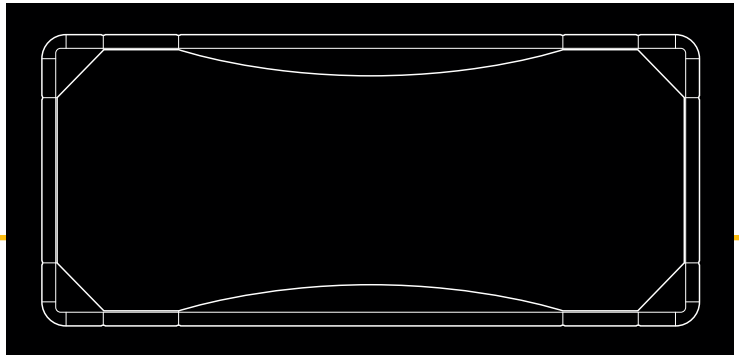

Expanse XP20

USER GUIDE

WAVETRONIX

Expanse XP20

USER GUIDE

Provo, Utah
801.734.7200
www.wavetronix.com

FCC and ISED Compliance

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesiredoperation of the device.

Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes à l'innovation, RSS(s) exemptés de licence de Sciences et Développement économique Canada. Le fonctionnement est soumis à la suivant deux conditions:
(1) l'appareil ne doit pas produire de brouillage;
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

FCC and ISED RF Exposure Statements

This equipment complies with FCC RF exposure safety guidelines for mobile devices and Canada RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & the user's body when operating the device.

L'appareillage répond aux limites de la norme RSS-102 sur l'exposition aux radiations établies pour un environnement non-contrôlé. Il devrait être installé et fonctionner à une distance minimale de 20 cm entre l'antenne et votre corps.

Disclaimer

The advertised detection accuracy of the Wavetronix SmartSensor sensors is based on both external and internal testing, as outlined in each product's specification document. Although our sensors are very accurate by industry standards, like all other sensor manufacturers we cannot guarantee perfection or assure that no errors will ever occur in any particular applications of our technology. Therefore, beyond the express Limited Warranty that accompanies each sensor sold by the company, we offer no additional representations, warranties, guarantees or remedies to our customers. It is recommended that purchasers and integrators evaluate the accuracy of each sensor to determine the acceptable margin of error for each application within their particular system(s).

WX-500-0348
02/20

CONTENTS

1

Choosing a mounting location

Mounting location, height, and offset

Choosing where to mount

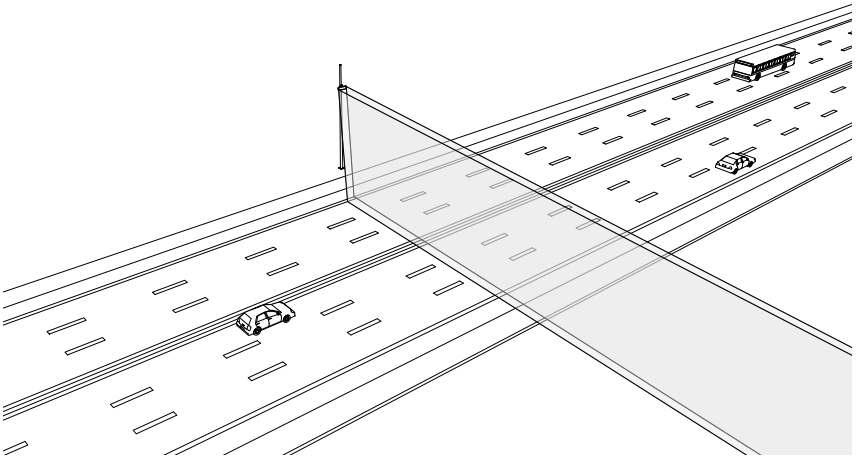

Figure 1. The XP20 radar footprint

- For best performance, make sure the lanes being detected are all parallel to each other; avoid on- and off-ramps/turn lanes that angle away from the road.

- Make sure all monitored lanes are within 6 to 250 ft. (1.8 to 76.2 m) of the sensor. Up to 22 lanes can be detected.
- If you're putting a sensor on a road with stoplights or stop signs, position the sensor toward middle of the block, to reduce the likelihood of having stopped vehicles in the XP20 radar footprint.

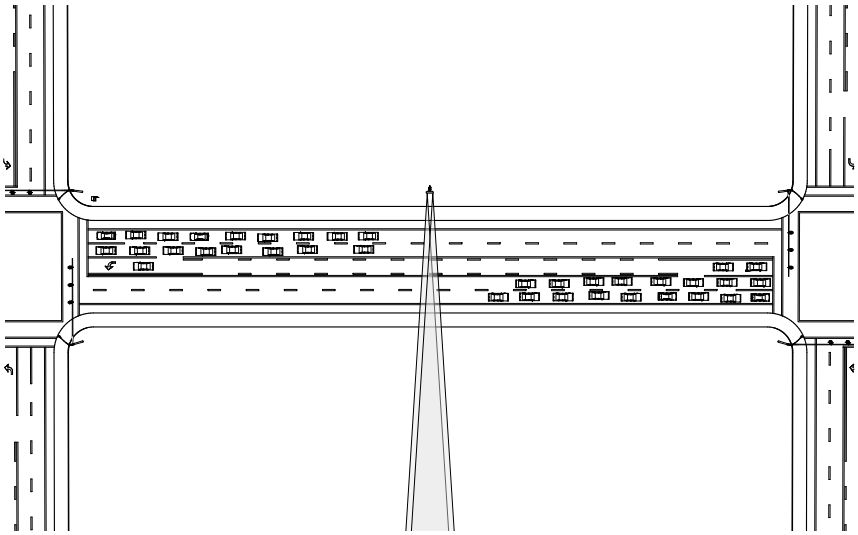

Figure 2. Midblock installation

Note. You can purchase your cable from Wavetronix or from a cable manufacturer. If you do the second, we recommend you purchase either the Alpha Wire 6453 or Belden 3105A cable.

- Keep cable lengths in mind when you pick mounting locations; when you use a Wavetronix or Wavetronix-recommended cable, the cable run between the XP20 and the cabinet can be as long as 2000 ft. (609.6 m).
- Consider timing: after a vehicle passes in front of the sensor, there's a slight delay before the data for that vehicle is sent from the sensor.
- In a time-sensitive application, like supplying a variable message sign with per vehicle warning messages, make sure the sensor is far enough upstream from the sign that the system has time to collect the data, process it, and send it to the sign by the time the vehicles reach the problem area.
- See if you can take advantage of any existing infrastructure in the area. The sensor can be mounted on existing poles (with the exception of wooden poles), as long as they fall within the acceptable offset range. You may also be able to tap into existing cabinets, power sources, and communication networks. All of these options could save you time and money.

Choosing a mounting height and offset

Mounting guidelines in feet

* reduction in number of reported speeds.

Offset	Height	(acceptable range)
6*	**12**	(9–19)
7*	**12**	(9–19)
8*	**12**	(9–20)
9	**12**	(9–21)
10	**12**	(9–22)
11	**12**	(9–23)
12	**13**	(10–24)
13	**13**	(11–25)
14	**14**	(11–28)
15	**15**	(12–26)
16	**15**	(12–27)
17	**16**	(13–28)
18	**17**	(14–29)
19	**17**	(14–30)
20	**18**	(15–30)
21	**19**	(15–31)
22	**20**	(16–31)
23	**22**	(16–32)
24	**24**	(16–33)
25	**26**	(17–33)
26	**26**	(17–34)
27	**27**	(18–35)
28	**27**	(18–35)
29	**27**	(18–36)
30	**29**	(19–37)
31	**29**	(19–37)
32	**29**	(19–38)
33	**30**	(19–39)
34	**30**	(19–39)
35	**30**	(20–40)
36	**30**	(20–41)
37	**31**	(20–41)
38	**31**	(21–42)
39	**33**	(21–43)
40	**33**	(22–43)
41	**34**	(22–44)
42	**34**	(22–44)
43	**35**	(22–45)
44	**35**	(23–46)
45	**36**	(23–46)
46	**36**	(23–47)
47	**36**	(24–48)
48	**38**	(24–48)
49	**38**	(24–49)
50–230	**39**	(25 to <offset)

Recommended

Note. Mounting height is measured from the road's height, not the bottom of the pole. If installing a new pole, remember that part of the pole will likely be below ground.

Definition. Offset is the distance between the pole the sensor is mounted on and the edge of the first lane to be detected.

Note. Some countries, such as the UK, have their own variant of these mounting guidelines due to differences in road layouts and traffic profiles. Please consult with your local Wavetronix office to ensure you are installing to the correct local guidelines.

Mounting guidelines in meters

	Offset	Height	(acceptable range)
* reduction in number of reported speeds.	**2.0***	**3.5**	(2.5–5.5)
	2.5*	**3.5**	(2.5–5.5)
	3.0	**3.5**	(2.5–5.5)
	3.5	**3.5**	(3.0–6.0)
	4.0	**4.0**	(3.0–7.0)
	4.5	**4.5**	(3.5–7.5)
	5.0	**4.5**	(3.5–8.0)
	5.5	**5.0**	(4.0–9.0)
	6.0	**5.5**	(4.5–9.0)
	6.5	**6.0**	(4.5–9.5)
	7.0	**6.5**	(5.0–10.0)
Recommended	**7.5**	**8.0**	(5.0–10.0)
Recommended	**8.0**	**8.0**	(5.0–10.5)
Recommended	**8.5**	**8.0**	(5.5–10.5)
Recommended	**9.0**	**8.5**	(5.5–11.0)
Recommended	**9.5**	**8.5**	(5.5–11.5)
Recommended	**10.0**	**9.0**	(6.0–12.0)
Recommended	**10.5**	**9.0**	(6.0–12.0)
	11.0	**9.0**	(6.0–12.5)
	11.5	**9.5**	(6.5–13.0)
	12.0	**10.0**	(6.5–13.0)
	12.5	**10.5**	(6.5–13.5)
	13.0	**10.5**	(7.0–13.5)
	13.5	**11.0**	(7.0–14.0)
	14.0	**11.0**	(7.0–14.0)
	14.5	**11.5**	(7.5–14.5)
	15.0	**11.5**	(7.5–15.0)
	15.5–70	**12.0**	(7.5 to <offset)

Additional information

- If the roadway is frequently used by tall vehicles, consider choosing a higher mounting height to help avoid occlusion.
- Don't use an offset of less than 6 ft. (1.8 m). Also, the sensor can be up to 230 ft. (70.1 m) from the road, but don't go out that far if you can avoid it; it could lead to decreased accuracy.
- For best results, choose the mounting height in the Height column in the table. If you can't, just keep it somewhere in the acceptable range.

Warning. Choosing a mounting height outside that range could negatively affect sensor accuracy.

Occlusion and multipathing

These are two problems you might face while using a radar detector.

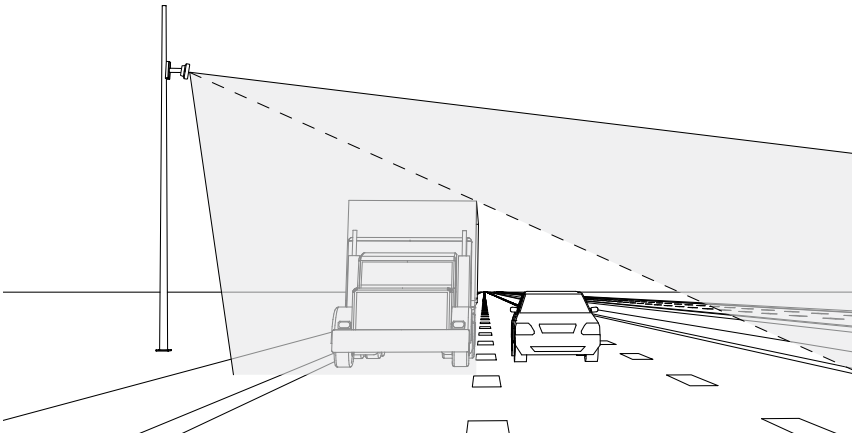

Figure 3. Occlusion

Occlusion occurs when one object blocks another object from the sensor's view, as shown above. This can happen with

- Tall vehicles like semi trucks
- Signs
- Barriers and sounding walls
- Trees and more

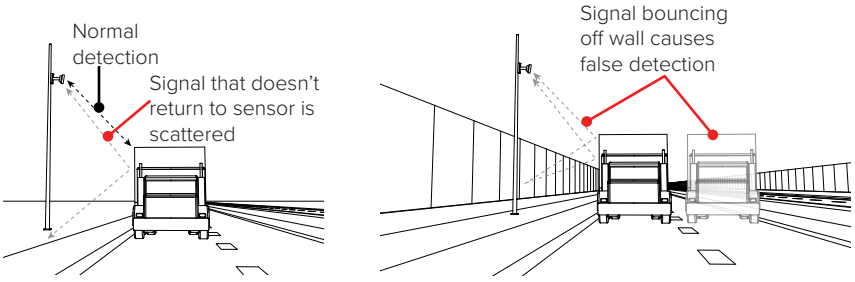

Figure 4. Left: direct path return; right: multipath return

Multipathing occurs when a large flat surface near the sensor interferes with detection. A radar signal can bounce around several times between the surface and the vehicles before returning to the sensor. This can make the sensor detect a vehicle where there is none.

This can happen with

- Buildings
- Signs
- Guard rails

- Sounding walls and more

Fixing occlusion problems

Note. A good rule of thumb is that 50% of a vehicle must be visible above any barrier in order to be detected.

- Move the sensor higher on the pole (keeping it within the recommendations in the mounting guidelines table).
- Move the sensor to another spot on the freeway if possible, away from obstructions.
- If there's a very large barrier in the median, you could do the following:
  - Use one sensor on either side of the road, pointing in (be sure to give the two sensors a 70-ft./21.3-m lateral offset and put them on different RF channels).
  - Put two sensors on the same pole in the middle of the median, both pointing out (put them on different RF channels), but this would mean they are next to the barrier in the median and that could cause multipath problems.

Fixing multipath problems

- Move the sensor if possible; make sure it is separated from overhead signs, overpasses, tunnels, parallel walls, etc. A 30-ft. (9.1-m) lateral separation would be ideal, but even just a few feet can make a difference.
- Adjust the sensor's sensitivity thresholds in the software.

2

Installing the XP20

Mounting the sensor

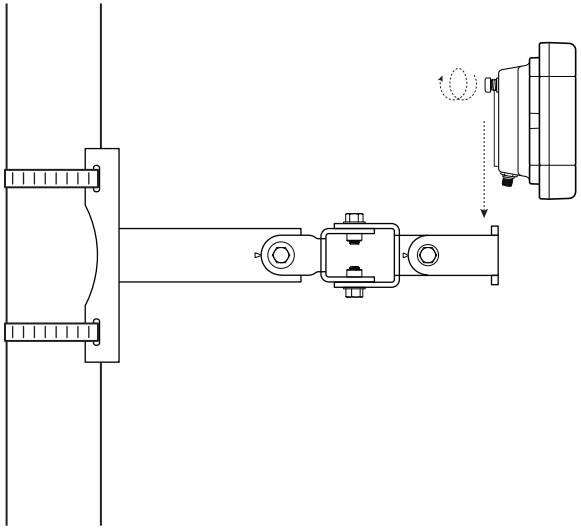

Figure 5. Mounting the sensor

1 Use Band-It or a similar clamping system to attach the mount to the pole.
2 Attach the sensor to the mount by positioning the slot on the

back of the sensor above the black tab on the end of the mount and sliding down.

3 Tighten the thumb screw on the sensor; for a more secure installation, finish tightening with a screwdriver.

Aligning the sensor to the roadway

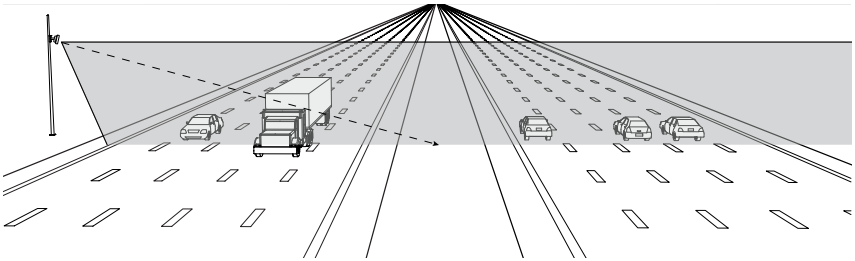

Figure 6. Up-and-down positioning

1 Tilt the sensor down so the front is aimed at the center of the detection area.

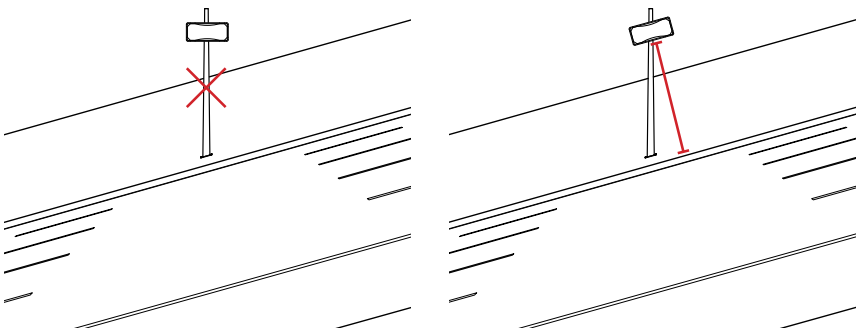

Figure 7. Rotating the sensor on a hill: incorrect (left) and correct (right)

2 Be sure the sensor is parallel to the slope of the road; if the sensor is installed on a road with an uphill/downhill grade, rotate the sensor so that the bottom edge matches the grade of the road.

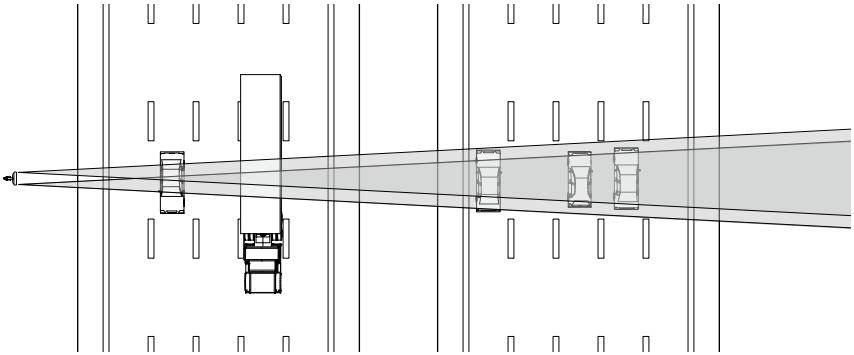

Figure 8. Side-to-side positioning

3 Adjust the side-to-side angle so it's perpendicular to the flow of traffic.
4 Once you are satisfied with the sensor alignment and positioning, tighten all bolts in the mount.

Note. You will double-check the alignment of the sensor in the software.

Assembling the cable

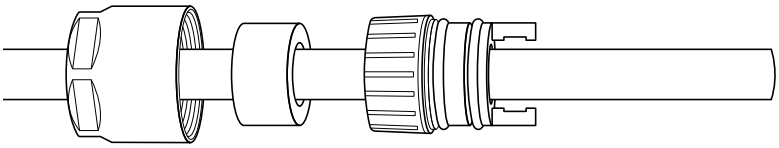

Figure 9. Cable with backshell nut, rubber seal, and clamping ring

1 Slide the backshell nut over the end of the cable.
2 Select the closest-fitting rubber seal for your cable; slide it over the end of the cable.
3 Slide the clamping ring over the end of the cable.

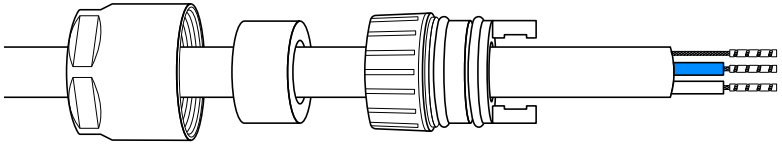

Figure 10. Cable with ferrules on conductors

4 Strip back the cable insulation 16 mm.
5 Cut off the shield braid and foil, but do not remove the uninsulated drain wire.
6 You should have two insulated condutors and one uninsulated

drain wire. On the two insulated conductors, strip back the insulation 8 mm.

7 Crimp ferrules to the ends of all three wires.

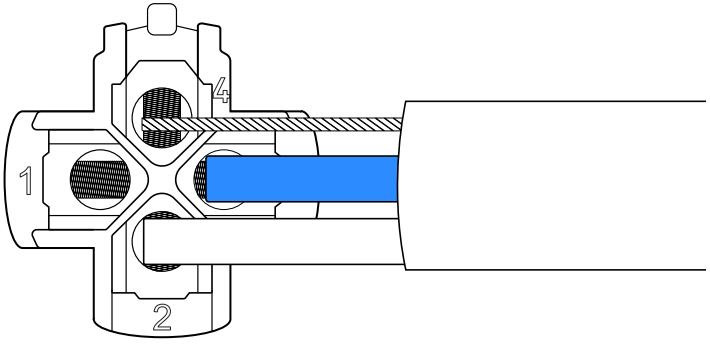

Figure 11. Terminating conductors and drain in pin housing

8 On the pin housing, loosen the set screws (located on the sides of the pin housing) on pins 2, 3 and 4, using the provided Allen wrench, to make room to terminate the wires.

9 Terminate the wires from the cable into the pin housing as follows: put the white conductor in pin 2, the blue conductor in pin 3, and the drain wire in pin 4.

10 Tighten the set screws.

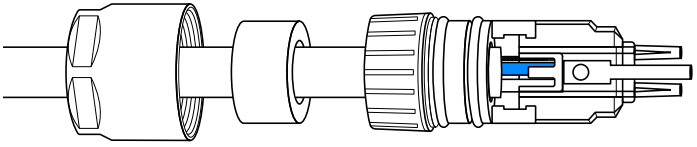

Figure 12. Cable with pin housing snapped to clamping ring

11 Slide the clamping ring forward and snap it into the pin housing. Note that the clamping ring only fits on in a certain way, so you'll have to align it properly.

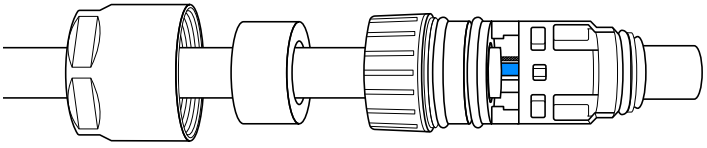

Figure 13. Adding clamping ring

12 Snap the connector insert on top of the pin housing. Again, you'll have to align it properly.
13 Slide the rubber seal inside the clamping ring.

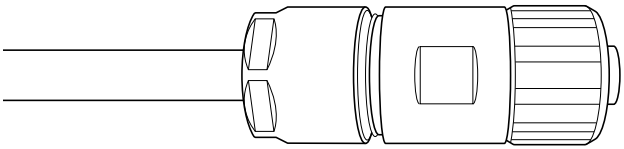

Figure 14. Completed connector

14 Insert the whole assembly into the backshell, twisting the backshell until it slips over the alignment marks in the connector insert; slide the backshell nut forward over the cable and screw the two together using two 18 mm wrenches.

Applying silicon dielectric compound

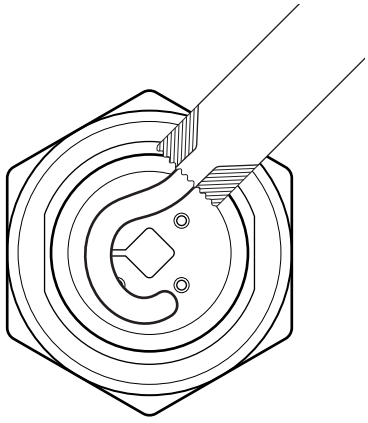

Figure 15. Applying the compound

1 Tear the tab off the tube of silicon dielectric compound that came with the sensor.
2 Squeeze about a quarter of the compound onto the connector at the base of the sensor.

Connecting the cable

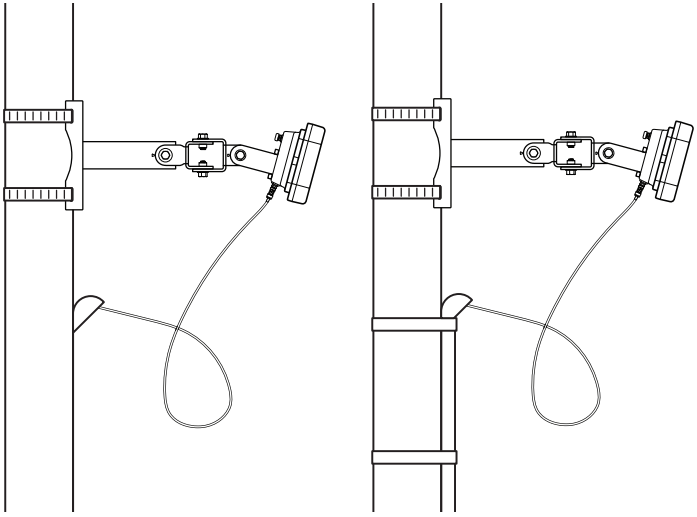

Figure 16. Cable run through pole (left) and through conduit (right)

Note. When you run the cable through the pole, don't drill through the sensor mount, as the sensor and sensor mount may need to be adjusted in the future.

1. Insert the cable connector into the sensor connector; be aware that the connector is keyed and will only fit in a certain way.
2. Tighten the nut on the cable connector.
3. If you haven't already, run the cable through the pole. Leave a small amount of slack at the top; this reduces strain, allows you to create a drip loop as shown above, and gives you something to work with should you someday need to move the sensor to a different spot on the pole.
4. If there's excess cable, don't cut it, as you may need it at a later time; leave it in the pole.

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