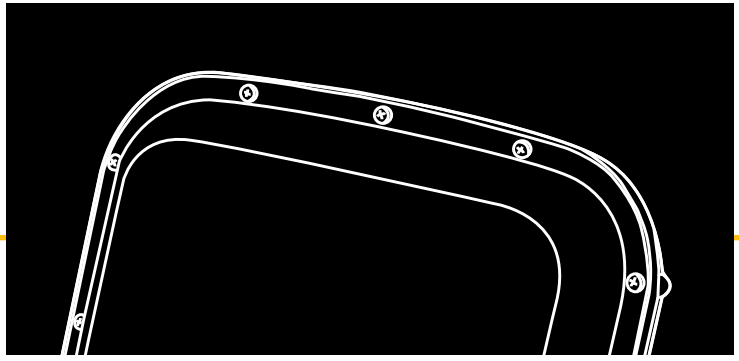

SmartSensor HD

USER GUIDE

WAVETRONIX

SmartSensor HD

USER GUIDE

Provo, Utah
801.734.7200
www.wavetronix.com

FCC Part 15 Compliance: The Wavetronix SmartSensor sensors comply with Part 15 of the Federal Communications Commission (FCC) rules which state that operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation. FCC compliance statements for applicable optional modules are to be found in the module specifications. Unauthorized changes or modifications not expressly approved by the party responsible for compliance with the FCC rules could void the user's authority to operate this equipment.

Hereby, Wavetronix LLC, declares that the FMCW Traffic Radar (SmartSensor HD, part number 101-0415) is in accordance with the 2004/108/EC EMC Directive.

The device has been designed and manufactured to the following standards:

- IEC/EN 60950 - 1:2006, A11:2009, A1:2010, A12:2011 - Electronic equipment safety requirements.
- EN 300 440-2 - Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive.
- EN 301 489-3 - Immunity to RF interference. Compliance with transmission limitations under 1GHz and conducted transmission over power lines, ESD.

The equipment named above has been tested by Compliance Certification Services and found to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives. This equipment has been evaluated at 2000m.

IP Protection: IP66

For installation into restricted access location.

All interconnecting cables shall be suitable for outdoor use.

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-500-0051
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Contents

Introduction

Welcome to the Wavetronix SmartSensor™ HD user guide.

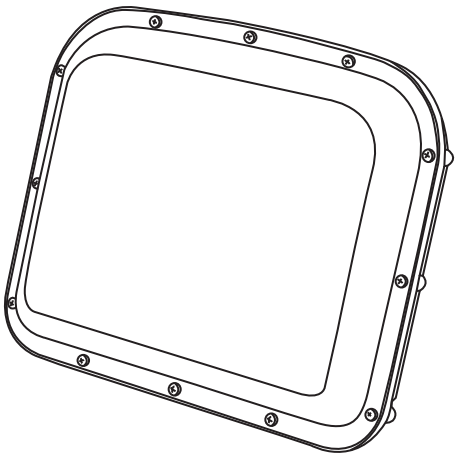


Figure 1. SmartSensor HD

This guide will cover selecting a mounting location for, installing, and configuring a SmartSensor HD. To find the instructions for specific tasks, see the table of contents. If your questions aren't answered in this guide, visit www.wavetronix.com/support for access to supplemental materials, like technical documents and troubleshooting information.

What you'll need

The sensor package includes the following:

- A SmartSensor HD
- A mounting backplate

- A SmartSensor HD quick start guide

The following aren't automatically included but are necessary for installation:

- Sensor mount
- SmartSensor 8-conductor cable

To support the sensor installation, you may need to order devices for power conversion, surge protection and communication, including some or all of the following:

- Contact closure device (Click 100, 104, 110, or 112/114)
- Click 200 surge protector
- Click 201/202 AC to DC converter
- Click 210 circuit breaker
- Click 230 AC surge protector
- Click 301 serial to Ethernet converter

For convenience, you can get these devices preassembled and prewired in pole-mount boxes and cabinet backplates, available from Wavetronix.

Service information

Don't try to service or repair this unit; none of its components or parts are serviceable in the field. Attempting to open this unit, unless expressly directed by Wavetronix, will void the customer warranty, as will any visible damage to exterior seal labels. Wavetronix is not liable for any bodily harm or damage caused if unqualified persons attempt to service or open the back cover of this unit. Refer all service questions to Wavetronix or an authorized distributor.

Important note

Failure to follow the installation guidelines laid out in this guide could result in decreased performance. If you believe it is necessary to deviate from these guidelines, contact a Wavetronix application engineer or technical support for assistance and recommendations.

1

Choosing a Mounting Location

Mounting location, height and offset

Choosing where to mount

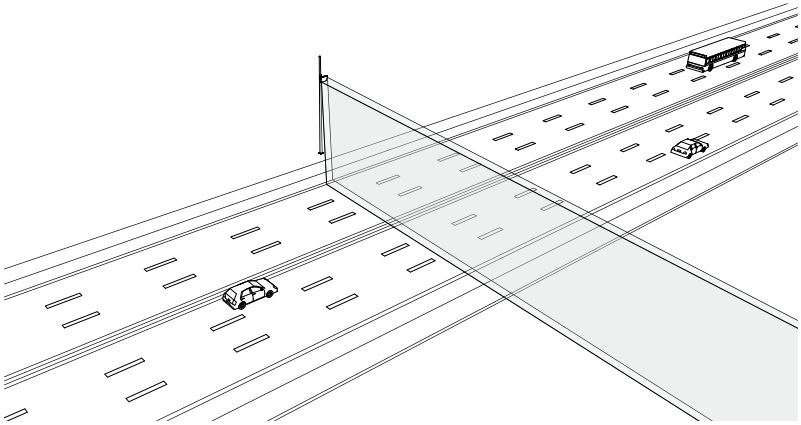


Figure 2. The HD's radar footprint

- 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 HD radar footprint.

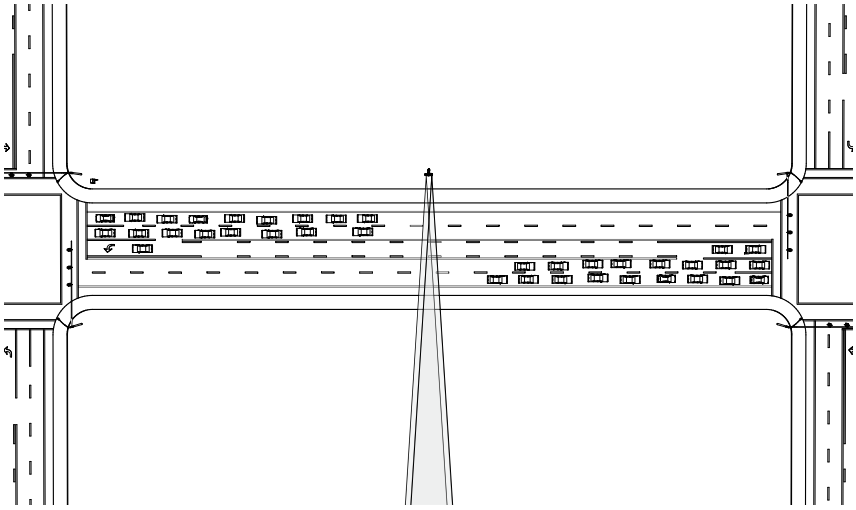


Figure 3. Midblock installation

For more information. See the HD support section of the Wavetronix website to learn more about cable lengths.

- Keep cable lengths in mind when you pick mounting locations; when you use the Wavetronix cable, cables can be as long as 600 ft. (182.9 m) if you're using 24 VDC and RS-485 communications; for longer connections, consider alternate wired and wireless options.
- 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 and trees), 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

	Offset	Height	(acceptable range)
*reduction in number of reported speeds	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)
Recommended	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– <offset)

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

*reduction in number of reported speeds

	Offset	Height	(acceptable range)
	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– <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.

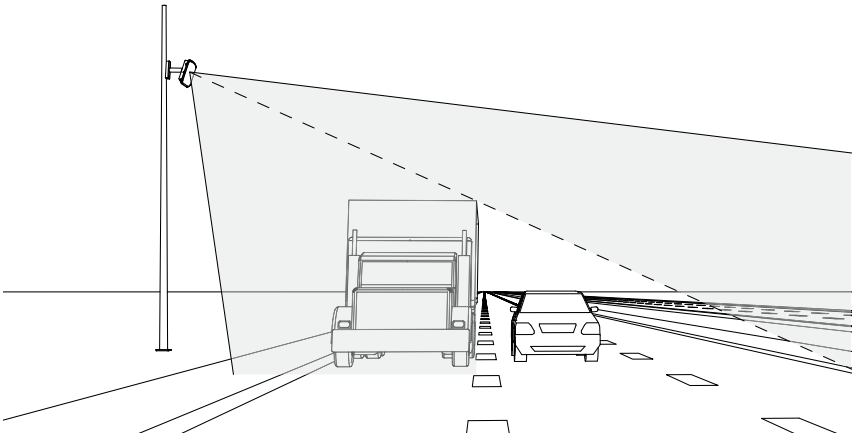


Figure 4. Occlusion

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

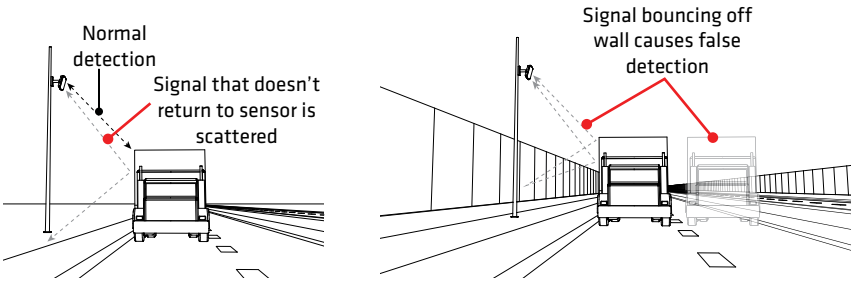


Figure 5. Left: direct path return; right: multipath return

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 SmartSensor Manager HD, as covered in chapter 8.

2

Installing the SmartSensor HD

Attaching the mount to the pole

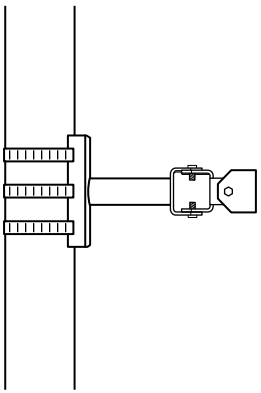


Figure 6. Attaching the mount

1. Insert the mounting straps through the slots on the mount.
2. Position the mount on the pole at the height you chose from the mounting table in the previous chapter.
3. Point the head of the mount toward the middle of the lanes you want to detect.
4. Tighten the straps.

Note. Be sure to keep the straps adjustable, because once you've used the alignment tool in the software, you may need to fine-tune the sensor's positioning.

Attaching the sensor to the mount

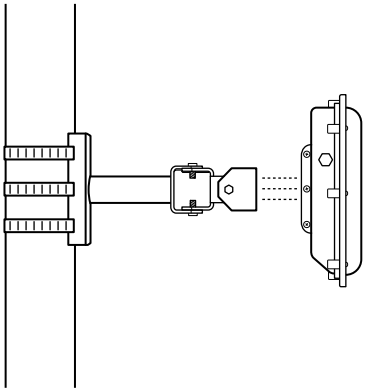


Figure 7. Attaching the sensor

1. Align the bolts on the sensor's backplate with the holes in the mount.
2. Make sure the large 10-pin connector at the bottom of the unit is pointing towards the ground.
3. Push the bolts through the mount holes.
4. Place the lock washers on the bolts, thread on the nuts and tighten.

Aligning the sensor to the roadway

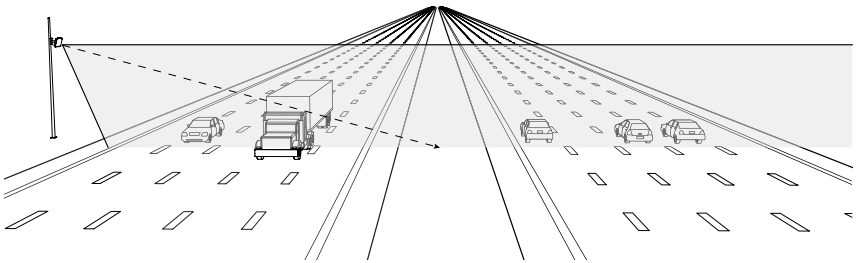


Figure 8. Up-and-down positioning

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

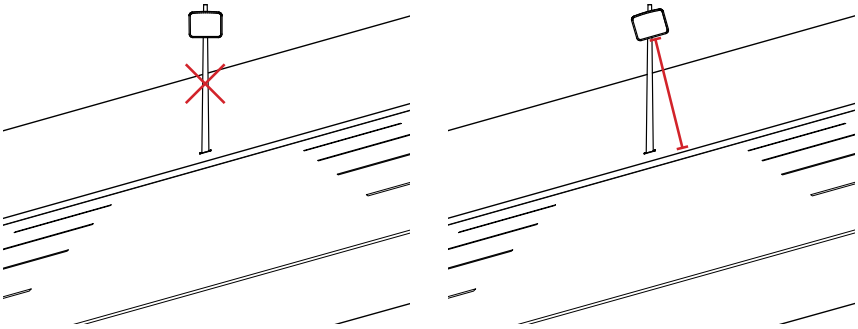


Figure 9. Rotating the sensor on a hill: incorrect (left) and correct (right)

2 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 (this will require the purchase of a rotating sensor backplate).

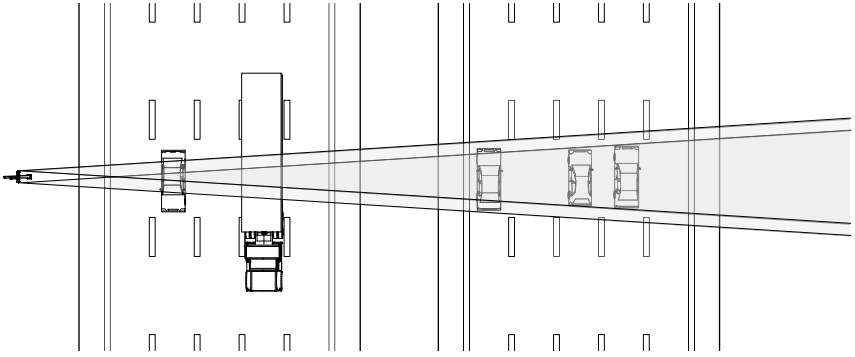


Figure 10. Side-to-side positioning

3 Adjust the side-to-side angle so it's perpendicular to the flow of traffic.

Applying silicon dielectric compound

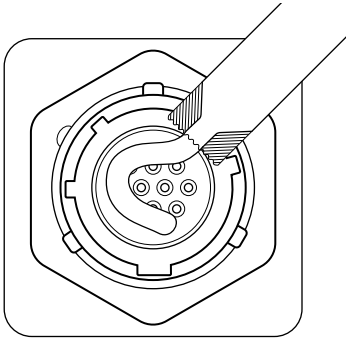


Figure 11. Applying the compound

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

Connecting the cable

Note. The HD sensor uses an 8-conductor cable that can be ordered from Wavetronix. It's also possible to order a retrofit HD with a legacy connector; this would use the older 9-conductor SmartSensor cable.

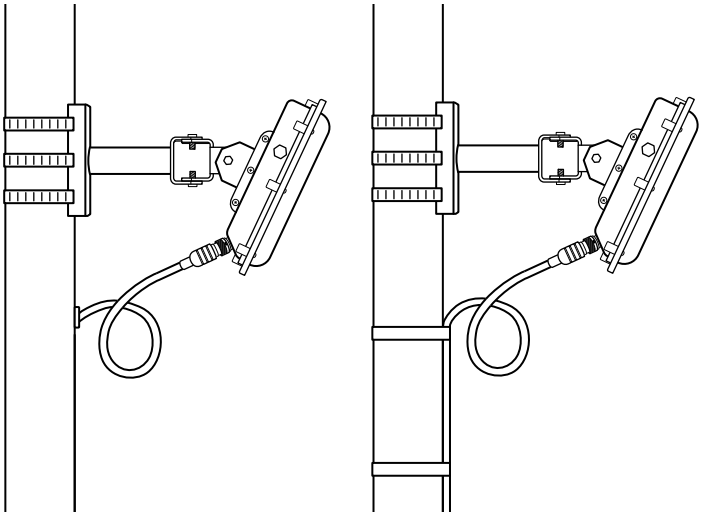


Figure 12. Cable run through pole (left) and through conduit (right)

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 it is a keyed connector.
2. Twist the cable connector clockwise until you hear it click into place.
3. 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.

3

Installing Power, Surge Protection and Communications

How you install power, surge protection and communication modules varies based on what enclosures you're using and where they're located.

Warning. We strongly recommend you follow the guidelines in this chapter, especially as they relate to surge protection. Failure to properly protect your sensors from surges will void the sensor warranty. If you need more information, contact support@wavetronix.com.

Installations with a pole-mount box only

As shown below, this is an installation where the sensor cable runs down the pole to the pole-mount box and to nowhere else. Power comes from solar, a battery, or a power line that runs straight to the pole; communications are wireless or use a comms line that runs straight to the pole.

Figure 13. Installation with pole-mount box and no cabinet

Note. This section assumes you are using the Standard Preassembled Cabinet from Wavetronix. If you bought individual Click modules instead, see *Click 100–400 Series User Guide* and support document 295, *How to Assemble the Power Plant*. If you are not using Wavetronix devices, contact your dealer or visit the knowledge base at www.wavetronix.com.

Setting up the pole-mount box

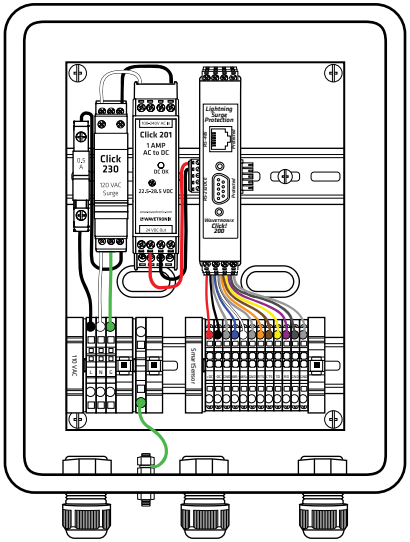


Figure 14. Standard Preassembled Cabinet (pole-mount box)

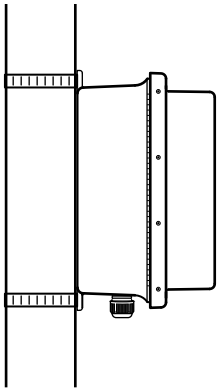


Figure 15. Attaching the pole-mount box

1. Find the mounting brackets that were included in the package and attach them to the back of the Standard Preassembled Cabinet.
2. Use Band-It or a similar clamping system to attach the Standard Preassembled Cabinet to the pole.

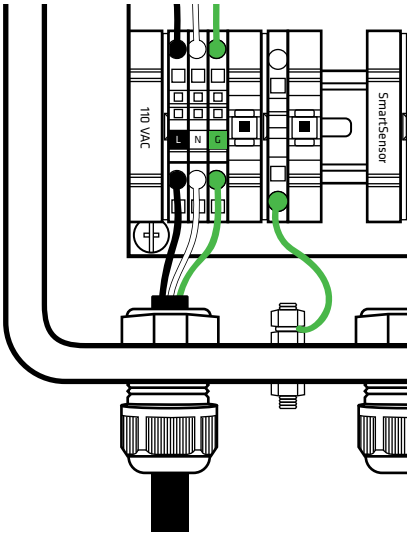


Figure 16. Connecting power cable to terminal blocks

3 Insert the power cable through the leftmost cable grip on the bottom of the box. Twist the cable grip to tighten.
4 Insert the black conductor into the round hole on the plug portion of the L terminal block. Insert a small screwdriver into the square hole above it, and rock upwards to secure the conductor in place.
5 Repeat step 4 with the white conductor in the N terminal block, and the green conductor in the G terminal block, as shown above.

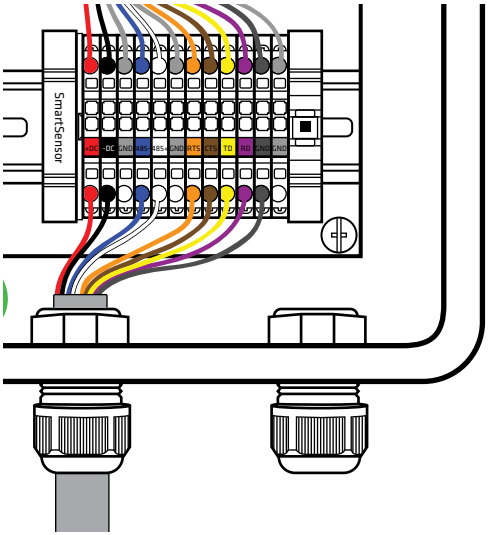


Figure 17. Connecting sensor cable to terminal blocks

6 Insert the sensor cable (the pigtail cable coming from the sensor) into the middle grip on the bottom of the box. Twist the cable grip to tighten.

7 Follow the instructions in step 4 to land each conductor into the correct terminal block. The blocks are color-coded for your convenience: land the red conductor into the block with the red label, and so on.

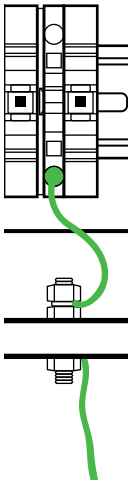


Figure 18. Connecting earth ground

8 Connect the grounding lug to earth ground.

More information about this setup

This cabinet is designed to be mounted on a pole and to provide everything your sensor needs:

- The Click power plant, consisting of a circuit breaker, AC surge protector, and AC to DC converter.
- The Click 200, which is a lightning surge protector. This device is where the sensor cable is landed (via the terminal blocks). It protects the rest of the pole-mount box from surges coming from the sensor cable. It's also where you can plug in to communicate with and configure the sensor.

Warning. For installs with only the pole-mount box (no traffic cabinet), you need the single Click 200 in the Standard Preassembled Cabinet. Failure to use a Click 200 could void the sensor warranty.

There are no communication options besides the RS-232 and RS-485 on the Click 200. An additional communication device can be easily added to communicate with the installation remotely.

Installations with a pole-mount box and traffic cabinet

As shown below, this is an installation where the sensor cable runs down the pole to the pole-mount box, then down to ground level, where it runs underground to a traffic cabinet. Power and communication modules are located in the cabinet, and power is sent to the sensor via the sensor cable.

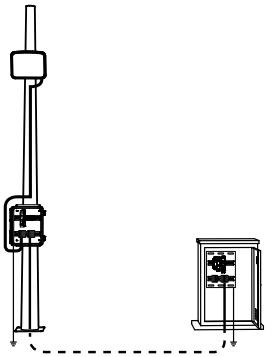


Figure 19. Installation with pole-mount box and traffic cabinet

Setting up the pole-mount box

Note. This section assumes you are using the Standard Preassembled Cabinet from Wavetronix. If you bought individual Click modules instead, see *Click 100–400 Series User Guide* and support document 295, *How to Assemble the Power Plant*. If you are not using Wavetronix devices, contact your dealer or visit the knowledge base at www.wavetronix.com.

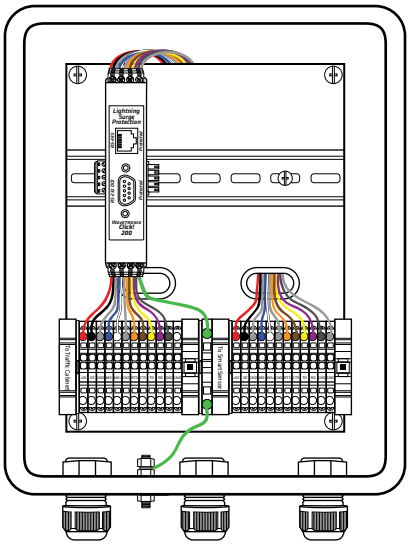


Figure 20. Surge Preassembled Cabinet (pole-mount box)

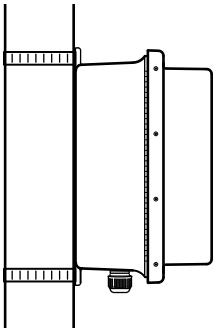


Figure 21. Attaching the pole-mount box

1 Find the mounting brackets that were included in the package and attach them to the back of the Surge Preassembled Cabinet.
2 Use Band-It or a similar clamping system to attach the Surge Preassembled Cabinet to the pole.

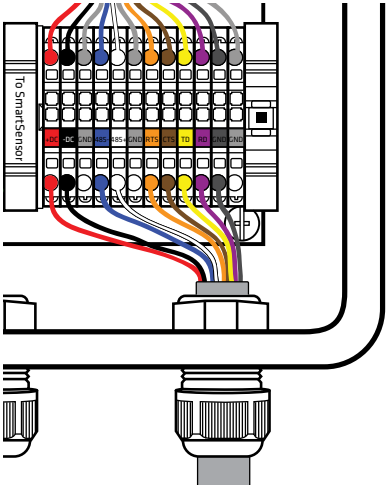


Figure 22. Connecting sensor cable to terminal blocks

3 Insert the sensor cable (the pigtail cable coming from the sensor) through the rightmost cable grip on the bottom of the box. Twist the cable grip to tighten.
4 Start connecting conductors to the terminal blocks marked "To SmartSensor": insert the red conductor into the round hole on the plug portion of the +DC terminal block. Insert a small screwdriver into the square hole above it, and rock upwards to secure the conductor in place.
5 Repeat step 4 to land each conductor into the correct terminal block. The blocks are color-coded for your convenience: land the black conductor into the block with the black label, and so on.

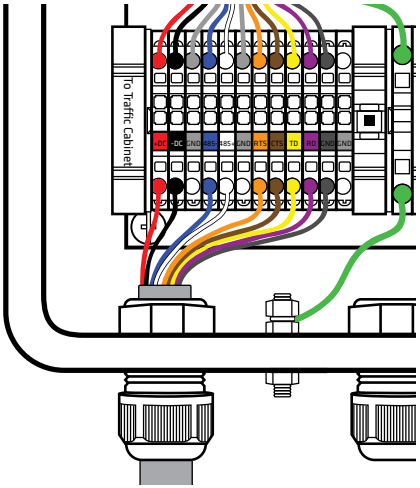


Figure 23. Connecting homerun cable to terminal blocks

6 Insert one end of the homerun sensor cable (the cable that runs to the traffic cabinet) into the leftmost grip on the bottom of the box. Twist the cable grip to tighten.

7 Follow the instructions in steps 4 and 5 to land each conductor into the correct spots in the set of terminal blocks marked "To Traffic Cabinet," remembering to follow the color-coded labels.

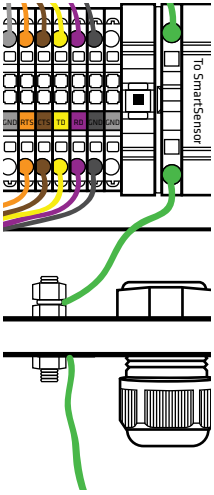


Figure 24. Connecting earth ground

8 Connect the grounding lug to earth ground.

Setting up the traffic cabinet

Note. This section assumes you are using the Standard Preassembled Backplate from Wavetronix; if you bought individual Click modules instead, see *Click 100–400 Series User Guide* and support document 295, *How to Assemble the Power Plant*.

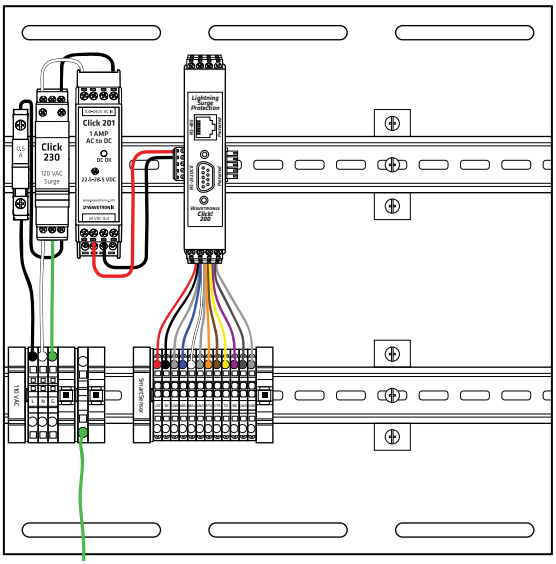


Figure 25. Standard Preassembled Backplate (for traffic cabinet)

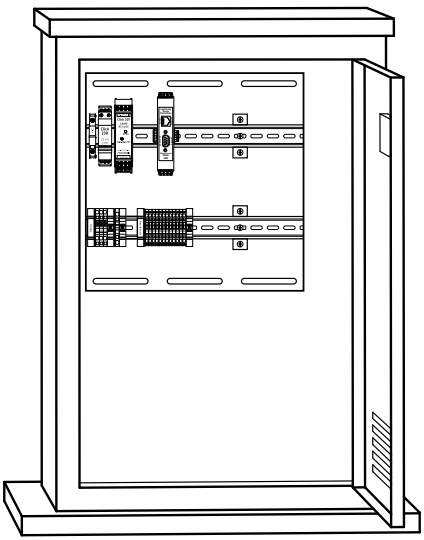


Figure 26. Mounting the backplate in the cabinet

1. If you haven't already, run the homerun cable back to the traffic cabinet.
2. Use the included screws to mount the Standard Preassembled Backplate in the traffic cabinet.

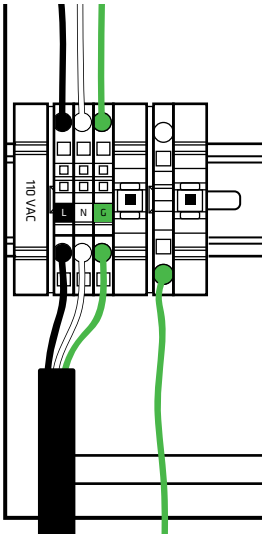


Figure 27. Connecting power cable to terminal blocks

3 Start by connecting the power cable. This backplate is shipped from Wavetronix with the conductors in the cable already terminated in a terminal block plug. Insert this plug into the power terminal blocks.

4 If for some reason the conductors aren't terminated into the terminal block plug, terminate them by inserting each conductor into the corresponding round hole on the plug (match each conductor to the label of the same color on the plug). Insert a small screwdriver into the square hole above it, and rock upwards to secure the conductor in place. Repeat with each conductor.

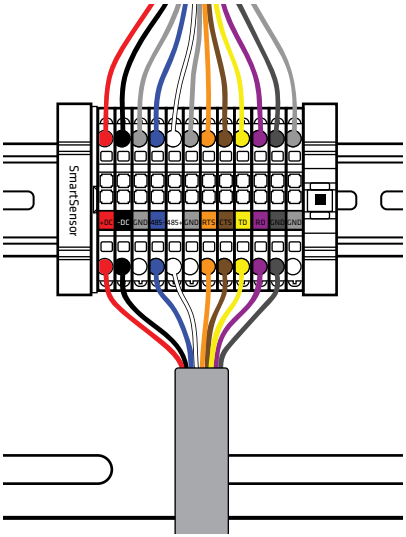


Figure 28. Connecting sensor cable to terminal blocks

5 Now wire the sensor cable (the homerun cable coming from the pole-mount box): follow the instructions in step 4 to land each conductor into the correct terminal block. The blocks are color-coded for your convenience: land the red conductor into the block with the red label, and so on.

6 Make sure the backplate is connected to earth ground.

Note. All electronic components should be grounded.

More information about this setup

Following this section provides everything your sensor needs:

- The Click power plant, consisting of a circuit breaker, AC surge protector, and AC to DC converter, located in the traffic cabinet.
- Two Click 200 modules, which are lightning surge protectors, one at either end of the underground cable run. This protects all the equipment, especially the sensor, from power surges on the cable, such as those caused when lightning hits the ground near where it's buried, which makes these very important! It's also where you can plug in to communicate with and configure the sensor.

Warning. Using two Click 200s is standard Wavetronix procedure for underground cable runs. Failure to follow these guidelines will void the sensor warranty.

There are no communication options in this setup besides the RS-232 and RS-485 on the Click 200. An additional communication device can be easily added to communicate with the installation remotely.

4

Installing and Running SmartSensor Manager HD

Download and installation

SmartSensor Manager HD (SSMHD) is software that lets you configure and interact with the HD sensor. It can only be installed on a PC.

Downloading SSMHD

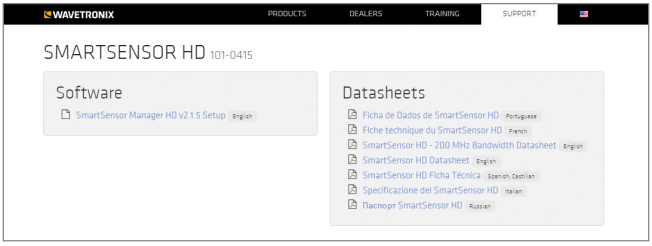


Figure 29. Finding the SSMHD download on the Wavetronix website

1. In a browser, navigate to www.wavetronix.com/en/support.
2. From the **Start by** drop-down menu, select **SmartSensor HD**.
3. The HD page will appear. Under the Software section, click **SmartSensor Manager HD vX.X.X Setup**. If you are prompted, click the **Download** button.

Installing SSMHD

Note. You must have administrator rights to install the program, as well as Microsoft .NET Framework version 3.5.

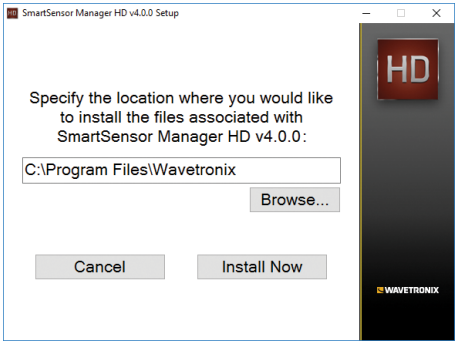


Figure 30. SSMHD install wizard

1. Double-click on the setup file.
2. Follow the instructions on your screen to choose where to install, and then to choose which shortcuts to create.
3. Click **Finish** when you're done.

SSMHD main screen

Open SSMHD to see the screen below.

Figure 31. SSMHD main screen

Changing the software language

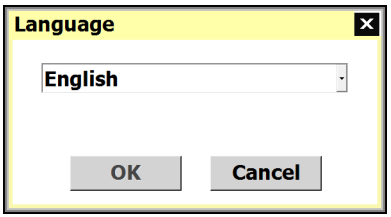


Figure 32. Language selection

1. Click the globe icon in the lower left corner.
2. A window will appear. Choose your desired language from the drop-down menu.
3. Click **OK**.

Changing the software size

Click one of the three boxes at the bottom of the screen to choose between the small, medium and large display sizes.

5

Connecting to a Sensor

SSMHD communication basics

Figure 33. Connect button, main screen

SmartSensor Manager can connect to your sensors via a serial (RS-232 or RS-485) or Internet (IP address) connection; this may require additional equipment. There is also a virtual option for testing or demo purposes.

Making a serial connection

Note. You may need a USB to serial adapter to connect to your computer.

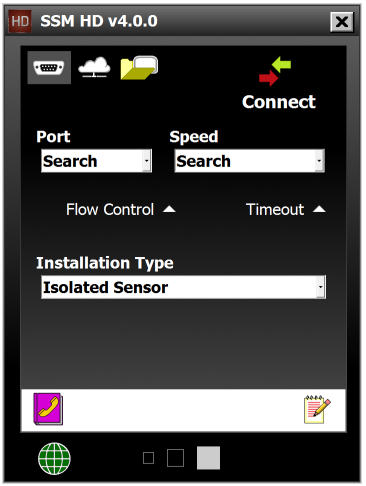


Figure 34. Serial connection screen

1. Click the serial connector icon on the **Connect** button of the main screen.
2. From the **Port** drop-down, choose the COM port on your computer that the sensor is plugged into.
3. From the **Speed** drop-down, choose 9600 bps (the default rate for the SmartSensor HD), unless you have previously changed the baud rate of the sensor.
4. Click **Connect**.

Note. If you are unsure of your port or speed, use **Search** and it will cycle through all available COM ports or baud rates.

Advanced serial connection settings

- **Flow Control –** This should be set to **None**. You would want to change this to **Hardware** if you're connecting through a device that uses RS-232 hardware handshaking (some older devices require flow control handshaking because they cannot keep up with the data rates of higher-performance devices).
- **Timeout –** This is how long the software tries to connect to the sensor before it gives up. You can increase this time if you're having trouble connecting to the sensor.
- **Installation Type –** If there is only one sensor on the bus, leave this set to **Isolated Sensor**. If your connection can see several sensors (they're all on a single bus, for example), set this to **Multi-drop Network** and enter the sensor ID of the sensor you want to connect to.

Making an Internet connection

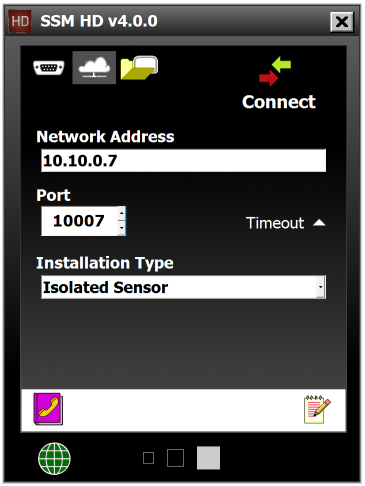


Figure 35. Internet connection screen

1. Click the cloud icon on the **Connect** button of the main screen.
2. Under **Network Address**, enter the IP address of the terminal server (such as a serial to Ethernet converter or a cellular modem) that the sensor is connected to. Do the same with the port number in the **Port** field.
3. Click **Connect**.

Advanced Internet connection settings

- **Timeout –** This is how long the software tries to connect to the sensor before it gives up. You can increase this time if you're having trouble connecting to the sensor.
- **Installation Type –** If there is only one sensor connected to the terminal server, leave this set to **Isolated Sensor**. If the terminal server can see several sensors, set this to **Multi-drop Network** and enter the sensor ID of the sensor you want to connect to.

Note. The SmartSensor HD is not a native IP device. Therefore, connecting via the Internet requires a terminal server, such as a Click 301 serial to Ethernet converter in the cabinet, or an external modem to put it on a cellular network.

Definition. A virtual sensor connection lets you see simulated traffic in SSMHD without actually being connected to a sensor—great for demos!

Making a virtual connection

Figure 36. Virtual connection screen

1. Click the folder icon on the **Connect** button of the main screen.
2. Under **Virtual Sensor File**, click the magnifying glass icon to navigate to the virtual sensor file you want on your hard drive. You can also create a new virtual sensor file in the window that pops up by navigating to the desired save location, typing in a new file name, and clicking **OK**.
3. If you want to change the simulated traffic, use the three settings under **Traffic Properties:** to change the style, flow, and average speed of the traffic.
4. Click **Connect**.

About virtual sensor files

If you make changes to the sensor's setup while using a virtual connection, those changes are saved to the virtual sensor file, which by default will be saved to C://ProgramFiles/Wavetronix/SmartSensorManagerHD vX.X.X/bin/.

If you want, you can back up those virtual sensor settings; that will create a sensor setup file which can then be restored to an actual sensor. More on the backup/restore tools in chapter 10.

Troubleshooting a connection

Some or all of the following may help you troubleshoot:

- Make sure that all power and communication wiring is correct.
- Check the port settings (baud rate, port ID).
- Make sure the sensor ID is correct.
- Make sure the terminal server is configured properly.
- If a failure occurs repeatedly, contact support@wavetronix.com.

Advanced communication tools

Once you've made a connection, the **Connect** button of the main screen should now be animated, with arrows moving past each other, and it should now say "Connected."

Viewing connection information

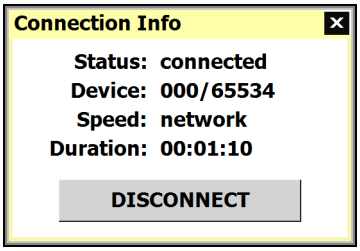


Figure 37. Connection Info window

1. Click **Connected**.
2. This will bring up the Connection Info window, with information about the connection status, device (subnet and sensor ID), speed in bps, and duration.

Disconnecting from a sensor

1. Click **Connected**.
2. This will bring up the Connection Info window. Click **Disconnect**.

Note. The address book lets you save device connection settings for future use.

Using the address book

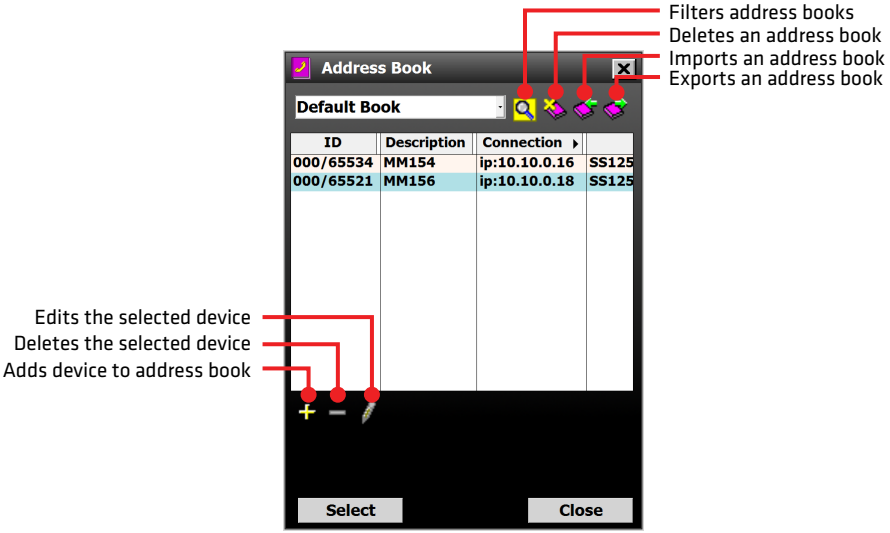


Figure 38. Address book screen

1. Click on the book icon at the bottom of the connection screen (serial, Internet or virtual).
2. The address book screen will appear; use the settings pointed out to add, edit and delete device connection settings.

Note. The error log can be useful in troubleshooting, or you may need to save it and send to support@wavetronix.com.

Viewing the error log

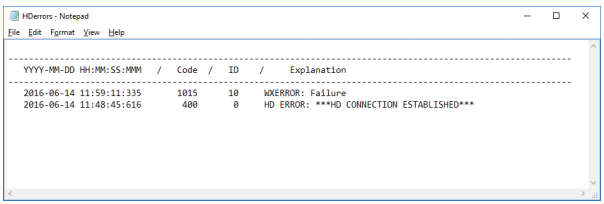


Figure 39. Error log

1. Click on the notepad icon at the bottom of the connection screen (serial, Internet or virtual).
2. The error log will be saved to C://ProgramFiles/Wavetronix/SmartSensor Manager HD vX.X.X/bin. It will also open in your default .txt editor. If you need to save a copy for troubleshooting purposes, do a Save As, as the file will be written over next time you view an error log.

Password-protecting the sensor

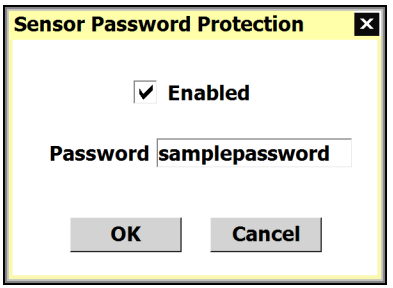


Figure 40. Setting a password for your sensor

1. Click on the key icon at the bottom of the connection screen (serial, Internet or virtual). The icon only appears when you're connected.
2. Check **Enabled** to confirm you want to password-protect the sensor.
3. Enter the new password into the **Password** field.
4. Click **OK**.

Note. If you do this, you'll have to enter the password every time you try to connect to the sensor, so only set a password if you're sure you need one.

If you forget your password

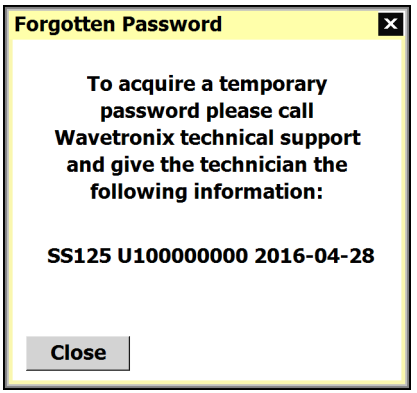


Figure 41. Forgotten Password window

When you're prompted to enter the password, you'll see a link you can click if you've forgotten the password you chose. It tells you to contact Wavetronix technical support and what information to give them.

Updating the sensor

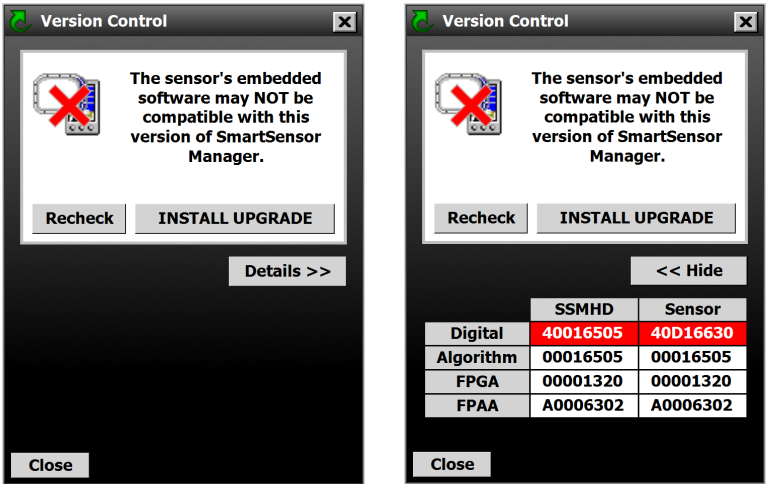


Figure 42. Version Control basic screen and detailed screen

1. If the version of SSMHD doesn't match the version of the sensor's embedded firmware, then after you click **Connect**, the Version Control screen will appear.
2. If you would like specifics on the mismatch, click the **Details >>** button.
3. Click **Install Upgrade**, or, if you prefer not to upgrade at this time, click **Close**.

Reading the date code

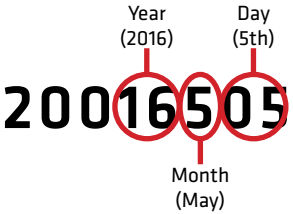


Figure 43. Date code

The firmware numbers can be interpreted according to this date code image. The month number is written in hexadecimal, meaning that October will be written as A, November as B, and December as C.

Downgrading the sensor

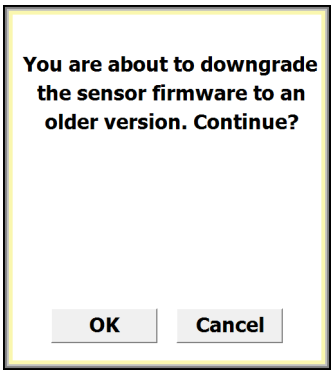


Figure 44. Downgrade warning message

If the downgrade message appears, it means that the sensor firmware is newer than the version of SSMHD you're using. Get the newest version of SSMHD from www.wavetronix.com.

6

Configuring Sensor Settings

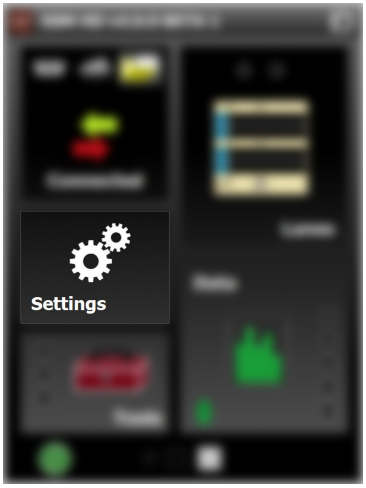


Figure 45. Settings button, main screen

Access the sensor settings by clicking **Settings** on the main screen. Changing these settings is optional; if you leave them set to their defaults, the sensor will still function.

Changing General tab settings

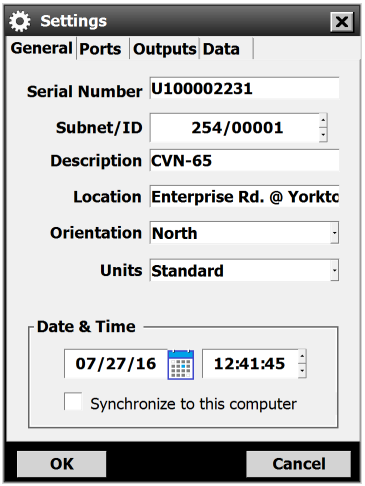


Figure 46. General tab

Setting	Description	Details
Serial Number	Shows the identification number assigned to the sensor by Wavetronix.	Can't be changed.
Subnet/ID	Subnet: defaults to 000. ID: defaults to the last five digits of the sensor serial number. No two sensors should have the same ID.	Subnet: change if you want to create groupings of sensors. ID: generally you won't need to change this.
Description	Lets you create a description of the sensor. Limit of 32 characters.	Change this if you think you'll find it useful in identifying the sensor later.
Location	Lets you enter the sensor's location. Limit of 32 characters.	Change this if you think you'll find it useful in identifying the sensor later.
Orientation	Lets you mark which direction the sensor is pointing.	Change this if you think you'll find it useful in identifying the sensor later.

Setting	Description	Details
Units	Sets whether the software displays distances in standard (mph/feet), metric (kph/meters), or UK (mph/meters).	Purely for your convenience—does not affect sensor performance.
Date & Time	Shows the date and time stored on the sensor's internal clock. The sensor stores time in Coordinated Universal Time (UTC) and doesn't account for daylight saving time. The software uses the local settings of the computer it's running on to display the date and time in local units.	You can change these or synchronize the sensor to your computer.

Changing Ports tab settings

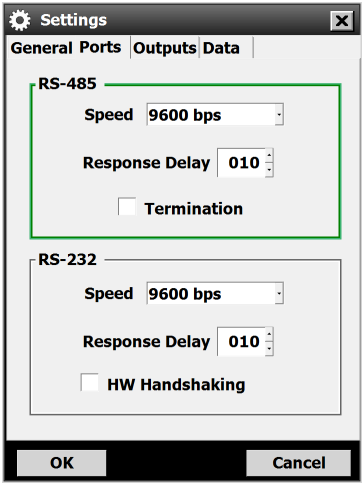


Figure 47. Ports tab

Setting	Description	Details
RS-485		
Border	Shows which comm link the SSMHD is connected to.	If there's a green border around this section, SSMHD is communicating over the RS-485 line.
Speed	Lets you change the baud rate for this comm link.	All Wavetronix devices default to 9600 bps.
Response Delay	Lets you set how long the sensor will wait before responding to a received message, shown in milliseconds. Default is 10 ms.	Change this if you're using a communication device that can't quickly change transmission direction.
Termination	Electronically turns RS-485 communication bus termination on or off.	You don't need to change this unless a multi-drop bus becomes overloaded.
RS-232		
Border	Shows which comm link the SSMHD is connected to.	If there's a green border around this section, SSMHD is communicating over the RS-232 line.
Speed	Lets you change the baud rate for this comm link.	All Wavetronix devices default to 9600 bps.
Response Delay	Lets you set how long the sensor will wait before responding to a received message, shown in milliseconds. Default is 10 ms.	Change this if you're using a communication device that can't quickly change transmission direction.
HW Handshaking	Turns on and off flow control hardware handshaking.	You may need this if you connect your sensor to certain RS-232 devices (like some modems) that can't keep up with the data rates of high performance devices.

Changing Outputs tab settings

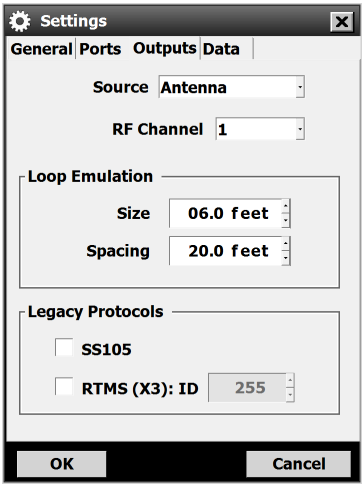


Figure 48. Outputs tab

Setting	Description	Details
Source	Lets you choose where SSMHD gets the traffic data it reports.	Choose **Antenna** for standard use (reports data as detected by the sensor). Choose **Diagnostic** for testing and training (creates simulated traffic).
RF Channel	Lets you change which radio frequency channel the sensor is transmitting on.	If you're using multiple sensors within 70 feet of each other, set each to its own RF channel.
Loop Emulation		
Size & Spacing	Makes your system emulate a system with inductive loops. These settings are read by a Click contact closure device, which uses that information to send contact closures that are properly timed to emulate a given loop size and spacing.	Use this if you used the SmartSensor HD to replace loops, and the rest of your system is still configured to deal with loops. This way the system keeps getting the sort of data it expects to see.

Note. Changing loop size will affect occupancy numbers in the interval data, but adjusting these settings will not modify the reported vehicle length or speed.

Setting	Description	Details
Legacy Protocols		
SS105	Sets the sensor to use the SS105 communication protocol. This doesn't turn off native SSHD protocol.	Click this checkbox if your backend system was originally configured for a SmartSensor 105 and is still expecting data in SS105 protocol.
RTMS (X3)	Sets the sensor to use the RTMS communication protocol (although only a portion of the RTMS commands are emulated). This doesn't turn off native SSHD protocol.	Click this checkbox if your controller or backend system was originally configured for an RTMS model X3 sensor and is still expecting data in RTMS protocol.

Note. For a SmartSensor HD in an RTMS-based system: if your system is set up to poll the sensor, turn on the RTMS protocol so the sensor can respond to RTMS commands. If your system is simply listening for data pushes from the sensor, don't turn on the RTMS protocol.

Changing Data tab settings

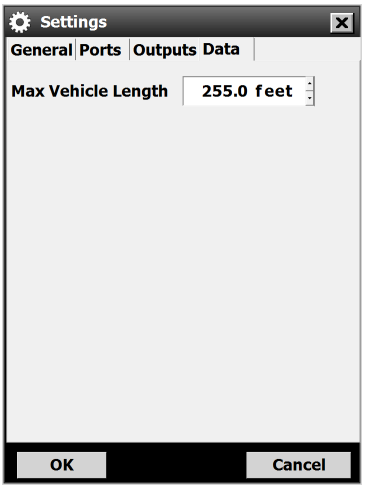


Figure 49. Data tab

Setting	Description	Details
Max Vehicle Length	Lets you set your maximum vehicle length; any detected vehicle that exceeds this length is reported as being only this long.	Change this if your roads have a max vehicle length.

7

Configuring Lanes

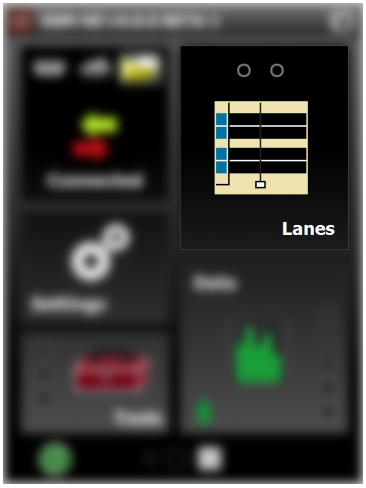


Figure 50. Lanes button, main screen

Click the **Lanes** button on the main screen to open the Lanes screen, then click the **Configuration** button to open the Configuration screen.

Figure 51. Lanes screen

Alignment

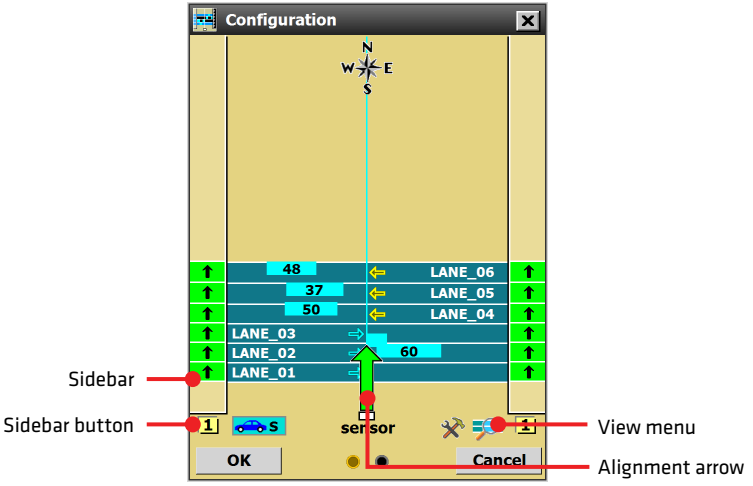


Figure 52. Alignment tools

Note. Lane configuration won't work as well as it should if the sensor is misaligned, so don't skip this step!

Checking sensor alignment

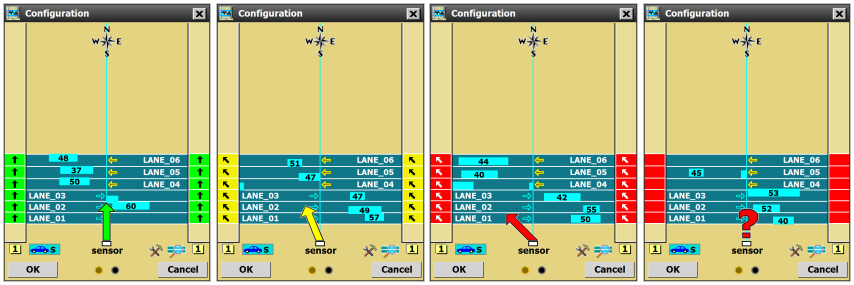


Figure 53. Good, mediocre, bad, and very bad alignment (left to right)

1. Be sure traffic is flowing freely on the road in order to get this tool to work best.
2. If you don't see the alignment arrow, open the View menu by clicking the magnifying glass icon, then select **Show Alignment**.

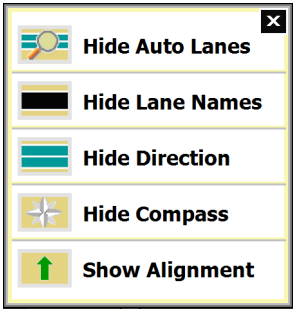


Figure 54. View menu

3. If you don't see the alignment sidebars, click the >> button on either side of the screen until the number 1 is displayed.
4. Watch the arrows to see where the sensor's alignment is at.
5. Move the sensor manually to fix it. Give the software a few moments after each sensor movement to adjust; a few vehicles need to pass by before it can report on the new alignment.
6. If you'd like, hide the arrow again using the View menu.

Note. The large arrow in the center shows the average alignment of all lanes; the small arrows in the sidebars show the alignment in each lane.

Troubleshooting the alignment tool

- The software needs a few vehicles to pass before it can start getting a read on the alignment. If you're having trouble, there might not be enough traffic on the road; wait until more vehicles have passed, or get in your own vehicle and drive in front of the sensor a few times.
- You may need to reset the alignment if there has been a drastic

change to the sensor's position.

- It can be difficult to align if there are non-parallel lanes of traffic (such as freeway ramps) in front of the sensor. Mark the non-parallel lanes as Inactive or Excluded (covered in the next section) until the alignment is taken care of.

Lane configuration

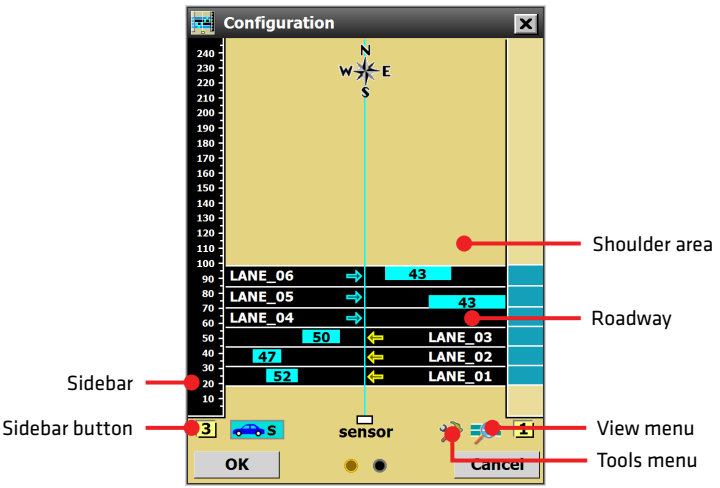


Figure 55. Configuration screen

Capturing lanes

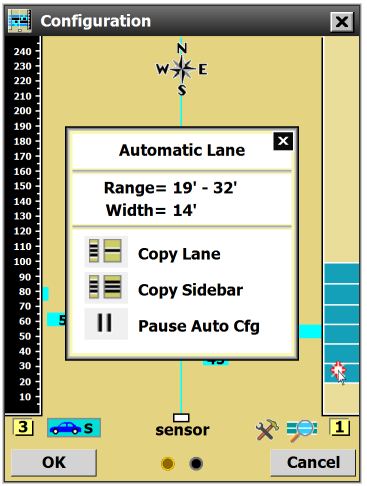


Figure 56. Automatic Lane window

Note. There must be traffic on the road for the automatic configuration process to work. If there's no traffic on the road, you may need to drive your own vehicle back and forth in front of the sensor a few times.

1. Open the Tools menu by clicking the hammer and wrench icon, then select **Clear Edit Area**.
2. Click on the sidebar button until sidebar 1 appears.
3. Open the Tools menu again and select **Restart Auto Cfg**.
4. Let the configuration process run (this could take a few seconds to a few minutes) until all of the lanes have been found by SSMHD; they will appear as blue bars in the sidebar and, if **Show Auto Lanes** is turned on, in the edit area.
5. If the software's set to **Show Auto Lane**, change it: open the View menu by clicking the magnifying glass icon, and select **Hide Auto Lanes**; the automatically detected lanes will disappear from the edit area.
6. If you want to capture all the lanes that appear in the sidebar, click anywhere in the sidebar; in the Automatic Lane window that appears, click **Copy Sidebar**. If you only want to capture certain lanes, click on those lanes in the sidebar; in the Automatic Lane window that appears, click **Copy Lane**. Repeat as needed. Captured lanes will appear black.

Excluding or including a lane or area

Note. Excluding a lane or area is useful when you're aligning the sensor and there are non-parallel lanes that are making the alignment difficult. It can also stop events from being generated in any non-lane areas.

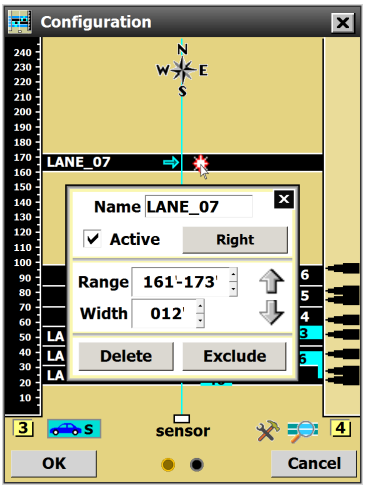


Figure 57. Lane window

1. Click on the lane or shoulder area you want to exclude. The Shoulder Area window or Lane window will appear, based on which you clicked.
2. Click the **Exclude** button.
3. To include an area that has previously been excluded, click on it to open this window again, and click **Include**.

Adding a lane

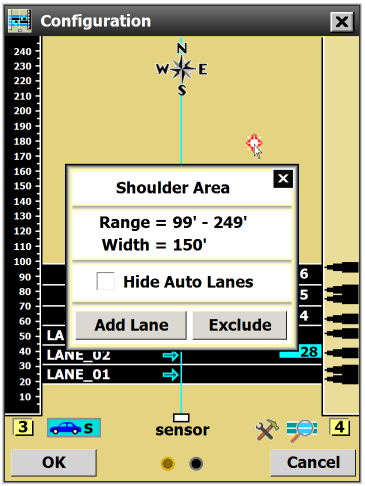


Figure 58. Shoulder Area window

1 Click on the spot where you want to add a lane. The Shoulder Area window will appear.
2 Click **Add Lane**. The new lane will appear black, unlike a blue automatically configured lane.

Editing a lane name

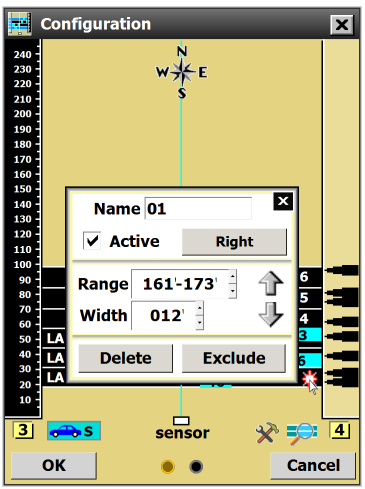


Figure 59. Lane window

1 Click on the lane you want to edit. The Lane window will appear.

Note. Other options found in the Lane window will be covered later in this chapter.

Note. The software won't let you use "LANE_xx" as the format (since that's the format it uses), but you can use the lowercase version, "Lane_xx", if you'd like.

2 Change the **Name** field at the top.
3 Click the **X** in the upper right corner to save and close the window.

Deleting a lane

1 Click on the lane you want to delete. The Lane window will appear.
2 Click **Delete**. Be aware that if the lane was automatically configured, and if **Show Auto Lanes** is turned on, once it is deleted it will still appear as a blue automatic lane.

Saving the configuration

Any of the following will save the configuration:

- Click **OK**.
- Click on the gray dot under the sensor for a shortcut to the Verification screen.

Either of these will cause a prompt to appear, asking if you want to save. Click **Yes**.

Sidebars, menus and windows

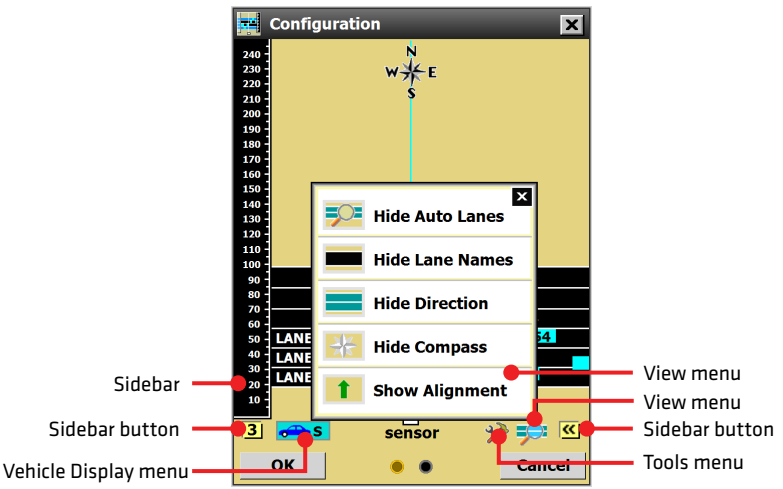


Figure 60. Tools for accessing menus and windows

The following section outlines all options available in the various sidebars, menus and windows accessible from the Configuration screen. Some of these change software functionality, while others simply change how things are displayed.

Viewing sidebars

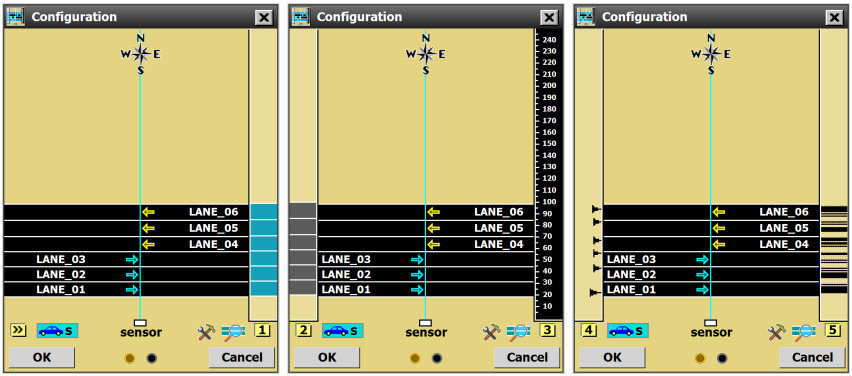


Figure 61. Sidebar options

The sidebars appear on either side of the screen and give information about the lanes and shoulder. Click the sidebar button to cycle through the six sidebar options.

Setting	Description	Details
>> **(off)**	No sidebar shown.	N/A
1 (Automatic configuration)	Shows the lanes that have been automatically configured by the sensor, in blue.	Use this to save only certain automatically configured lanes to the sensor, as discussed under Automatic Configuration. Or use the automatically configured lanes as a reference—to see where the software has calculated that the lanes are—while you're manually configuring or adjusting lanes.
2 (Saved configuration)	Shows the lanes that have been saved, in black.	Use the lanes currently saved to the sensor as a reference—to see where the lanes have previously been saved at—while you're manually configuring or adjusting lanes.

Setting	Description	Details
3 (Scale)	Shows a ruler indicating distances, in feet or meters, from the sensor. You can click on this sidebar to see a pop-up window showing the spot you clicked's distance from the sensor.	Use this to measure how far lanes or events are from the sensor, or to determine where to place manual lanes.
4 (Centers)	Shows the relative center of a lane, based on the occurrence of detections; the more vehicles are detected at a given range, the larger the arrow-shaped indicators become. For best results, you'll need to let this run for a few minutes.	Use this to get a sense of where vehicles are most often being detected, which can be useful for verifying lane placement or manually adding lanes.
5 (Tracks)	Shows a thin line for each vehicle that passes; as more vehicles pass in a given spot, the lines will pile up to make thicker lines. You can click on this sidebar to clear all tracks and restart accumulating them.	Use this to get a sense of where vehicles are most often being detected, which can be useful for verifying lane placement or manually adding lanes.

Note. The difference between centers and tracks is that tracks accumulate more quickly, but also more quickly become solid bars, showing only the lane's placement. Centers accumulate more slowly, but you can get more precise information about frequency of vehicle detection at a given range for a longer time.

Using the Automatic Lane sidebar window

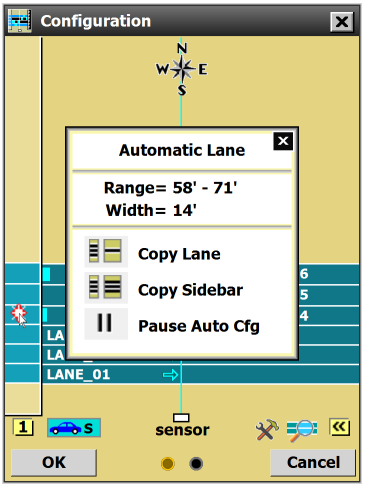


Figure 62. Sidebar 1 (automatic configuration) window

When sidebar 1 (automatic configuration) is open, click on one of the lanes in the sidebar to open this window.

Setting	Description	Details
Range & Width	Shows the size and placement of the lanes (**Range** refers to the distance from the sensor).	Can't be changed.
Copy Lane	Saves the lane you clicked on to the edit area.	An automatic lane will appear blue; a saved lane turns black.
Copy Sidebar	Saves all the lanes currently shown in the sidebar to the edit area.	This is the recommended method for saving automatically configured lanes to your configuration.
Pause Auto Config	This temporarily halts the automatic configuration process; no new lanes will be placed until you click again to resume.	Use this if, during the configuration process, there are traffic events you don't want to be part of the sensor's calculations.

Sidebar 1 shoulder area window

If you click the shoulder area, instead of a lane, it will open a window with just the range/width of the shoulder and the **Copy Sidebar** option.

Using the Saved Lane sidebar window

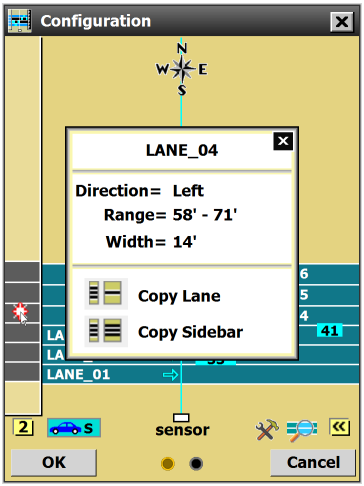


Figure 63. Sidebar 2 (saved configuration) window

When sidebar 2 (saved configuration) is open, click on one of the lanes in the sidebar to open this window.

Setting	Description	Details
Direction	Shows the direction of traffic, as it's been detected by the sensor.	Can't be changed here, but can be changed in the Lane window.
Range & Width	Shows the size and placement of the lanes (**Range** refers to the distance from the sensor).	Can't be changed here, but can be changed in the Lane window.
Copy Lane	Saves the lane you clicked on to the edit area.	An automatic lane will appear blue; a saved lane turns black.
Copy Sidebar	Saves all the lanes currently shown in the sidebar to the edit area.	This is the recommended method for saving automatically configured lanes to your configuration.

Sidebar 2 shoulder area window

If you click the shoulder area, instead of a lane, it will open a window with just the range/width of the shoulder and the **Copy Sidebar** option.

Using the Vehicle Display menu

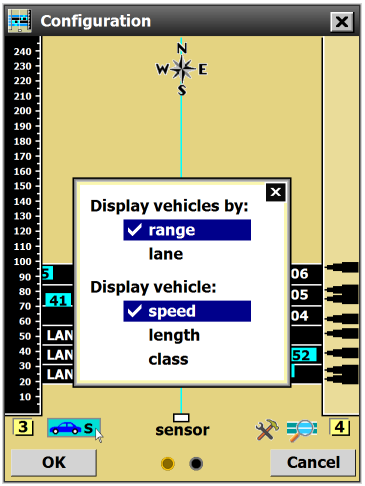


Figure 64. Choosing vehicle display options

Click the vehicle display button (dark blue car on a teal background) to change how the detected vehicles are displayed.

Setting	Description	Details
Display vehicles by:	Determines where detected vehicles are displayed: **Range** (the default) means the vehicles are displayed exactly where they're detected. **Lane** means the vehicles are displayed in the center of their lane, even if they're actually closer to the lane's edge than shown.	**Range** is more useful as an accurate depiction of what's being detected, and for detecting anomalies such as multipathing. **Lane** is more useful for demonstration purposes, to show sensor functionality.
Display vehicle:	Lets you choose what number is displayed atop the teal boxes representing a detection: the vehicle's **speed**, its **length**, or the length **class** bin it falls into (**class** will be grayed out if no class bins are currently configured; learn how to configure them in chapter 9). **Speed** is the default.	If you're comparing vehicle detections with observed vehicles out on the road, to check for accuracy, you may find it useful to be able to view different sorts of information about the detections, based on what you're currently observing on the road.

Note. You must have length classification bins set up in order to select the **class** option here. If you don't have them set up, **class** will be grayed out in this menu. See chapter 9 to set up these bins.

Using the Tools menu

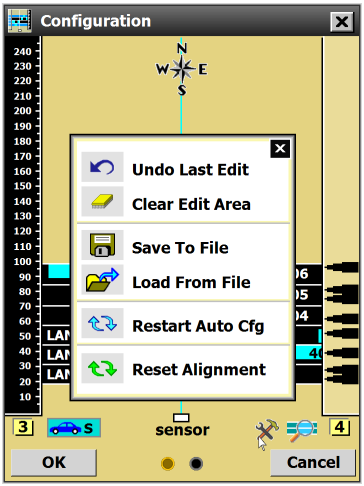


Figure 65. Tools menu

Click the hammer and wrench icon to open the Tools menu.

Setting	Description	Details
Undo Last Edit	Undoes the last edit undertaken in the edit area.	N/A
Clear Edit Area	Clears all captured and manually created lanes from the edit area. Does not clear automatically configured lanes, however.	Automatically configured lanes only disappear if you choose **Hide Auto Lanes** from the View menu or Automatic Lane window. Even then, they're not deleted, just hidden.
Save To File & **Load From File**	Let you save lane configuration information to a file on your computer, and then load from that file back to SSMHD.	Use these if you're replacing an old HD with a new one and don't want to do the whole configuration process again. You can save from the old sensor, put up the new one, and load it with the lane information.
Restart Auto Cfg	Begins the automatic configuration process over.	N/A
Reset Alignment	Begins the alignment check process over.	N/A

Note. This only saves lane configuration settings to file. Saving all configuration settings to file is covered in the Tools chapter of this guide.

Using the View menu

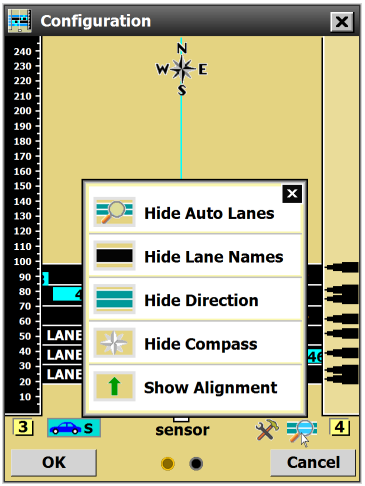


Figure 66. View menu options

Click the magnifying glass icon to display the View menu.

Setting	Description	Details
Show/Hide Auto Lanes	Shows or hides the blue automatically configured lanes (those that haven't been saved yet).	This is one step in the process of saving only a portion of the automatically configured lanes; see the Lane Configuration section of this chapter for details. Hiding automatic lanes can also be done through the Automatic Lane window.
Show/Hide Lane Names	Changes the display of the text on the lanes.	This setting is for your convenience and doesn't affect sensor operation.
Show/Hide Direction	Changes the display of the arrows on the lanes.	This setting is for your convenience and doesn't affect sensor operation.

Setting	Description	Details
Show/Hide Compass	Shows or hides a compass that shows which direction the sensor is pointing. This is completely user-set; the information comes from the Orientation field under Settings, so if you didn't change that setting, this will default to north. You can change the orientation by clicking on the compass.	This setting is for your information and doesn't affect sensor operation.
Show/Hide Alignment	Shows or hides the arrow used for indicating the alignment of the sensor.	See the Alignment section earlier in this chapter for more information.

Using the Automatic Lane window

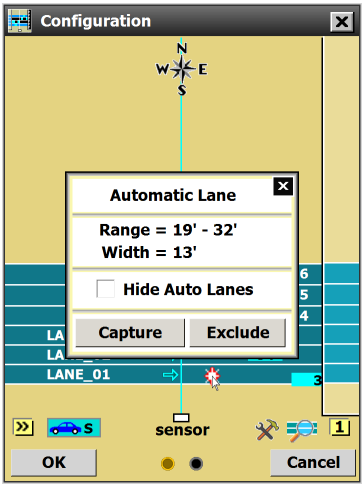


Figure 67. Automatic lane window

Click an automatic lane in the edit area to open this window.

Setting	Description	Details
Range & Width	Shows the size and placement of the lanes (**Range** refers to the distance from the sensor).	Can't be changed.

Setting	Description	Details
Hide Auto Lanes	Hides (but does not delete) the automatically configured lanes from the edit area.	This can also be done through the View menu.
Capture	Saves the lane you clicked on to the sensor's configuration.	When captured, the lane will turn from blue to black. This can also be done by clicking on the automatic configuration sidebar.
Exclude	Tells the sensor to ignore the lane; detections in the lane won't affect alignment or configuration. To include the area again, click it to open the Excluded Area window and click **Include**.	An excluded lane behaves like a deleted lane; the difference is that an excluded lane can easily be included again, while a deleted lane will have to be reconfigured. An excluded area will turn red.

Using the Lane window

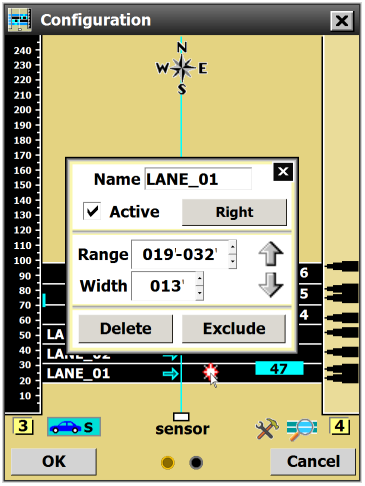


Figure 68. Lane window

Click a saved (black) lane in the edit area to open this window.

Note. If you decide to renumber the lanes manually, the software won't let you use "LANE_xx" as the format, but you can use the lowercase version, "Lane_xx", if you'd like.

Setting	Description	Details
Name	Lets you type in a new lane name.	SSMHD uses "LANE_xx" as the default ("xx" is the number of the name, with LANE_01 nearest the sensor). When you add a new lane, all lanes with this name format will be updated. For RTMS and Z4 data push, lane mapping may be changed using the notation #xx ("xx" being a lane number). All lanes must use this format for the new lane mapping to take effect.
Active	Lets you set a lane status as active or inactive.	You might set a lane inactive when it's been correctly configured and tuned, but you don't need data reporting for it right now. By making it inactive instead of deleting it, you can easily turn it on later if needed.

Note. Wrong-way detections are reported as having negative speeds. If a lane is set as bi-directonal, traffic in both directions is reported as having positive speeds.

Direction	Sets the direction for the lane. Choose between **Left**, **Right** and **Bi-direction**. **Left** and **Right** refer to the direction that the traffic is moving toward, relative to the sensor. (If you choose **Bi-direction**, then Direction Protection, a setting found on the Verification screen, will be disabled.)	Choose **Left** or **Right** depending on the direction the traffic is moving. (If Direction Protection is turned on, then choosing **Left** or **Right** here will help the sensor detect wrong-way vehicles, and they will not be counted by the sensor—though they will still appear.) If you set it to **Bi-direction**, data will be reported for traffic going both directions (useful for lanes that change direction at certain times of day, such as those that change to match commuter traffic at the beginning and end of the work day).

Setting	Description	Details
Range & Width	Shows and changes the size and placement of the lane (**Range** refers to the distance from the sensor).	Change these values with the arrows or by typing in order to manually fine-tune your lane placement. Be aware that changing these may cause other lanes to change size or even disappear.
Delete	Deletes the selected lane.	If you only want the selected lane to temporarily disappear or to be ignored, consider excluding or deactivating the lane instead; this will make it possible to easily recover the lane without having to reconfigure it.
Exclude	Tells the sensor to ignore the lane; detections in the lane won't affect alignment or configuration. To include the area again, click it to open the Excluded Area window and click **Include**. (The lane may reappear as an automatic lane; click on it to capture it.)	An excluded lane behaves like a deleted lane; the difference is that an excluded lane can easily be included again, while a deleted lane will have to be reconfigured. An excluded area will turn red.

Using the Shoulder Area window

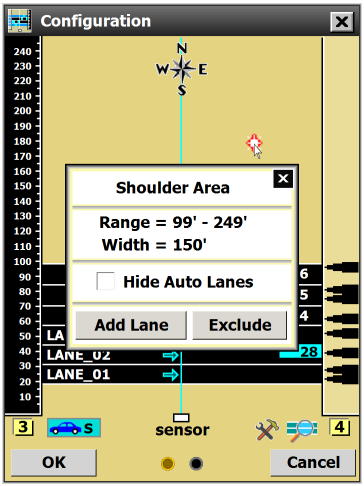


Figure 69. Shoulder Area window

Click in the shoulder (tan) area to open this window.

Setting	Description	Details
Range & Width	Shows the size and placement of the lanes (**Range** refers to the distance from the sensor).	Can't be changed.
Hide Auto Lanes	Hides (but does not delete) the automatically configured lanes from the edit area.	This can also be done through the View menu.
Add Lane	Creates a new lane in the spot you clicked on.	Unlike automatically configured lanes, which are blue when they first appear, user-created lanes will appear black.
Exclude	Tells the sensor to ignore the area you clicked on; detections there won't affect alignment or configuration. To include the area again, click it to open the Excluded Area window and click **Include**.	This may be useful in order to ignore phantom detections from multipathing. An excluded area will turn red.

Using the Excluded Area window

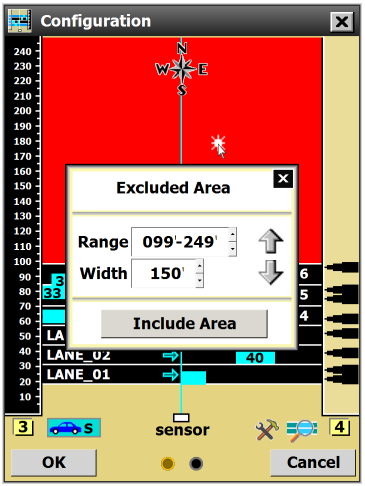


Figure 70. Excluded Area window

Click any excluded (red) area, either shoulder or lane, to open this window.

Setting	Description	Details
Range & Width	Shows and changes the size and placement of the excluded area (**Range** refers to the distance from the sensor).	Change these values with the arrows or by typing in order to manually fine-tune your lane placement. Be aware that changing these may cause other lanes to change size or even disappear.
Include Area	Restores the area or lane that was previously excluded.	When you include a lane that was previously excluded, it may reappear as an automatic lane; click on it to capture it.

8

Verifying Lanes

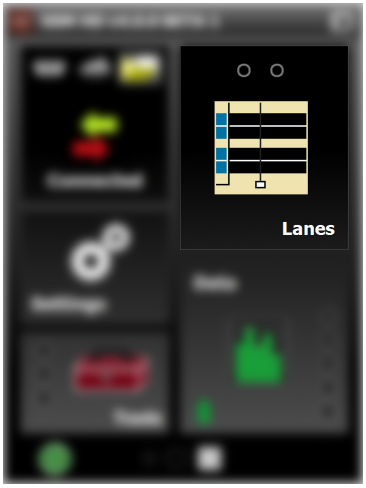


Figure 71. Lanes button, main screen

Click the **Lanes** button on the main screen to open the Lanes screen, then click the **Verification** button to open the Verification screen.

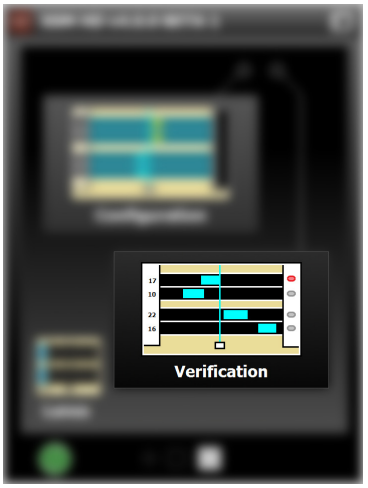


Figure 72. Verification screen

Verification options

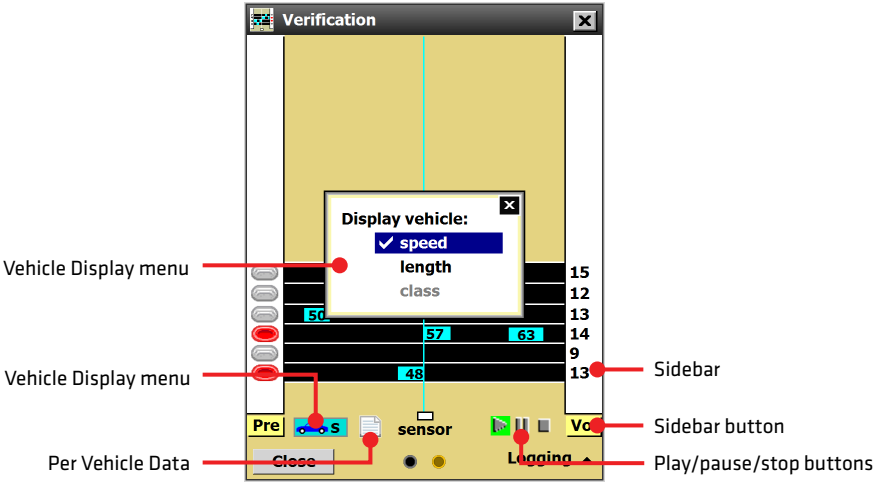


Figure 73. Lane verification tools

Verifying lanes means comparing the detection data in the SSMHD software with the actual traffic in the roadway; you can observe the roadway traffic yourself, or record it using a separate device. If the actual traffic matches the software traffic, your lanes are set up properly.

Verifying lanes using vehicle display options

1 Set up a way to observe on-road traffic: seat yourself in a place where

you can see both the road and the computer, or have someone else observe traffic for you while you monitor your computer.

2. Click the vehicle display icon (dark blue car on a teal background). The Display vehicle: menu will appear.
3. Choose **speed**, **length** or **class** to choose which of these will appear on top the detections (the detections appear as teal rectangles moving across the screen).
4. Compare the detections on the software, with their speed, length or class information, with what is observed in the roadway. If they match, the lanes are set up properly.

Definition. "Class" refers to length classification bins. You must have length classification bins set up in order to select the **class** option here. If you don't have them set up, **class** will be grayed out in this menu. See chapter 9 to set up these bins.

If the detections don't match traffic

You may be able to improve accuracy by adjusting lane properties and thresholds (covered later in this chapter), double-checking the alignment (covered in the previous chapter), or changing the mounting locations. If all else fails, contact your dealer or support@wavetronix.com.

Verifying lanes using sidebars

1. Set up a way to observe on-road traffic: seat yourself in a place where you can see both the road and the computer, or have someone else observe traffic for you while you monitor your computer.
2. Click the sidebar button until the desired sidebar appears; sidebar option definitions are as follows:

Setting	Description	Details
>> **(off)**	No sidebar shown.	N/A
Pre (Presence)	Shows a button that lights up red when a vehicle is detected crossing in front of the sensor.	Choose this if you want to confirm that the sensor is detecting the vehicles.
Vol (Volume)	Shows a growing tally of how many vehicles have been detected in each lane.	Choose this to check that the sensor is detecting vehicles over a longer period of time.

Setting	Description	Details
Spd (Speed)	Shows the constantly-updated average speed of vehicles detected in each lane.	Choose this to check that the sensor is detecting speeds correctly. If you'd prefer a per vehicle speed, rather than an average, use the Vehicle Display menu.
C (Class)	Shows a growing tally of how many vehicles of a given length class have been detected in each lane.	These sidebars only appear if classes have been set up on the Definitions screen. There will be one sidebar for each class (C1, C2, etc.).

Note. For this to be a useful way to verify detections, you need a way to measure or estimate the speeds of the vehicles on the roadway.

3. Compare the information in the sidebar with what's being detected on the roadway. It's easiest to do this one lane at a time. For instance, you could manually count all vehicles that pass in lane 1 in a set period of time, then check to see if the volume counts match your counts. If they match, the lanes are set up properly.
4. Repeat with all lanes, and, if desired, other sidebar options.

If the detections don't match traffic

You may be able to improve accuracy by adjusting lane properties and thresholds (covered later in this chapter), double-checking the alignment (covered in the previous chapter), or changing the mounting locations. If all else fails, contact your dealer or support@wavetronix.com.

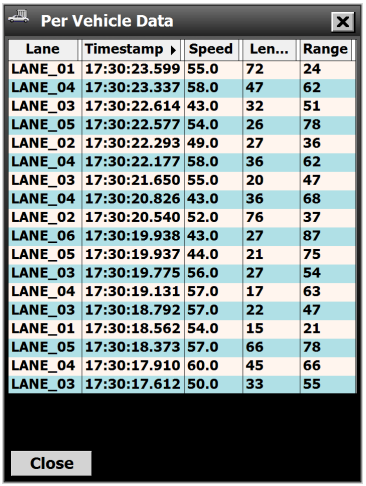
Using the play/pause/stop buttons

You may find it useful to use these buttons to pause or restart the speed and volume counts on the sidebars. For instance, using the example in step 3 above, you could do the following:

1. Open the volume sidebar, then click the stop button to stop the counts.
2. Once there is a large gap in the traffic in lane 1, click the play button. This will restart the counts at 0.
3. Count vehicles in lane 1 manually until there is another large gap in the traffic.
4. Click the pause button. Now you know the volume counts in the sidebar precisely reflect the traffic that passed between those two gaps, and you don't have to hurry to compare your counts before another vehicle passes and messes it up.

Note. This option is similar to using the sidebar or the Vehicle Display menu; the biggest difference is that you get much more detailed information—this is the only way to see timestamps and ranges of detections.

Verifying lanes using per vehicle data



Lane	Timestamp	Speed	Len...	Range
LANE_01	17:30:23.599	55.0	72	24
LANE_04	17:30:23.337	58.0	47	62
LANE_03	17:30:22.614	43.0	32	51
LANE_05	17:30:22.577	54.0	26	78
LANE_02	17:30:22.293	49.0	27	36
LANE_04	17:30:22.177	58.0	36	62
LANE_03	17:30:21.650	55.0	20	47
LANE_04	17:30:20.826	43.0	36	68
LANE_02	17:30:20.540	52.0	76	37
LANE_06	17:30:19.938	43.0	27	87
LANE_05	17:30:19.937	44.0	21	75
LANE_03	17:30:19.775	56.0	27	54
LANE_04	17:30:19.131	57.0	17	63
LANE_03	17:30:18.792	57.0	22	47
LANE_01	17:30:18.562	54.0	15	21
LANE_05	17:30:18.373	57.0	66	78
LANE_04	17:30:17.910	60.0	45	66
LANE_03	17:30:17.612	50.0	33	55

Figure 74. Per Vehicle Data screen

1. Set up a way to observe on-road traffic: seat yourself in a place where you can see both the road and the computer, or have someone else observe traffic for you while you monitor your computer.
2. Click on the paper icon to open the Per Vehicle Data screen. This will open in a full-sized screen that covers the Lane Verification screen, but you can drag it to the side if you want to observe both at once.
3. Compare the information on this screen with what's being detected on the roadway. It's easiest to do this one lane at a time. For instance, you could use a radar gun to track speeds of vehicles in lane 1, and check on this screen to see if the sensor's detected speeds match the actual vehicle's speeds. If they match, the lanes are set up properly.
4. Repeat with other lanes and other criteria, as needed.

If the detections don't match traffic

You may be able to improve accuracy by adjusting lane properties and thresholds (covered later in this chapter), double-checking the alignment (covered in the previous chapter), or changing the mounting locations. If all else fails, contact your dealer or support@wavetronix.com.

Using the play/pause/stop buttons

You may find it useful to use these buttons to pause or restart the per vehicle data being constantly updated on this screen.

- The pause button will cause the screen to stop being updated; when

you hit play again, it will resume.

- The stop button will also stop the screen from being updated, but when you hit play, all previous detections will be deleted.

Verifying lanes using logging

Note. This tool records per vehicle data and saves it to a file. It's useful for verification after the fact; you record the traffic, log the per vehicle data for the same interval of time, and then you can compare the two later.

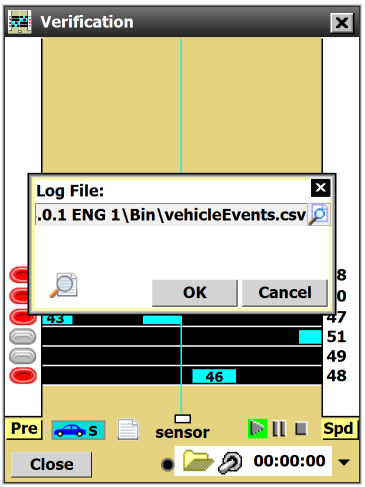


Figure 75. Log File window

1. Set up a way to record what's happening on the road, such as a video camera or someone with a speed gun manually recording passing vehicles.
2. In the lower right corner of the Verification screen, next to the word "Logging," click the upward-pointing arrow. The Logging area will appear, as seen above.
3. Choose where to store the log file by clicking the folder icon. If you want to change the location shown in the window that opens, click the magnifying glass icon next to the file name. (If you create a new file, add a .csv file extension to the end of the filename.)
4. Click **OK** when done.
5. To begin logging, click the switch icon. When you're done, click it again to stop. Record the traffic that passes on the road during the same interval.
6. To view the file, click on the folder icon, and then the magnifying glass icon at the bottom of the window that opens. You can also navigate to the file on your computer: C://ProgramFiles/Wavetronix/SmartSensor Manager HD vX.X.X/bin. The file that was created will be a .csv spreadsheet that can be opened in Microsoft Excel.
7. Compare the logged data to what was detected on the roadway. If they match, the lanes are set up properly.

If the detections don't match traffic

You may be able to improve accuracy by adjusting lane properties and thresholds (covered later in this chapter), double-checking the alignment (covered in the previous chapter), or changing the mounting locations. If all else fails, contact your dealer or support@wavetronix.com.

Lane adjustment

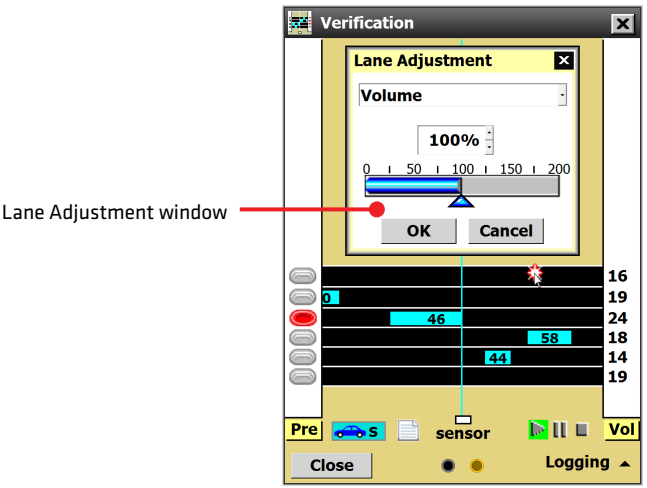


Figure 76. Other tools

Adjusting lane properties and thresholds

Note. These settings allow you to try to fix problems you noticed during the verification process. If adjusting these doesn't fix your problem, contact your dealer or support@wavetronix.com.

1. Click on the lane you wish to adjust (you can only adjust one at a time.) The Lane Adjustment window will appear.
2. Choose the desired property from the drop-down menu.

Setting	Description	Details
Volume	Adjusts the aggressiveness of traffic radar–specific algorithms.	Adjust this setting if you observe a count accuracy problem. Adjust the percentage up to increase the number of detections and down to decrease. You'll likely need to adjust at least 10–15% in either direction (possibly much more); adjusting less may not impact detections. We recommend you keep the slider between 20 and 190%.
Detection	Raises or lowers the thresholds for detecting vehicles. It lets you determine how large a radar return must be in order for the software to define it as a vehicle detection.	Adjust this setting if you're having a problem with multipathing—by raising it a little, you may be able to weed out false detections. But raising it too high will begin to weed out real detections as well. Increasing the decibels raises the threshold and results in fewer detections; decreasing lowers the threshold and results in more detections.
Speed	Raises or lowers the speed calculated for all vehicles in each lane.	Adjust this setting if speeds are consistently too high or too low. After you enter a value, the sensor calculates the speed of each detection and then multiplies it by your entered value.
Length	Increases or decreases the length calculated for all vehicles in each lane.	Adjust this setting if lengths are consistently too big or too small. After you enter a length, the sensor calculates the length of each detection and then adds or subtracts your entered value to it.

Note. Each of these settings affects only the lane you clicked on.

Note. Since the occupancy metric reported in the interval data is calculated using length, a change in this parameter will also change the reported occupancy.

Setting	Description	Details
Extension Time	Increases or decreases the extension time, which the sensor uses to prevent vehicles with trailers from being broken up into multiple detections.	Adjust this setting if the sensor seems to be mishandling detections of vehicles with trailers. Increasing the extension time will help make sure such vehicles aren't counted as multiple detections, but too much can lead to multiple vehicles being detected as a single vehicle. After you enter a value, the sensor automatically determines the extension time and then multiplies it by your entered value.
Direction Protection	Determines whether the software reports or ignores any vehicles that are traveling the opposite direction in a given lane. For example, if this is turned on, and if a lane is configured as moving left to right, then any traffic moving right to left will be ignored (it won't be shown on the Verification screen—though it will be shown on the Configuration screen—and it won't be counted).	By default, Direction Protection is turned on for each lane (although if you set a lane as bi-directional, this setting is turned off and can't be turned back on from here—you'll have to go back to the Configuration screen). Having it on can be useful if, for instance, the sensor's in an area where work vehicles often go the wrong direction up the road. You'll need it off, however, to do wrong-way detection.
Set Defaults	Returns all the settings for this lane to the defaults.	N/A

Note. There must be a minimum of 5.5 ft. (1.7 m) between vehicles in order for them to be detected as separate vehicles; this minimum may increase as vehicle speeds increase.

Note. If Direction Protection is on, wrong-way vehicles will not be shown moving across the Verification screen. However, they will still be shown on the Configuration screen.

3 Use the slider or the text box to change the value for that property.
4 Click **OK**.

9

Setting Up and Downloading Sensor Data

Figure 77. Data button, main screen

Click the **Data** button on the main screen to open the Data screen.

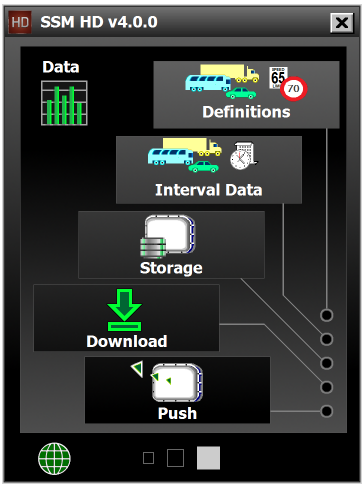


Figure 78. Data screen

Definitions

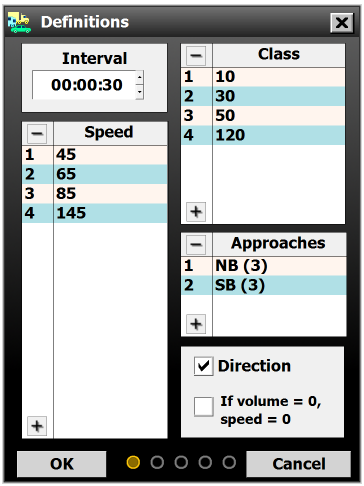


Figure 79. Definitions screen

This screen lets you define interval length, bins (class, speed and direction) and approaches. You can set all, some or none of these definitions simultaneously.

How you set these will affect your sensor's onboard storage—the more definitions you have set, the larger the records will be, and the faster the onboard memory will fill up.

Adjusting the data interval

1 Determine what interval you need for your particular application. For example, for real-time applications, you might want to aggregate data over short periods of time to reduce reporting latency. On the other hand, for a long-term testing site, long intervals could be sufficient for your needs and would mean you don't have to download the data as often.

2 Type the desired interval time into the **Interval** text field, or use the up and down arrows to change it.

Definition. Interval data is collected for all the vehicles that pass the sensor in a set amount of time (that time is called "the interval"). A shorter interval means the sensor records data more often, so onboard storage fills up faster. A longer interval means you can leave the sensor alone longer.

Creating, adjusting and deleting speed bins

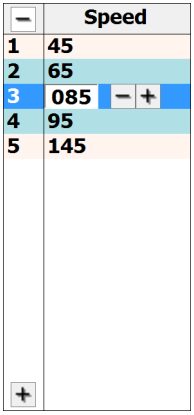


Figure 80. Adjusting a speed bin

Definition. A speed bin is a classification of a vehicle based on its speed (usually a range of speeds); which speed bin a detection falls into is part of the data collected about it. For interval data, the sensor records how many detections fell into each bin over the course of the interval.

1 To create a speed bin, press the **+** button at the bottom of the Speed area. Each line is one bin.

2 To adjust the parameters of a bin, click on it and use the **+** and **–** buttons to change the value, or type a new value in. The number that you see is the maximum speed for that bin. For instance, in the image above, the highlighted bin is for vehicles traveling between 66 and 85 miles per hour.

3 To delete a bin, highlight it and click the **–** button at the top of the Speed area.

Note. The first speed bin created defaults to 145; it is the maximum speed value and cannot be changed. This bin can't be deleted until all the others are deleted first.

Creating, adjusting and deleting class bins

Definition. A class bin is a classification of a vehicle based on its length (usually a range of lengths); which length bin a detection falls into is part of the data collected about it. For interval data, the sensor records how many detections fell into each bin over the course of the interval.

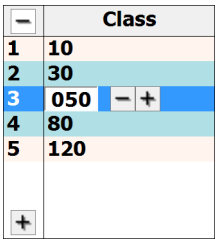


Figure 81. Adjusting a class bin

Note. The first class bin created defaults to 120; it is the maximum length value and cannot be changed. This bin can't be deleted until all the others are deleted first.

1. To create a class bin, press the **+** button at the bottom of the Class area. Each line is one bin.
2. To adjust the parameters of a bin, click on it and use the **+** and **–** buttons to change the value, or type a new value in. The number that you see is the maximum length for that bin. For instance, in the image above, the highlighted bin is for vehicles that are between 31 and 50 feet long.
3. To delete a bin, highlight it and click the **–** button at the top of the Class area.

Creating, adjusting and deleting approaches

Definition. An approach is a grouping of lanes used in data collection; they let you collect per vehicle–based stats you couldn't get otherwise, such as 85th percentile. Be aware that adding approaches will increase the data report size, meaning the sensor can store fewer intervals in onboard storage.

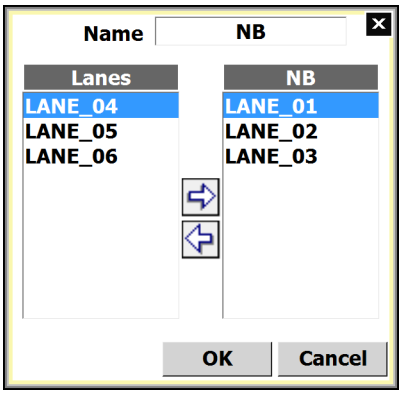


Figure 82. Approaches window

1. To create a new approach, click the **+** button at the bottom of the Approaches area. The Approaches window will appear.
2. Type a name for your new approach in the **Name** field at the top.
3. From the lanes list on the left, select a lane you want in your new approach.
4. Click the right arrow to move it to the approach list on the right.

5 Repeat for all desired lanes.
6 To remove a lane from your approach, highlight it in the approach list, and click the left arrow to move the lane back to the lanes list.
7 When you're done, click **OK**. Repeat steps 1–6 as needed.
8 To remove an approach, highlight it and click the **–** button at the top of the **Approaches** area.

Note. A lane can belong to more than one approach.

Using direction bins

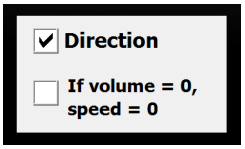


Figure 83. Direction checkbox

Definition. There are two direction bins: Right and Wrong. Vehicles are classified depending on whether they are traveling the direction the lane is configured. For bi-directional lanes, traffic moving from left to right will be placed in the Right bin, and traffic moving from right to left will be placed in the Wrong bin.

To enable the use of direction bins, click the **Direction** checkbox in the lower righthand corner of the Definitions screen.

Using the Speed = 0 option

If during an interval, the volume is zero (meaning no cars were detected), SSMHD will report the average speed of the last interval. If you would like the intervals that are reporting zero volume to report speeds as zero, simply check the **If volume = 0, speed = 0** checkbox.

Interval Data

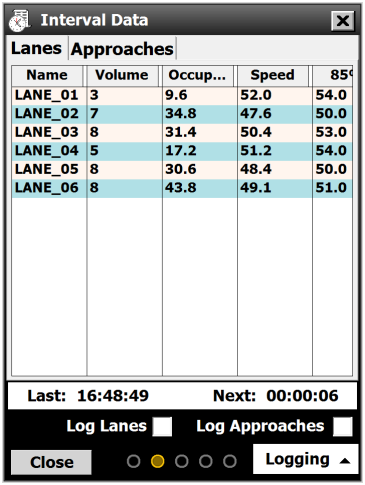


Figure 84. Interval Data screen, Lanes tab

Note. Logging interval data is useful for verifying your sensor setup—just log a few intervals then compare with video or other recorded data. Or you can use the feature at test sites, where you just need to examine a few intervals' worth of detections.

Access the Interval Data screen by clicking the **Interval Data** button on the Data screen. This screen lets you log interval data (data collected about all detections in a given interval of time) for both lanes and approaches.

Note. The **Lanes** and **Approaches** tabs let you view the detected data in real time. However, which tab you have open doesn't affect logging.

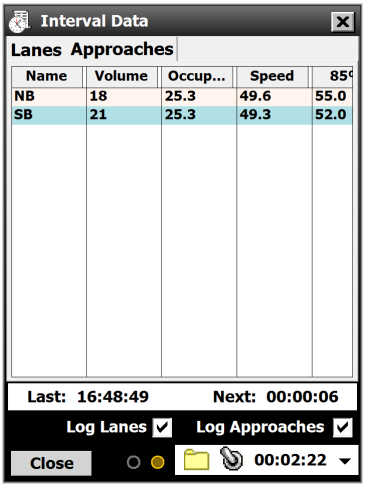


Figure 85. Interval Data screen, Approaches tab

Logging interval data

1. In the lower right corner of the Interval Data screen, next to the word "Logging," click the upward-pointing arrow. The Logging area will appear, as seen above.
2. Choose where to store the log file by clicking the folder icon; the Log File window will open. If you want to change the location shown, click the magnifying glass icon next to the file name.
3. Click **OK** when done.
4. Click the checkboxes of what you want to log: **Lanes**, **Approaches**, or both. If you don't click either checkbox, the resulting log file will be blank.
5. To begin logging, click the switch icon. When you're done, click it again to stop.
6. To view the file, navigate to it on your computer. The file that was created will be a .log file that can be opened in a text editor.

Note. Keep this screen open while you log—if you close it, the logging will stop!

Interval data

The Lanes and Approaches screens show the following data about each interval that passes (they don't all fit on the screen, so click and drag from side to side to show more data):

- **Name –** Of each lane or approach.
- **Volume –** Number of vehicles detected during the interval.
- **Occupancy –** Percentage of time, during the interval, that the detection zone was occupied.
- **Speed –** Average lane speed during the interval. (Note that if Direction Protection is on, the speeds of any wrong-way detections aren't factored into this average speed. If Direction Protection is off, wrong-way detections are factored into the average speed. See chapter 7 for more details.)
- **85% –** 85th percentile speed, meaning that 85% of the vehicles in the interval were going this speed or slower.
- **Headway –** Average time separation between vehicles in the interval, measured from front bumper to front bumper.
- **Gap –** Average time separation between vehicles in the interval, measured from back bumper of the front car and front bumper of the back car.
- **Classes –** How many vehicles fell into each of the length-, speed- and direction-based bins set on the Definitions screen.

For more information. See support document 299, *How Does the SmartSensor HD Measure Occupancy?* for more on how occupancy is calculated.

Storage

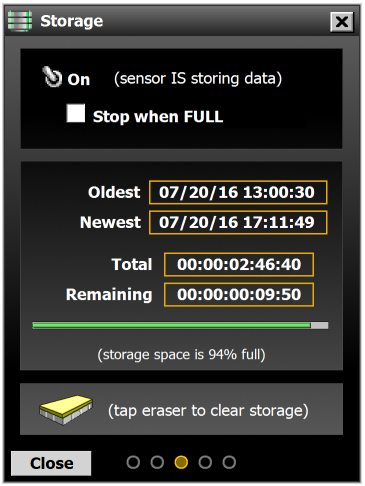


Figure 86. Storage screen

Access the Storage screen by clicking the **Storage** button on the Data screen.

Understanding data storage tools

Setting	Description	Details
On/off switch	Turns interval data storage on or off.	Turn this on for normal data collection.
Stop when FULL	Sets the sensor to stop storing data once the storage capacity is reached, meaning all new data after that point won't be saved to memory.	Use this if you don't want old data to be overwritten by new data, should the sensor's memory fill up.
Oldest	Shows the timestamp of when the earliest interval data packet currently saved to the sensor was stored.	Use this to see what timeframe your data storage covers.
Newest	Shows the timestamp of when the most recent interval data packet was stored.	Use this to see what timeframe your data storage covers.
Total	Shows the amount of time that data can be stored, based on the current lane and interval configuration.	Use this to know how much storage space is used on the sensor.
Remaining	Shows how long until the sensor's storage reaches capacity.	Use this to know how much storage space remains on the sensor.
Status bar and percentage	Shows how full the sensor's storage is and how much storage capacity remains.	Use this to know how much storage space remains on the sensor.
Eraser	Erases all the interval data currently saved to the sensor.	This data can't be recovered, so don't click this until you've downloaded the data to your computer, if needed.

About storage capacity

The storage capacity shown on this screen is measured in time—how much time until the storage is full. This is affected by the size and frequency of the interval packets that are saved.

- Larger packets—ones with more approaches, more bins, more lanes, etc.—will fill up the sensor's storage faster.

- Having a short interval means that there will be more frequent interval data packets, so the storage will fill up faster. A long interval means fewer packets and therefore you can leave the sensor alone for longer periods between your data downloads.

Always check back to this screen after you have changed all other settings to get the most accurate information on how often your sensor will need to have information downloaded from it.

A few things can cause this screen to be incorrect: if you're using a virtual connection, or if the sensor setup is different now from what it was when the sensor started storing its current batch of data. In the latter case, the green status bar will be a better indicator of storage capacity.

Download

Access the Download screen by clicking the **Download** button on the Data screen.

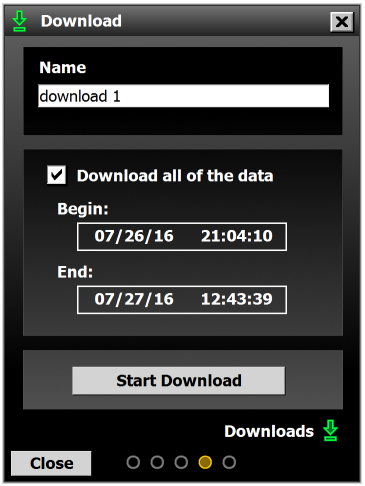


Figure 87. Download screen

Downloading stored detection data

1. Type a name for your download in the **Name** text field.
2. If you want all the data currently on the sensor, keep the **Download all of the data** checkbox checked. If you want only part of the data, uncheck that checkbox, which will make the **Begin:** and **End:** fields editable. Set those to the desired begin and end date/times for your download.

Note. You can view a list of previous data downloads by clicking the green **Downloads** arrow in the lower right corner. A similar button can be found in the corner of the **Data** button on the main SSMHD screen.

3 Click **Start Download**.

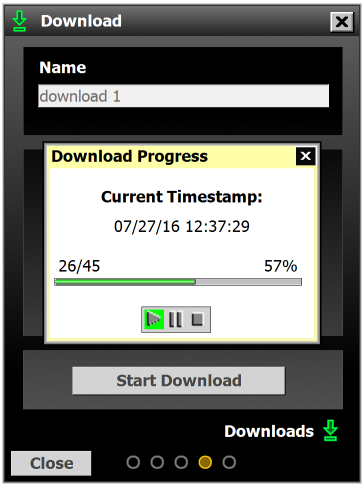


Figure 88. Download Progress

4 The Download Progress window will appear to show the status of the download. If you need to, use the buttons at the bottom of the window to start, pause or stop the download.

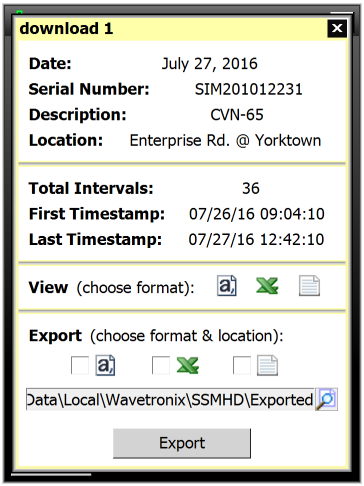


Figure 89. Export window

5 When the download is complete, the Export window will appear, showing the following information about the downloaded file: its name, the date it was downloaded, information about the sensor, the number of intervals downloaded and the time frame that the

downloaded data covers.

6 There are three formats you can view or export the downloads in: a comma delimited (.csv) file, a Microsoft Excel file, or a Wavetronix-specific text format that opens in a text editor like Notepad. To view the downloaded data, click the desired format's icon on the **View: (choose format)** line.

7 To export the downloaded data, click the checkbox next to your desired format on the **Export: (choose format & location)** line. Click the magnifying glass icon to change where to save the file, if desired, and then click **Export**.

Push

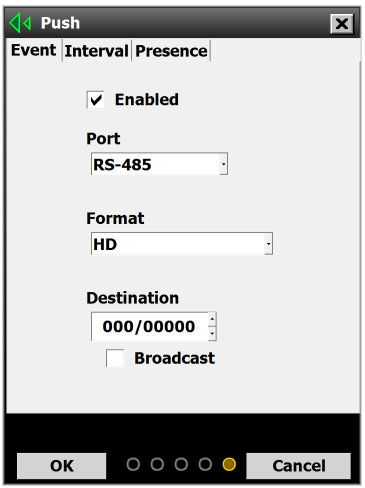


Figure 90. Push screen

Access the Push screen by clicking the **Push** button on the Data screen.

This function lets you push data from the sensor without waiting for a request from SSMHD. You can push event, interval or presence data.

Enabling data push

1 Choose which kind of data you want to push, then click on the corresponding tab: **Event**, **Interval** or **Presence**.

2 Click the **Enabled** checkbox.

3 Choose which port you want to push the data on, RS-485 or RS-232. Be aware that both of these are half-duplex, meaning that they can't send and receive data at the same time. If you use one of these ports

Note. You can set the sensor to push multiple kinds of data at the same time, but if you do, set them to push on different ports.

for pushing data, you might want to use a different port when connecting to the sensor.

4 Choose which format you want the pushed data in.

Setting	Description	Details
All three pushed data types		
HD	Native SmartSensor HD (SS125) format.	Use this for a standard SmartSensor HD system.
SS105 Simple	Emulates the original SmartSensor (SS105) format, without a multi-drop header.	Use this when you're using the SmartSensor HD in a system that was designed for a SmartSensor 105.
SS105 Multidrop	Emulates the original SmartSensor (SS105) format, with a multi-drop header.	Use this when you're using the SmartSensor HD in a system that was designed for a SmartSensor 105.
Event data only		
Z4 2-Loop	Emulates a dual-loop system. Speed and duration are measured using the loop size and spacing set in the Loop Emulation settings.	Use this when you're using the SmartSensor HD in a system that was designed for dual inductive loops.
Z4 1-Loop	Emulates a single-loop system. Duration is measured using the loop size set in the Loop Emulation settings.	Use this when you're using the SmartSensor HD in a system that was designed for single inductive loops.
Z4 2-Loop Pulsed	Emulates a dual loop system; outputs will be held active for 125 ms for each vehicle detected, so only speed will be measured.	Use this when you're using the SmartSensor HD in a system that was designed for dual inductive loops and all you need is vehicle presence and speed.
Z4 1-Loop Pulsed	Emulates a single-loop system; only indicates vehicle presence—no speed or duration information.	Use this when you're using the SmartSensor HD in a system that was designed for single inductive loops and all you need is vehicle presence; this may be useful for doing counts.

Definition. Z4 is a Wavetronix-specific protocol that lets sensors talk to other Wavetronix devices, mostly contact closure devices.

Note. The Loop Emulation settings are found on the Settings screen and covered in chapter 6.

Setting	Description	Details
Z4 1-Loop Speed	Emulates a single-loop system; has a set vehicle length of 15 feet, so the emphasis is on speed.	Use this when you're using the SmartSensor HD in a system that was designed for single inductive loops and you are focused on speeds.
Interval data only		
HD (legacy)	Emulates the interval data from older versions of this sensor; it's similar to the HD format but lacks speed bins and direction bins, and has fewer length bins.	Use this when you're using a newer SmartSensor HD in a system that was designed for an older SmartSensor HD.
RTMS	Emulates RTMS format.	Use this when you're using the SmartSensor HD in a system that was designed for an RTMS X3.
Presence data only		
Z4 Presence	Outputs presence data in the Z4 format.	Use this if your application needs the immediacy of presence data, and you need it to communicate with other Wavetronix devices such as contact closure cards.

Note. Presence data has lower latency than event data, so it may be useful for applications that need the quickest possible data reporting. However, the trade-off is lower accuracy. For most applications, event data is the best choice.

5 Set the destination, which is the address the sensor will push data to (only valid for HD and Z4 formats). For the HD format, it's the 8-bit subnet/16-bit ID, and for the Z4 format it's a 24-bit address. Make sure this destination address is unique for the communications bus in use.

6 If you'd rather just broadcast the pushed data, click the **Broadcast** checkbox to push the data to the broadcast address (000/65535 for SS125 and 16777215 for Z4).

7 Click **OK** to finish.

Note. If the HD is pushing data to a custom software application, set the destination to 000/00000.

10

Using Tools

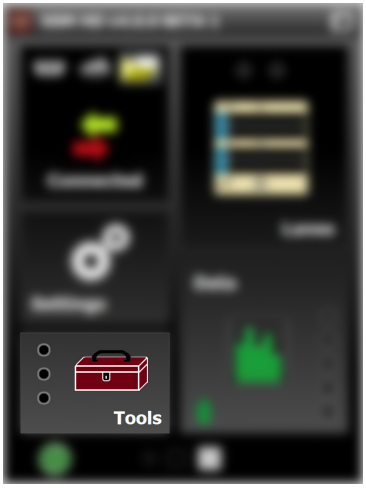


Figure 91. Tools button, main screen

Click the **Tools** button on the main screen to open the Tools screen.

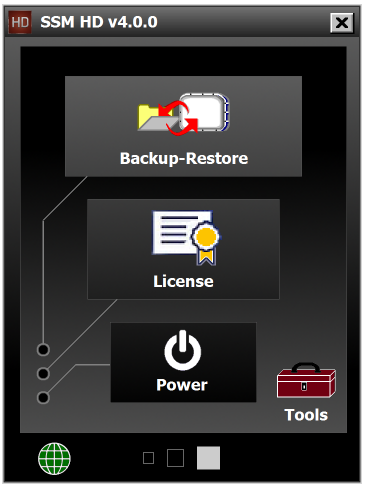


Figure 92. Tools screen

Backing up and restoring sensor setup files

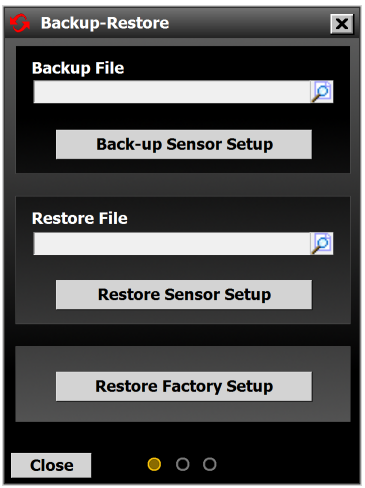


Figure 93. Backup-Restore screen

Setting	Description	Details
Backup File	Allows you to create a backup file (.ssc) of the sensor settings you currently have configured. Click the magnifying glass to navigate to where you want to create the backup file; type a name and hit **OK**. Click the **Back-up Sensor Setup** button to save the backup file to your computer.	This may be useful if you are making changes to the sensor and want to back up your configuration before you do so, so that you have a known good configuration to fall back on if necessary. Alternatively, it may be useful if you are replacing a sensor in the field, and you want to quickly apply the settings from the old sensor to the new one.
Restore File	Loads a backup file (.ssc) to the sensor, replacing the current sensor configuration with the configuration saved to the .ssc file. Click the magnifying glass to navigate to where the desired backup file is saved; select it and hit **OK**. Click the **Restore Sensor Setup** button to apply the saved configuration from the backup file to the sensor.	This may be useful if you have made changes to the sensor and need to restore a backed-up configuration from a saved file (see above).
Restore Factory Setup	Sets all sensor settings back to the factory defaults.	N/A

Viewing licensing information

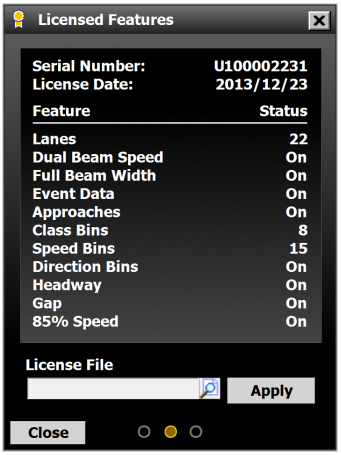


Figure 94. Licensed Features screen

Setting	Description	Details
Serial Number	Shows the serial number of the sensor.	N/A
License Date	Shows the date the sensor was licensed.	N/A
Feature	Shows a list of all possible sensor features, along with its status: whether or not it is enabled under the current license, or, for variable features such as number of lanes, the number that is currently allowed under the current license.	Explanations of what each of these features are can be found throughout the rest of this guide.
License File	Currently not in use.	N/A

Accessing power options

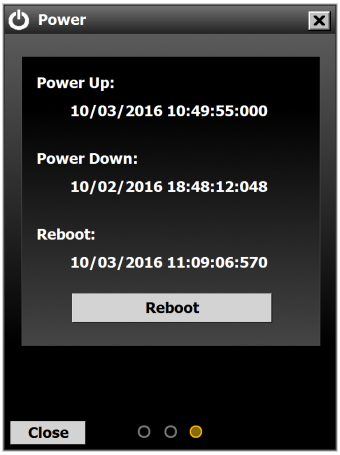


Figure 95. Power screen

Setting	Description	Details
Power Up / Power Down	Shows the timestamp of the last time the sensor powered up or down.	May be useful for diagnostic purposes, to see if the sensor has lost power at some point.
Reboot	Shows the timestamp of the last time the sensor was rebooted. Click the **Reboot** button to reboot the sensor.	May be useful for when you have a remote connection to the sensor and need to reboot.

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WAVETRONIX

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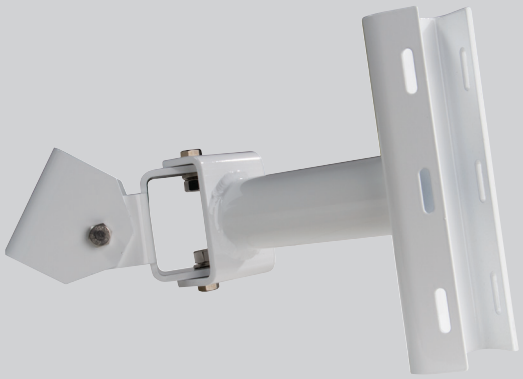
Appendix K SmartSensor Mount Datasheet

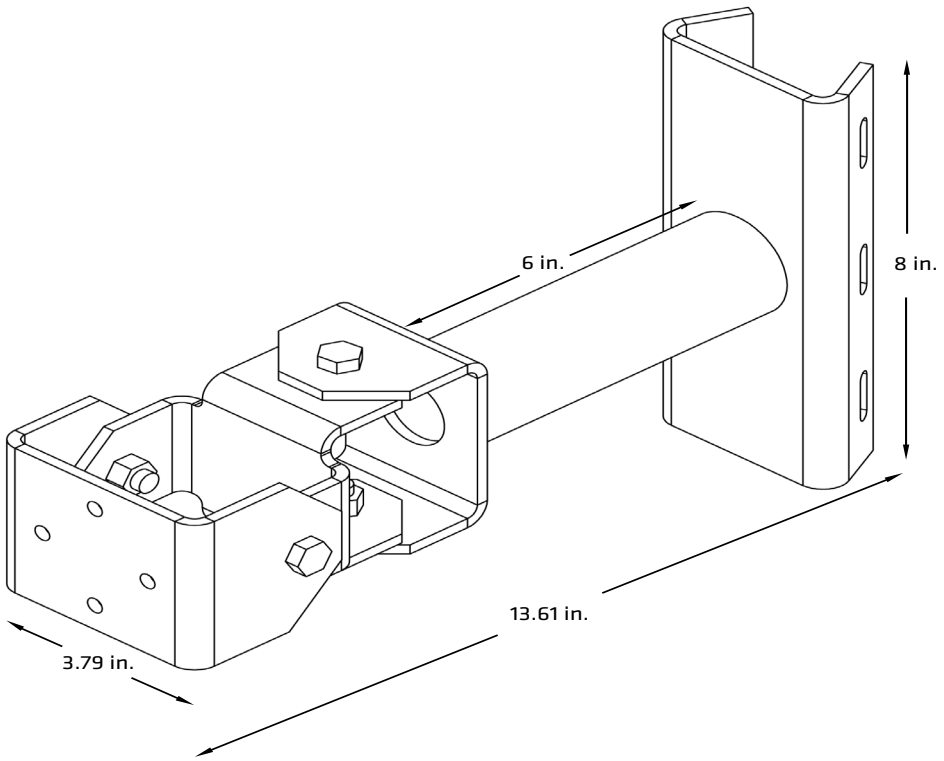
The SmartSensor Mount Datasheet is inserted on the following page.

Pole mount for SmartSensors

The SmartSensor™ mount makes installation quick and easy by helping you securely mount any of the Wavetronix SmartSensors. Sturdily built of powder-coated aluminum for durability and weather-resistance, this mount can withstand whatever the elements throw at it.



- Two axes of rotation for horizontal and vertical positioning
- Mates with fixed and rotational backplates on the SmartSensor V, HD, Advance, and Matrix
- Symmetric hole pattern for flexibility in sensor attachment
- Two contact points for attachment to circular or non-circular poles
- On circular wpoles, another axis of rotation around the pole is available
- Accepts ¾” banding
- Heavy duty aluminum construction makes mount sturdy and long-lasting
- Powder coated for oxidization resistance, allowing mount to withstand the harshest weather conditions of features
- Supports a 20-lb. (9.1-kg) load



Technical specifications

Mounting

- Rotational axes: 2
  - NOTE: SmartSensor Advance and SmartSensor Matrix are shipped with rotational backplate for third axis of rotation. SmartSensor V and SmartSensor HD can be ordered with rotational backplate if third axis is required.
- Maximum load: 20 lbs. (9.1 kg)
- Symmetric hole pattern that mates with fixed and rotational SmartSensor backplates
- Contact points with pole: 2
- Slotted for ¾-in. (1.9-cm) banding
- Additional degree of movement achieved by using the 360-0129

Construction

- Constructed of aluminum 0.1875 in. (0.48 cm) thick
- 316 stainless steel hardware
- Powder coated
- Weight: 3 lbs. (1.36 kg)

Ordering information

SmartSensor Mount
SS-611

Accessories

360-0129 – Add-on Knuckle

Contact us

801.734.7200
sales@wavetronix.com
www.wavetronix.com

Bid specifications

1.0 General. This item shall govern the purchase of a traffic sensor mounting assembly equivalent to the Wavetronix SmartSensor™ mount.

2.0 Mounting. The mounting assembly shall provide at least two axes of rotation to ensure proper installation.

The mounting assembly shall be able to support at least a 20-lb. (9.1-kg) load.

The mounting assembly shall feature a symmetric hole pattern that mates with fixed and rotational SmartSensor backplates.

The mounting assembly shall have two contact points with the pole.

The mounting assembly shall be slotted for 3/4-in. (1.9-cm) banding.

3.0 Construction. The mounting assembly be constructed of 0.1875 in. (0.48 cm) thick or thicker aluminum with 316 stainless steel hardware.

The mounting assembly shall be powder coated for oxidation resistance.

The mounting assembly shall weigh 3 lbs. (1.36 kg).

Appendix L MVD Guide

The MVD Guide is inserted on the following page.