SPECTRUM
Installation & Calibration Guide
Revised 10/18/2019

Spectrum 90

Spectrum 180

Contents

WARNING: This is a Class A product. In a domestic environment this product may cause radio frequency interference in which case the user may be required to take adequate measures.

INTRODUCTION

This manual provides information for installation, configuration and operation of the Spectrum device. Read and fully understand this manual before performing installation or configuration tasks.

The Spectrum is a sensor assembly, which should be used in conjunction with Traf-Sys SaaS or VisiCount software.

1 REQUIRED ACCESSORIES

The following accessories are required for initial operation, but they are not included with the Spectrum:
  – RJ-45 Ethernet cable
  – PoE Ethernet switch or PoE injector
  – Computer with latest web browser on the LAN for configuration and calibration

2 SPECTRUM FUNCTION

The device continually acquires stereoscopic video images in its visual range.
The internal software evaluates the stereoscopic images. Persons within the device view are detected automatically and their movements are tracked until out of view.
The internal software provides the following functions:
  – Counting is bidirectional. Configuration lines designate "IN" count direction.
  – The device detects objects larger than 20in (50 cm). Static objects are suppressed.
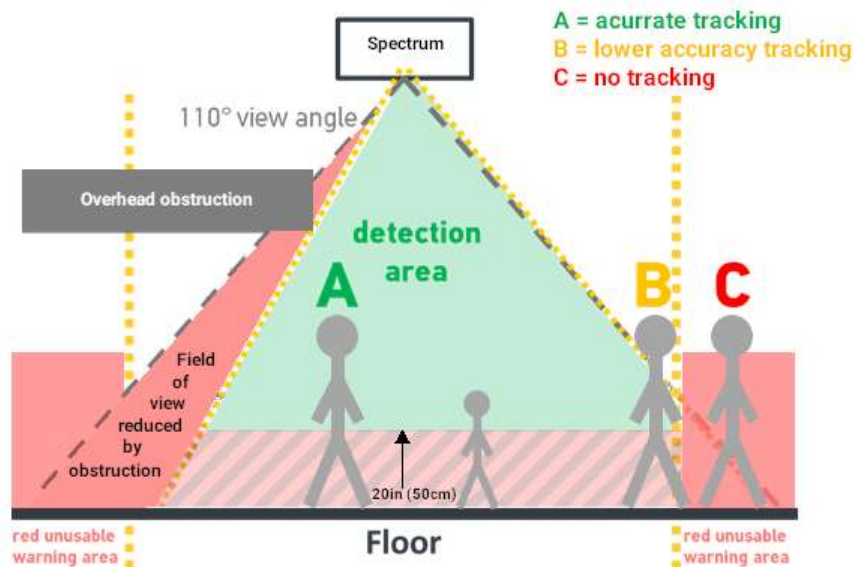
3   SPECTRUM HARDWARE

(1) USB 2.0
(2) Factory reset button
(3) Ethernet RJ45
(4) Status LED

4   USER WEB INTERFACE

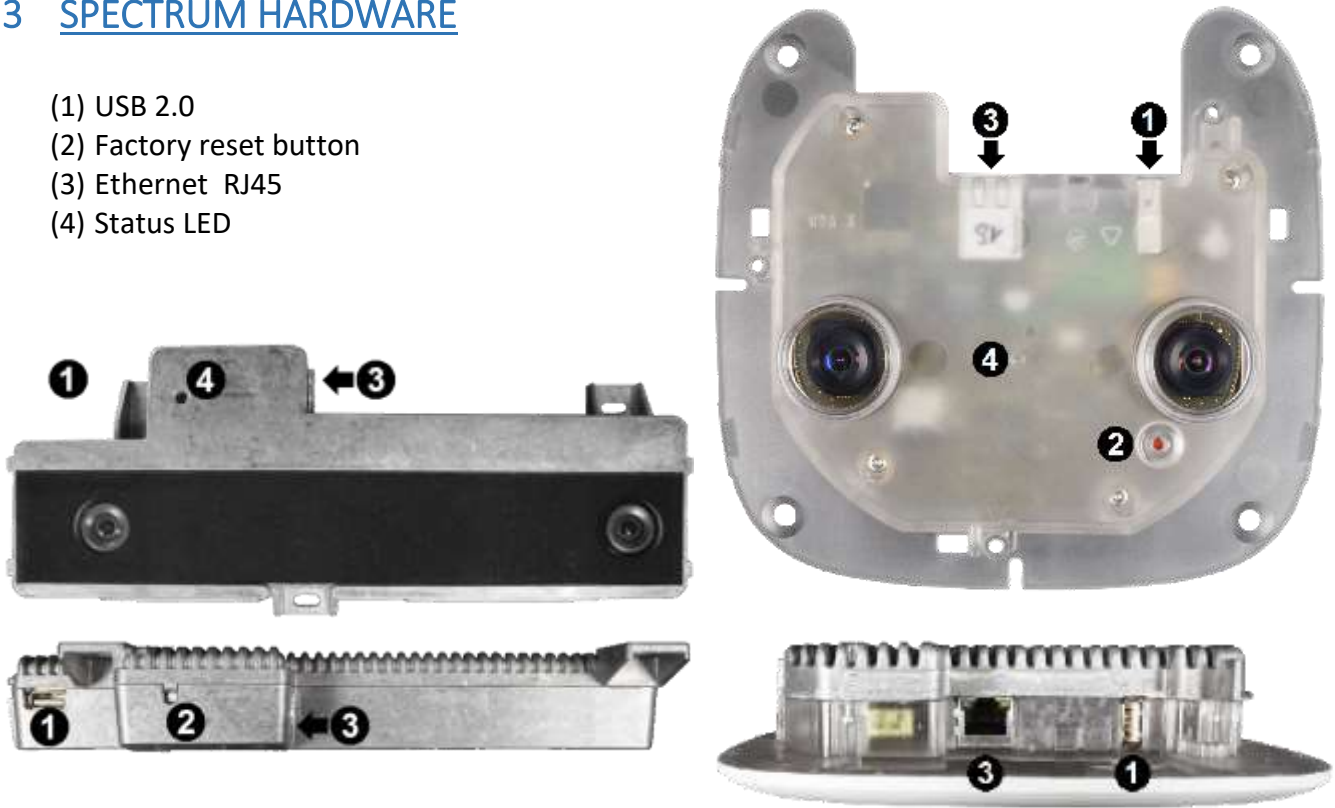The Spectrum configuration and calibration are edited in the user web interface. Connect on the local area network by opening a web browser and entering the IP address in the address bar. Connecting over peer to peer option requires a POE (power over ethernet) injector and ethernet connection to a computer.

4.1   Logins

The user interface has two password protected logins. The corresponding login button must be clicked.

– Read-Only Login
  ~ Verify operation, view settings and configuration, no editing permissions
  ~ The password by default is user

– Setup Login
  ~ Full editing of configuration and calibration
  ~ The password by default is installer
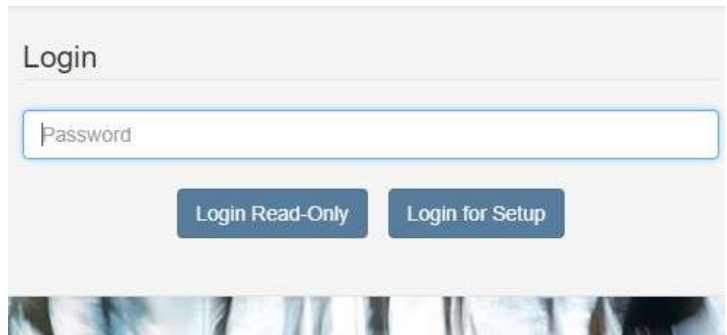
4.2 Navigation Bar

The navigation bar is located on the left side of the user web interface.
Click the arrow icon ➡ at the top to expand or collapse the navigation bar.

Collapsed   Expanded View

5 NETWORK SETTINGS

Traf-Sys Pre-Configured Network Settings

Customers using VisiCount SaaS, or VisiCount (on premise), need to provide local area network settings for each device. Traf-Sys support will pre-configure the Spectrum devices with the network settings provided to expedite the installation process.

Customer Configured Network Settings

Customers that are unable to determine a reserved IP address before time of shipment will be responsible for configuring the network settings.

*Traf-Sys support will need the local IP address for remote calibration. Including when DHCP is used.
*Local network settings should be established before installation.

5.1 Default Network Settings

IP Address 192.168.1.8
Subnet Mask 255.255.255.0

DHCP can be enabled from Fallback Mode see section 9.1

5.2   Setting Spectrum Time

5.2.1 Click Other Settings

5.2.2 Locate section <u>System Time</u>

5.2.3 Use dropdown to select Region

5.2.4 Use dropdown to select Location

5.2.5 Select the check box for NTP

5.2.6 Enter the IP address or URL of Timeserver

5.2.7 Click **Save**

Region	Locations	US Time regions	UTC-	DST
America	New York, Detroit	Eastern Time	UTC -5	UTC-4
America	Kentucky/Louisville, Monticello	Eastern Time- KY	UTC -5	UTC-4
America	Indiana/Indianapolis, Marengo, Petersburg, Vevay, Vincennes, Winamac	Eastern Time- IN	UTC -5	UTC-4
America	Chicago, Menominee	Central Time	UTC-6	UTC -5
America	Indiana/Tell City, Knox	Central Time - IN	UTC-6	UTC -5
America	North Dakota/Center, New Salem, Beulah	Central Time - ND	UTC-6	UTC -5
America	Denver, Boise	Mountain Time	UTC -7	UTC-6
America	Phoenix	Mountain Standard Time -No DST	UTC -7	N/A
America	Los Angeles	Pacific Time	UTC -8	UTC -7
America	Anchorage, Juneau, Sitka, Yakutat	Alaska Time	UTC -9	UTC -8
America	Metlakatla, Nome	Alaska Standard Time - No DST	UTC -9	N/A
America	Adak	Hawaii-Aleutian Standard Time	UTC -10	N/A
Pacific	Honolulu	Hawaii-Aleutian Standard Time	UTC -10	N/A

5.3   Password – Read-Only and Full access

For best support, Traf-Sys recommends maintaining the default passwords.
Read-Only = <mark>user</mark> / Setup = <mark>installer</mark>

<u>Read-Only Login</u> -Verify operation, view settings and configuration, no editing permissions
Read-Only access can be disabled.

<u>Setup Login</u> - Full editing of configuration and calibration

Lost or forgotten passwords will result in reinstalling the firmware and factory defaulting the device.

5.4   Network Settings

Network communication settings includes; static IP Addresses, DHCP, and DNS.

5.4.1 Click **Network** [Network]

5.4.2 Locate section Ethernet IP

Static IP Address

5.4.3 Enter static IP Address
5.4.4 Enter Subnet Mask
5.4.5 Enter Default Gateway
5.4.6 Click **Save**

DHCP (Dynamic Host Configuration Protocol)

5.4.7 Click box Use DHCP
5.4.8 Click **Save**

Ethernet DNS

5.4.9 Enter Preferred DNS IP address
5.4.10 Enter Alternative DNS IP address
5.4.11 Click **Save**
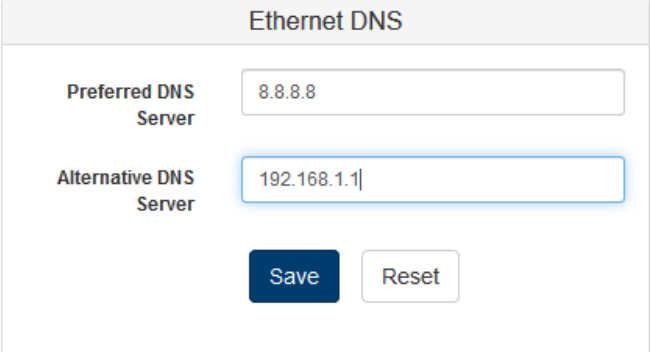
Ethernet IP

Hostname   AIPS901967

☐ Use DHCP

IP Address   192.168.1.8

Subnet Mask   255.255.255.0

Default Gateway   192.168.1.1

Save   Reset

Ethernet DNS

Preferred DNS Server   8.8.8.8

Alternative DNS Server   192.168.1.1

Save   Reset

6 INSTALLATION

Test network connection to the Spectrum before installing. Ensure ability to login for calibration.

6.1 Mounting Requirements

– The mounting surface needs to support 1.5 pounds.
– The mounting position should allow for optimal view of the counting area:
   ~ No obstructions between the device and people's heads
   ~ The flow of people should be within the monitored floor area
   ~ Avoid placement in the path of door swing
   ~ Spectrum device must be 12 to 20 inches (30 to 50 cm) away from the entry (door). The initialization area is needed for sensor recognition of persons prior to the count line.
   ~ Avoid a counting area where people are encouraged to linger. Tracking may be lost. (ex. due to persons bending down or interacting with objects)
– Limit obstructions within the counting area.
– Ensure sufficient illumination.
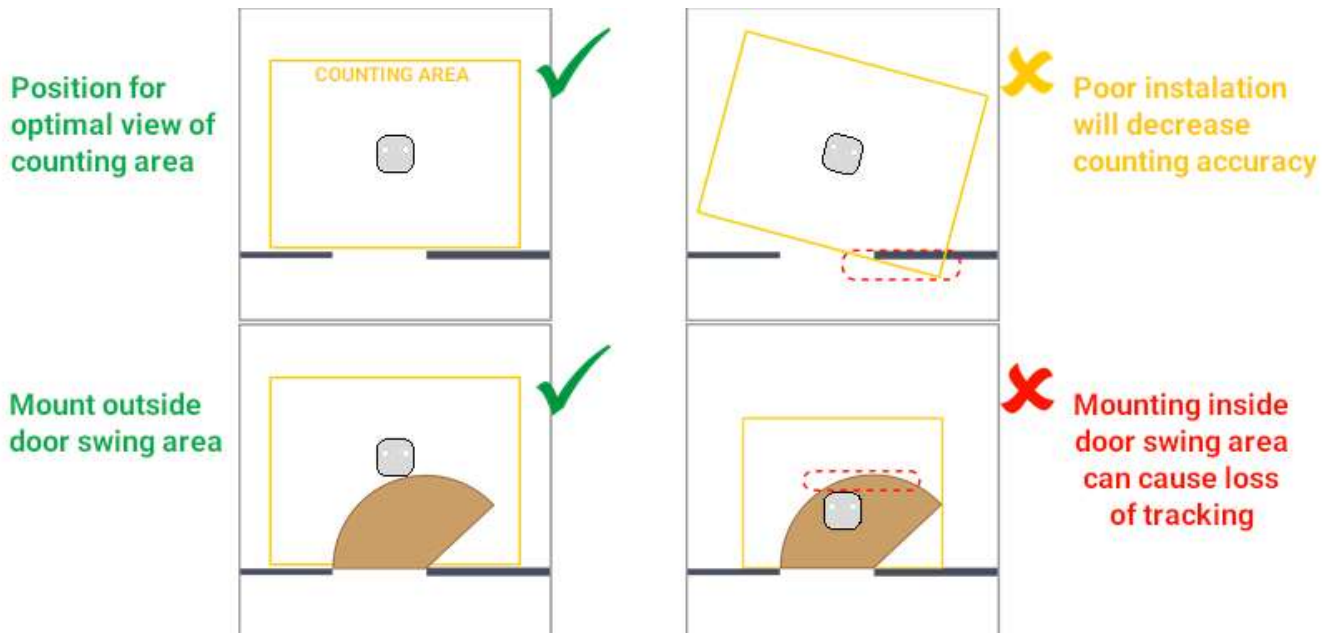
6.2   Ethernet Wiring

– POE Input voltage 36 - 57 V DC
– Transfer rate 100 /1000 MBit/s
– maximum length 328 ft (100 m)
– RJ-45 Connector

6.3   Spectrum 90 Positioning Measurements

– Mounting height 6.6 – 19.7 ft (2.0 - 6 m) Extended Height Range is required over 13 ft
– Optimal distance from the entry 12 to 20 in (30 - 50 cm)
– Centered in the entry area
– Consider the following parameters when positioning the device:
  ~ The pitch and yaw angles allow values up to 30° maximum. (mounting the Spectrum parallel to
     the floor will provide the highest count accuracy)
  ~ The Spectrum references the floor directly beneath the device to calculate mounting height.
  ~ For the highest level of accuracy, double check measurement from the floor to the lens.
– Spectrum 90 height and detection area table available in appendix (Appx. 2)

6.4   Spectrum 90 Surface Mounting

6.7.1 Screw the surface mount box to the ceiling
6.7.2 Plug in ethernet cable
6.7.3 Snap the spectrum into the mount box
6.7.4 Attach the faceplate

6.5   Spectrum 90 Recess Mounting

6.8.1 Drill a hole between 5.6 - 5.9 inch (144 - 150 mm) diameter
6.8.2 Assemble the three screws and flaps on the spectrum
6.8.3 Rotate the flaps so they are tucked in close to the spectrum body
6.8.4 Plug in ethernet cable
6.8.5 Insert spectrum into the ceiling hole
6.8.6 Tighten screws with a T15 bit
6.8.7 Attach the faceplate

6.6   Spectrum 180 Positioning Measurements

– Mounting height 9.8 – 29.5 ft (3.0 – 9.0 m). Extended Height Range is required over 19.5 ft
– Optimal distance from the entry 12 - 20 inches (30 - 50 cm)
– Centered lateral alignment in the entry area
– Consider the following parameters when positioning the device:
   ~ The device has an integrated tilt measurement.
   ~ The pitch and yaw angles allow values up to 30° maximum. (mounting the Spectrum parallel to
      the floor will provide the highest count accuracy)
   ~ The reference plane for the mounting height is the floor directly beneath the device.
   ~ For the highest level of accuracy measure from the floor to the optics.
– Spectrum 180 height and detection area table available in appendix

6.7   Spectrum 180 Surface Mounting

6.7.1 Plug in ethernet cable
6.7.2 Screw Spectrum 180 to the ceiling
6.7.3 Align the cover tabs with Spectrum housing
6.7.4 Slide cover to secure (lenses should not be
      obstructed by the cover)
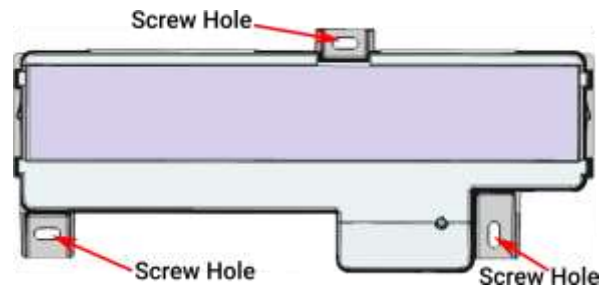
6.8   Spectrum 180 Recess Mounting

6.8.1 Cut a hole 4.5in X 10.5in
6.8.2 Plug in ethernet cable
6.8.3 Snap the Spectrum 180 into the mounting bracket
6.8.4 Screw the mounting bracket to the ceiling
6.8.5 Align the faceplate tabs with mounting bracket
6.8.6 Slide faceplate to secure (lenses should not be obstructed by faceplate)

7 CALIBRATION

Once the Spectrum is securely mounted, verify login for setup. If remote calibration was purchased email support@trafsys.com or call Traf-Sys Support 412-428-0098 option 3. Support will need the exact height in inches from the floor to lens of the counting sensor. A picture of the doorway including the counting sensor would also be helpful.

7.1 Camera Position Setup

Set the parameters for height, floor area, and obstructions in Camera Position Setup.

7.1.1 Select Camera Position

Camera Position

The Spectrum can approximately measure its own mounting height and tilt with an accuracy +/- 5%. The auto calibration fields (grey) are on top of the manual input fields (white).

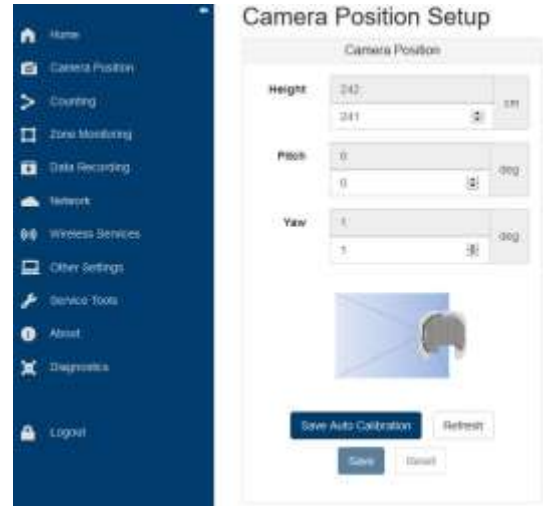7.1.2 Ensure floor area is clear

7.1.3 Click **Save Auto Calibration** if the values are correct

7.1.4 Click **Refresh** to auto calibrate again

7.1.5 Select the bottom field (white) to manually enter a value

7.1.6 Click **Save**

7.1.7 Click **Reset** to go back to the last saved settings

Height Range

The Spectrum can be set to an extended height range to allow for installation at higher mounting heights. The extended height range does reduce the overall coverage area. A reboot is required after making height range changes. See the appendix Height Range Coverage Chart for more information

Floor Area

7.1.8 Click **Range** to show or hide the shaded unusable counting area

7.1.9 Click **Floor** to show or hide the yellow polygon line defining the floor area

7.1.10 Verify the Edit radio button is selected to define the floor area

a. Define the floor area by moving, adding, or deleting points on the yellow polyline.
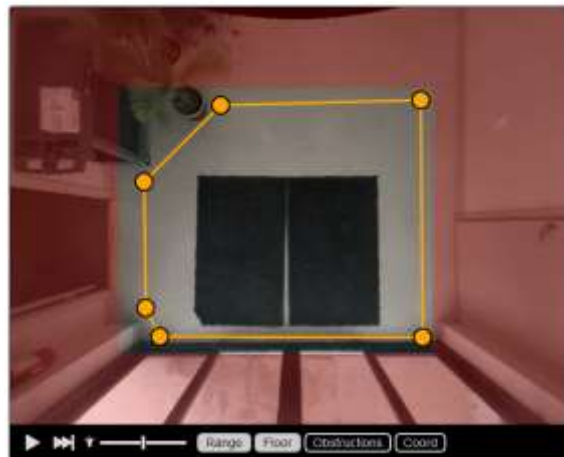
   i. Double click the line to add a point

   ii. Double click the point to delete it

b. Polyline can have between 3 to 20 points.

7.1.11 Click **Save**

7.1.12 Click **Reset** to go back to the last saved settings

Obstructions

Overhead obstructions that appear in the field of view must be masked to disregard them in count calculations. Obstructions are masked by coloring them in the live view.

7.1.13 Click **Obstructions** to see marked objects

7.1.14 Select the <u>Edit</u> radio button to mark overhead obstructions in the live view

7.1.15 Click **Pencil** to color

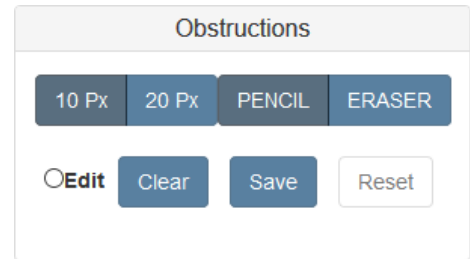7.1.16 Click **Eraser** to remove coloring mistakes

7.1.17 Click **10 Px** or **20 Px** to change the cursor diameter for drawing or erasing

7.1.18 Click and hold mouse button in the detection area to color obstructions.

7.1.19 Click **Save**

7.1.20 Click **Clear** to erase all marks

7.1.21 Click **Reset** to go back to the last saved settings
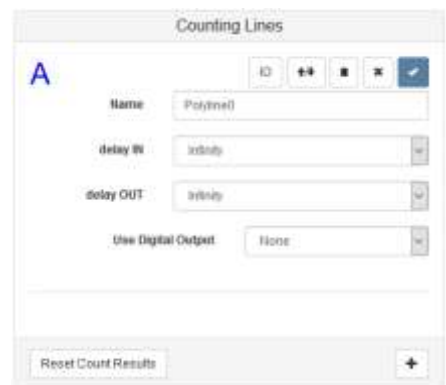
7.2   People Counting Setup

Count line is represented by a colored polyline with lettered end points. Counting is bidirectional.

"IN" direction is designated by triangle midway between points.

*Do not place count line at doorway. An initialization area of 12 - 20 inches (30 to 50 cm) is needed for the highest counting accuracy.

7.2.1 Select <u>Counting</u> in navigation bar

Counting Lines

7.2.2 Click **+** to create a new count line

7.2.3 Create <u>Name</u> (entrance/location)

7.2.4 Set <u>delay IN</u> to Infinity (Appx. 1)

7.2.5 Set <u>delay OUT</u> to Infinity

7.2.6 Verify <u>Use Digital Output</u> = None

7.2.7 Configure the count line by moving/ adding/ deleting points on the polyline
  a. Click + hold then drag to move points
  b. Double click to points to delete
  c. Double click the line to add a point

7.2.8 Click the IN/OUT ⬍ toggle button to change line counting direction (triangular marker denotes IN)

7.2.9 Click ✓ check mark to save

7.2.10 Click ✕ discard to go back to the last saved settings

7.2.11 Click 🗑 delete to remove counting line
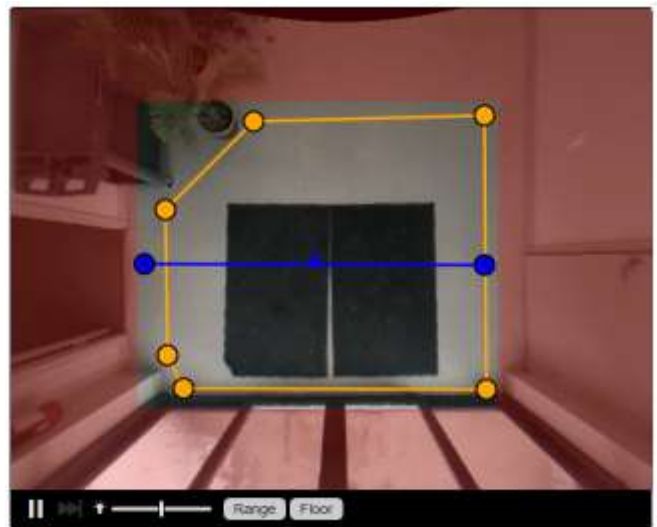
Counting Filter

7.2.12 Verify <u>Ignore non-person objects</u> is checked

Object Tracking

The Spectrum tracks objects larger than 20 in (50 cm)

Click Play in camera view to watch traffic and verify counting
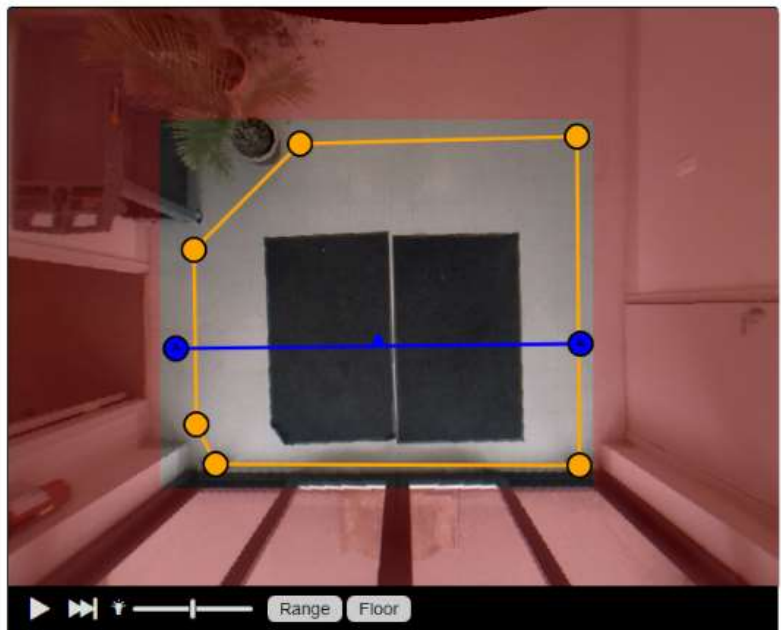
8 TRAF-SYS DATA HOSTING

Push Service needs to be enabled for hosted customers - VisiCount SaaS

Push Service (Hosted Clients)

8.1.1 Click **Data Interface** (navigation bar)
8.1.2 Locate section Push Service
8.1.3 Click **SOAP**
8.1.4 Click **Save**

*Leave Push Service OFF for VisiCount Software

Push Service
○ OFF
● SOAP
○ IBM Watson IoT
○ REST Push
○ Google Pub/Sub

SOAP Protocol Type	HTTPS
SOAP Server	soap.trafnet.com
SOAP Server Port	443
SOAP Service Name	SOAPdService.asmx
Use Proxy for Push Service	☐

Save   Reset

9 TROUBLESHOOTING

9.1 Status LED

The device boot takes about 40 seconds. During this time the status LED is as follows:
On boot first the LED is red for approximately 12 sec.
LED blinks green for approximately 15 sec.
User interface is accessible approximately 10 sec after LED turns green

The status LED use different colors for signaling.

Color	Period	Description
RED	10 sec. after power on	Boot process
RED	permanently	No IP address assigned by DHCP. Startup is blocked until it gets an answer by the DHCP server.
RED	permanently	Device in fallback mode (see section 9.1)
GREEN	power on	IP address is assigned, sensor is ready to detect and count people. About 10s later sensor is ready to be accessed by web interface.
Blinking GREEN	During startup after red	Base system is started.
off	permanently	No Power
BLUE	Less than 5 sec. while pushing reset button	Change to fallback mode when disengaging the reset button.
YELLOW	after 5 sec. pushing reset button	Factory reset

9.2 Optical Self Diagnosis

Optical Self Diagnosis. The Spectrum constantly evaluates its visible range. The status of this optical self-diagnosis (OSD) is shown on the home page of user interface.

	Status	Cause
0	OK	Normal state
1	Covered	One or both cameras covered
3	Too dark	Illumination is too low for proper function or both cameras are completely covered
5	Too bright	This is more hypothetical, because not caused by direct sunlight and reflections from sunlight

The device does not stop counting in case of an error.

The OSD status could help in troubleshooting issues and is also available in data protocols to validate data.

10 FACTORY RESET BUTTON

The device must be powered to use the reset button. Gently press the button with a pencil.

10.1 Fallback System

The Fallback System is a simple user interface that allows you to:
- Set the IP setting to use DHCP.
- Set the device to the factory default settings (factory reset).
- Reboot the device.

9.1.1. Momentarily press the reset button

9.1.2. Release the button while LED is illuminated blue

9.1.3. The spectrum will restart in a basic emergency system in DHCP mode

9.1.4. The LED will remain illuminated red while in Fallback System

* Web browsers may reload the Fallback page from cache. Press Ctrl + F5 keys to force a full refresh.

Set to DHCP

The network configuration of the last used partition will be set to DHCP.

Set DHCP

Parameter Factory Reset

The parameters will be reset to factory default. This equals the configuration present when the device was delivered.

Factory Reset

Diagnosis

Push this button for retrieving some diagnose information like MAC address and the like:

Retrieve Diagnose Info

Reboot

When you reboot the device the device will boot into the last used partition. When you entered this fallback partition because of a rolling reboot it is likely that you end up here again.

Reboot

10.2 Factory Reset

All settings (including network settings) will be restored to the factory defaults

9.2.1. Press and hold the reset button for more than 5 second

9.2.2. Release the button when the LED is illuminated yellow

9.2.3. The device will reboot

9.2.4. Wait for solid green LED before accessing user web interface

11 TRAF-SYS CONTACT INFORMATION

Phone: 412-428-0098
Toll Free: 1-888-815-6568
Email: support@trafsys.com
Web: www.trafsys.com

Appendix

Appx.1. - Count Line Delays

There are three modes for counting people who turn around in the monitored floor area:

No delay: Counts every line cross (immediate result after crossing the counting line).

Infinity (recommended): Excludes U-turn counts (result delayed until person leaves the floor area).

Time period: (e.g. 10 sec) Count if the person stays longer than the time period and without a U-turn in this time (result delayed until time period is over or until person leaves floor area before end of time period).

Low and Standard setting — INCHES

Install Height	S-90	S-180	Width	Depth
79			73	63
87			89	77
94			106	91
102			122	104
110			138	118
114			146	124
118			154	130
126			171	146
134			187	157
138			195	165
142			203	173
150			219	185
157			236	199
161			244	205
165			252	213
173			268	226
181			283	240
189			301	254
193			309	260
197			315	268
205			315	281
213			315	295
220			315	307
228			315	315
236			315	315
240				
244				
252				
260				
268				
276				
283				
291				
299				
307				
315				
323				
331				
339				
346				
354				

Extended setting — INCHES

Install Height	S-90	S-180	Width	Depth
79				
87				
94				
102				
110				
114				
118				
126				
134				
138			87	75
142			91	79
150			96	85
157			104	89
161			106	91
165			110	94
173			116	100
181			124	106
189			130	110
193			134	114
197			136	116
205			144	122
213			150	128
220			156	132
228			163	138
236			169	144
240			173	146
244			175	150
252			183	156
260			189	159
268			195	165
276			203	171
283			209	177
291			215	181
299			222	187
307			228	193
315			234	199
323			240	203
331			248	209
339			254	215
346			260	220
354			268	224