Use the same triangle pattern as for the roof edge, but extend the triangle height to the base of the skylight (Figure 3). If the triangle height is to exceed 20', commercial grade de-icing cable should be used; contact Danfoss Technical Support toll-free at 866 676 8062.

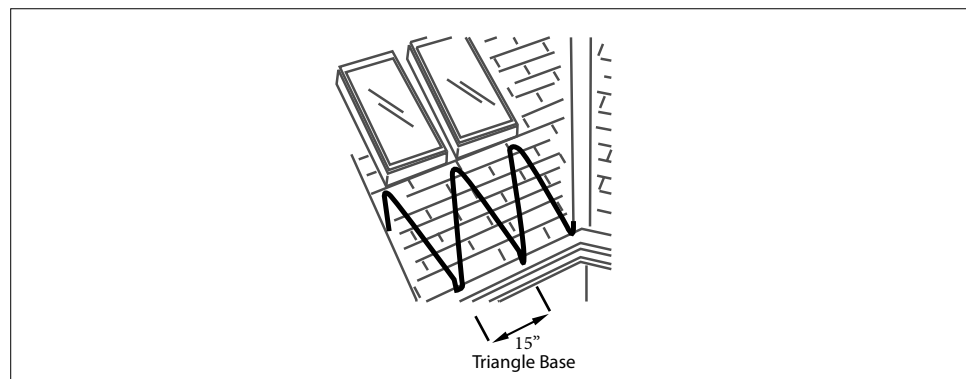


Figure 3. Skyline Pattern

Dormer Pattern:

Place the RX heating cable around the perimeter of the dormer, as in Figure 4.

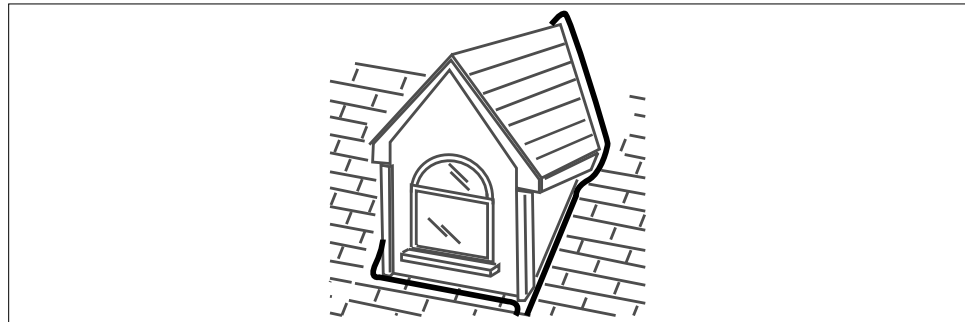


Figure 4. Dormer Pattern

Valley Pattern

Route the cable a minimum of 3' up and down the valley; lengthen as appropriate for a higher roof (Figure 5).

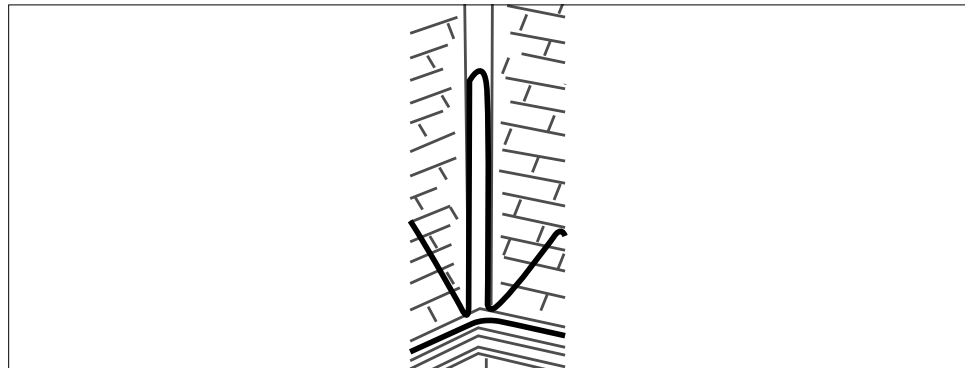


Figure 5. Valley Pattern

Other areas:

Other areas of the roof not mentioned here may also be heated using the triangle pattern to prevent the formation of ice dams.

Gutters and Downspouts:

If a gutter is present, all gutters below heated areas of the roof must have a heating cable run through to allow for the drainage of melted snow/ice. If a downspout is present along the route of the gutter, drop the RX cable down and back up the downspout; continue the cable along the gutter (Figure 6). If the downspout is at the end of the cable route, you need only to run a single length down the downspout (Figure 6).

CAUTION: Install such that the heating cable does not touch, overlap or cross itself.

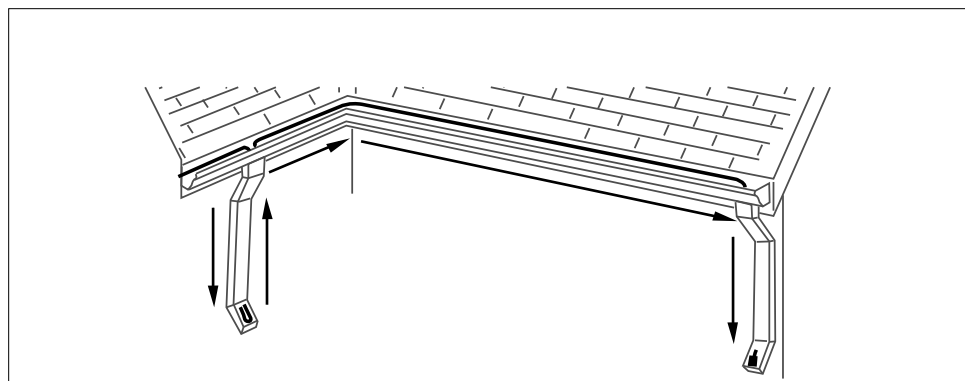


Figure 6. Cable routed back along the roof line in the gutter and downspouts

Double runs of RX cables may be used when ice problems are only present in the gutters (Figure 7).
CAUTION: Install such that the heating cable does not touch, overlap or cross itself.

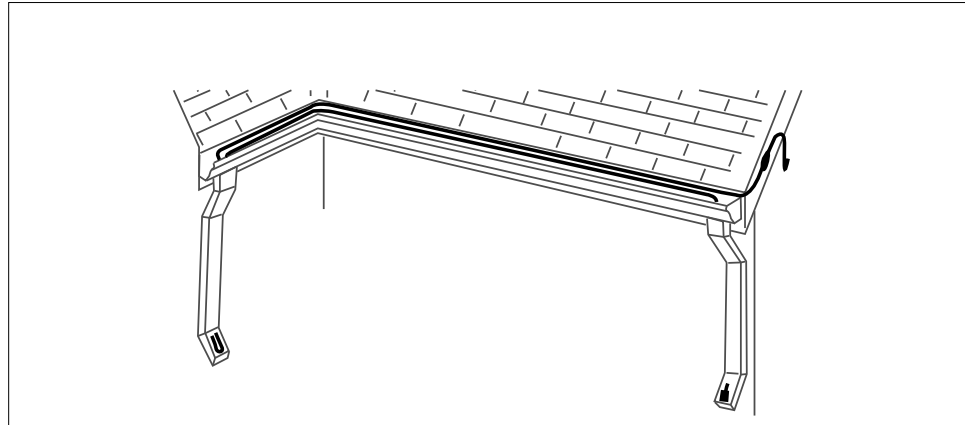


Figure 7. Double Cable Run in gutter and downspouts

Note: One should take into account the number of cables used when designing the layout. It may be simpler to install the heating system using more short kits, or fewer large kits. Also consider what to do with cable excess or shortage. Larger triangles or double runs in gutters and downspouts can take up extra cable.

Cable Testing



While not required, you may test the cable by completely unrolling the cable and plugging it in. Never energize a coiled cable. After 10 minutes, the cable should feel warm to the touch.

Installing the Cable using the Roof Clips



Attach the start the cable to the roof as indicated in Figure 8 or Figure 9. **Do not energize the cable.**

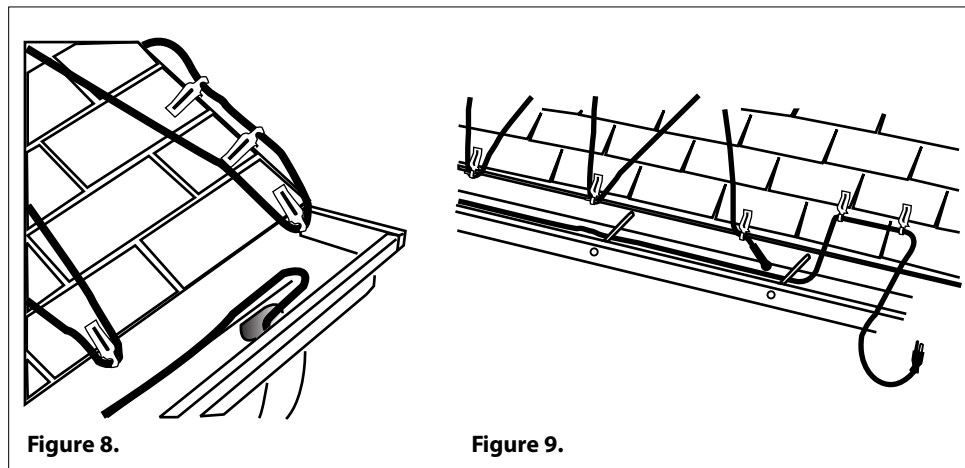


Figure 8.

Figure 9.

Installing the Cable using the Roof Clips



Top of Triangles: lift the shingle gently using the putty knife. Insert the clip and press the shingle down firmly; it will reseal itself in hot weather.

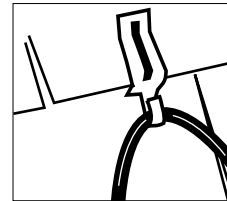


Figure 10.

Bottom of triangles along roof edge: Create a drip loop over the edge of the roof, leaving at least 2" between the bottom of the drop loop and the gutter bottom.

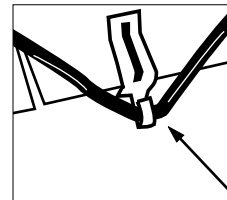


Figure 11.

drip loop

Top of Triangles: lift the shingle gently using the putty knife. Insert the clip and press the shingle down firmly; it will reseal itself in hot weather.

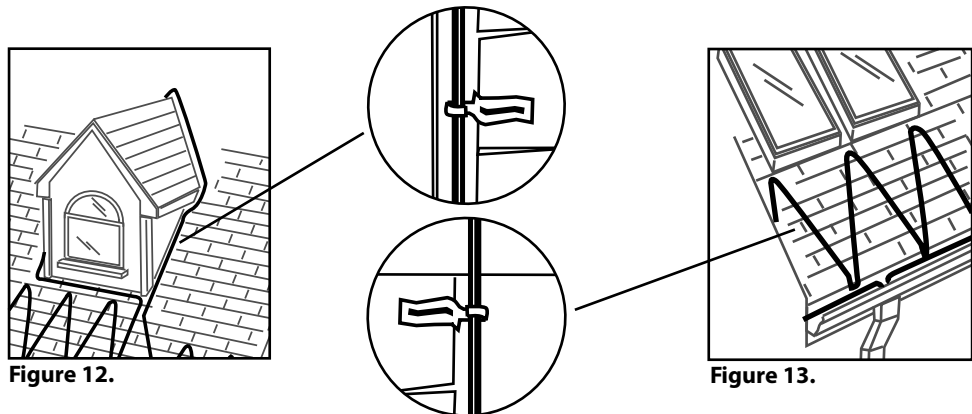


Figure 12.

Figure 13.

Tighten clips and spacers using fingers or pliers once installation is complete; do not use a hammer. Using a weighted string may help with installation of cables in downspouts.



Use and Maintenance

Each snow season:

- Check cable position
- Ensure all debris is removed
- Inspect cable for damage, deterioration
- Test GFI devices

When to operate the heating system:

Operate the RX system in the winter season when temperatures fall between 15°F to 35°F (-9°C to 2°C). In very cold temperatures, the RX system may not generate enough heat to prevent the formation of ice dams. Turn off the system when ice dams have melted or temperatures are greater than 35°F (2°C).

An optional automatic system controller is available. Contact your local Danfoss Representative for details.

In the off season the system may remain on the roof. Disconnect the system to ensure it isn't accidentally turned on. Never operate the system when ambient temperatures are above 50°F (10°C) to prevent cable damage or fire hazard.

During the winter season, ensure the system is working efficiently by observing the melting path created by the heating cables. Cable layout modification may be required to adapt to changing ice dams or incorrect design.

Use a weather-proof power outlet to prevent accidental GFI tripping.

Warranty

DANFOSS RX KIT WARRANTY

For a period of two (2) years from the date of purchase Danfoss warrants that the Danfoss RX Kit is free from defects in material, design and workmanship. The warranty is only valid if the warranty certificate is correctly filled out and the installation is in accordance with the installation instructions.

The warranty certificate shall be presented to Danfoss in the case a claim is made. The defective Danfoss RX Kit has to be inspected by or submitted to Danfoss or an authorized Danfoss RX dealer. Failure to comply with the before mentioned conditions will void this warranty. Danfoss will, when the customer has documented that a defect in the Danfoss RX Kit was present at the date of delivery, repair or supply a new Danfoss RX Kit at Danfoss' option. All claims shall be made within the warranty period. Danfoss shall not be liable for any claims made later than two (2) years from date of purchase. Danfoss shall not be liable for any consequential and secondary costs or damages linked to the defect or replacement of the Danfoss RX Kit .

THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ON THE PART OF DANFOSS. DANFOSS DISCLAIMS ANY WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. DANFOSS NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM OR CORPORATION TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH SALE OR PRODUCT. DANFOSS SHALL NOT BE HELD RESPONSIBLE FOR DAMAGE TO PERSON OR PROPERTY, CONSEQUENTIAL LOSS, LOSS OF PROFIT, LOSSES ON GOODS IN STORE, OR THE LIKE WHICH MIGHT ARISE OUT OF THE FAILURE OF THE EQUIPMENT DELIVERED, IRRESPECTIVE OF THE CAUSE (INCLUDING FAULTY MANUFACTURE).

RX Kits - 120V Part Numbers

Part No.	Length (feet)	Watts	Amps	Ohms	No. Shingle Clips / Kit
088L3500	30	170	1.4	85.7	25
088L3502	65	310	2.6	46.2	25
088L3503	80	390	3.3	36.4	50
088L3504	100	450	3.8	26.7	50
088L3505	120	535	4.5	23.1	75
088L3508	170	760	6.3	19.0	100
088L3510	230	1080	9.0	13.3	100
088L3511	265	1220	10.2	11.8	125

Each kit comes with 10 spacer clips as standard.

Appendix A Find the Required Cable Length

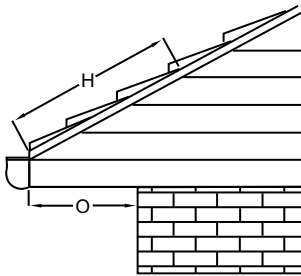


Fig. A

EXAMPLE:

24' roof with overhang
24" use multiplier 2.7 i.e.
Cable length = 24' x 2.7
= 64.8'

No dormers exist on this
roof
2 Valleys (x6') = 12'

24' gutter with 1 down
spout, 10' in height
= 24' x 1 = 24'
and 1 x (2 x 10')
= 20'

Therefore total cable:
64.8' + 12' + 24' + 20'
= 120.8' (088L3505)

Table 1 - Summary of Cable Lengths

Item	Required Cable Length (ft)	Remarks
Roof Edge (Fig.A)	See Table 2	Multiplier depends on roof overhang
Dormer Perimeter	1' per linear foot	Measure dormer perimeter
Roof Valley	6' minimum	Per valley 3' up, 3' down
Gutter	1' per linear foot gutter	Measure gutter length
Downspout	2' per linear foot of downspout	Cable loops down and up

Table 2 - Cable Length Multipliers and Roof Overhang

Eave Overhang "O"	Loop Height "H"="O"+6	Roof Multiplier
12"	18"	1.9
24"	30"	2.7
36"	42"	3.6
48"	54"	4.6

See Figure A for standard roof

Table 3 - Cable Length Calculations

Section	Calculation	Cable Length (ft)
1. Roof	$\frac{\text{Length}}{\text{Length}} \times \frac{\text{Multiplier}}{\text{Multiplier}}$	
2. Dormers	$\frac{\text{Number of}}{\text{Number of}} \times \frac{\text{(sum up, over and down)}}{\text{(sum up, over and down)}}$	
3. Valleys	$\frac{\text{Number of}}{\text{Number of}} \times \frac{6'}{6'}$	
4. Gutters*	$\frac{\text{Length}}{\text{Length}} \times \frac{1'}{1'}$	
5. Downspouts	$\frac{\text{Number of}}{\text{Number of}} \times \frac{\text{(2 x height)}}{\text{(2 x height)}}$	
Total		_____

*For gutters more than 4" wide, make two traces of RX cable in the gutter, ie multiply those gutter lengths with widths >4" by 2.

Remember to make accurate measurements of the roof, overhang, gutters, valleys, and downspouts to enter into the table above.

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