IRC3000 Series People Counter

Applications Notes

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1.People Counter Principles: Field of View

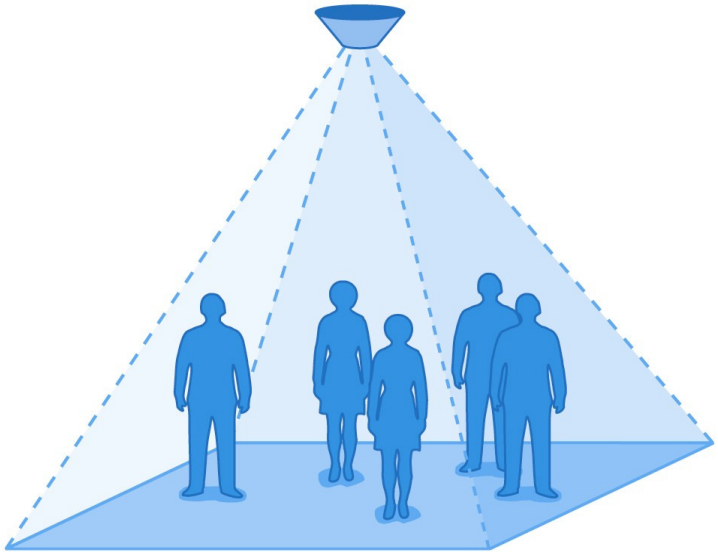

Figure 1.1

The IRISYS People Counter is downwards looking.

- Counter should look straight down.
- The area on the ground is a square whose size is dependant on the height of the counter, see the Mounting Height Graph document IPU40188 for details.

An UNOBSTRUCTED view of the area beneath the counter is essential.

- Ensure in-store posters and signs do not obscure the counters view or under counting could occur.

It counts moving FREE-FLOWING People.

- Avoid areas of stationary people, for example, waiting or queuing areas, customer service desks etc.
- If people become crowded within the field of view then accuracy may be reduced.
- The setup software must be used to configure the counter for correct operation and system integration, as well as to understand what the people counter is 'seeing' to ensure it is consistent and valid.
- As part of the installation and commissioning of each counter the installer should view the count data from the data logger to ensure the counter is integrated correctly and count data is available.

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2. People Counter Principles: What the counter 'Sees'

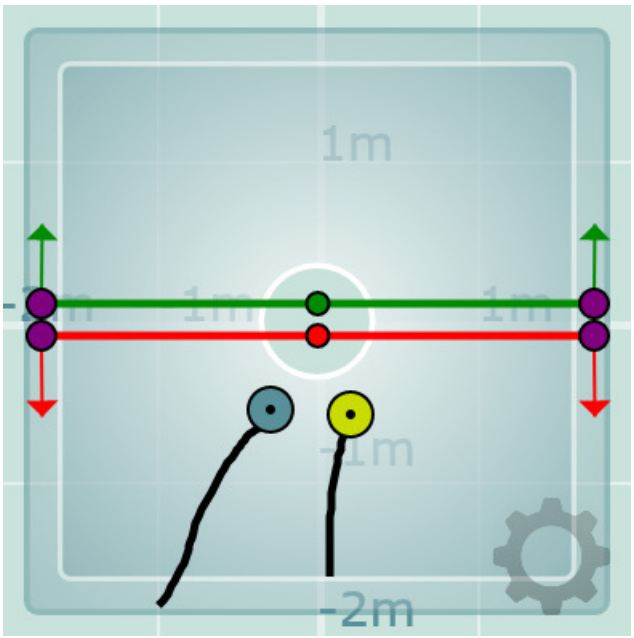

Figure 2.1 – What the Counter 'Sees'

The people counter 'sees' the temperature differences between person & background and interprets these signals in order to identify individuals as they walk underneath.

- Works on temperature difference and not absolute temperature.
- People may be hotter or colder than the background. (Temperature sensitivity is approximately 0.5°C)

The algorithms within the device interpret the signals and provide the user with a simple display showing people as moving dots against a blue background.

- A person who stops in the field of view may be lost by the counter as it relies on temperature difference caused by people movement – when they move they will be detected again. It takes up to 10 seconds of inactivity before a person is lost to the counter.
- People are 'tracked' through the field of view, and their size, path, direction and speed, are all used in the counting process. The black tracking line behind each target is the route that the target was tracked through.
- The counter does not emit anything, it only detects naturally occurring infrared emitted from the body as heat – it is a 'passive' device (not an 'active' device).

Two count lines are provided by default (expandable to 8 lines if required); these must be positioned correctly for the actual counting (see next sections).

To ensure that the tracking and counting is as accurate as possible you should always use counters running the very latest version firmware. If you have Beta (evaluation) units then these must be upgraded to Release firmware (as a minimum) before being utilised on any end customers sites.

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3.People Counter Operation: The Count Lines

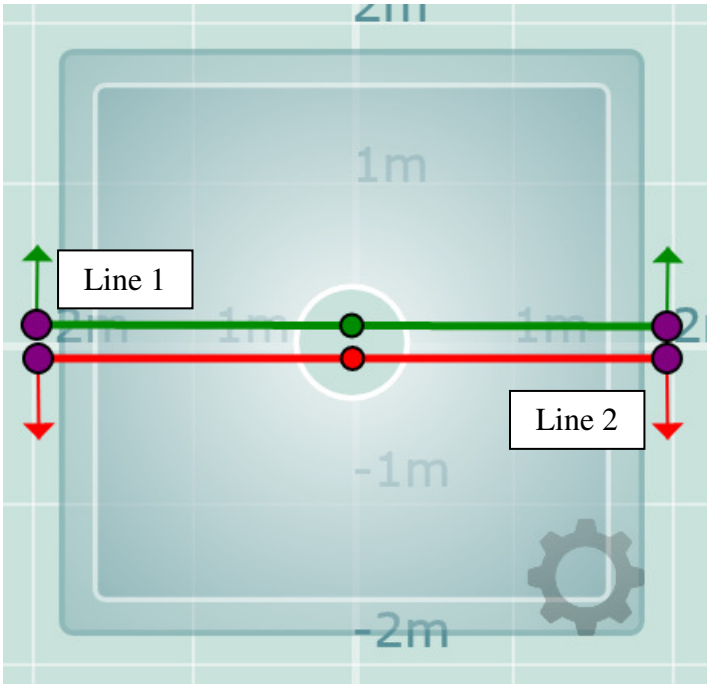

Figure 3.1 – The Count Lines

Two independent 'count lines' are provided in each master counter by default.

- The count lines are configured as part of the installation process.
- Best performance is always achieved by fine adjustment of the count lines' position and shape.
- Count lines are configured across all units in a wide opening network of counter units.

The 'arrows' indicate direction of counting.

- A person must cross the count line in the indicated direction. If a person crosses a count line against the direction of the arrow, a count increment will not occur.
- Generally, one count line counts 'IN' traffic, the other count line counts 'OUT' traffic, but lines can be configured as required.
- A number of different count modes are available for selection by the installer, see next section.
- The lines work independently from each other – you do not have to cross one line then the other in order to generate a count increment. But, depending on the count mode selected they will interact with each other, see following sections.

Up to eight count lines can be enabled if required. Count lines can also be removed if no longer required.

You should not enable more than the required number of count lines as this will impact the amount of stored counts on an IP counter.

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4. People Counter Operation: The Counting Modes

How and when a count increment is registered depends on the count logic mode selected.

Count modes available for selection are:

A. Immediate increment on line crossing.
B. Deferred increment given when target leaves the field of view.

Each mode has a further option which can be enabled or disabled; this gives a total of four distinct counting modes, see Figure 4.1.

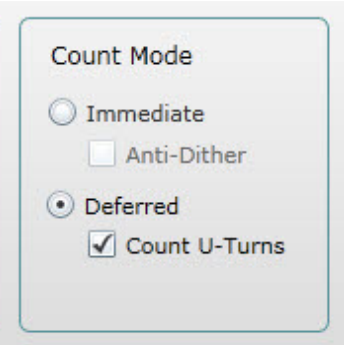

Figure 4.1

It is the installer's responsibility to select the appropriate counting mode based on;

- The line positions
- The behaviour of people
- What you want to count
- What you don't want to count

In most cases, the default mode, of Deferred, will be optimum but this may need changing for certain situations.

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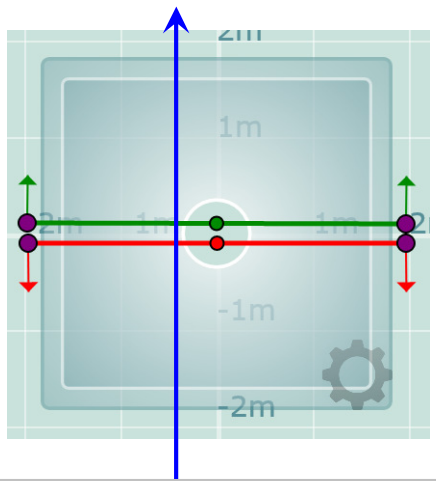
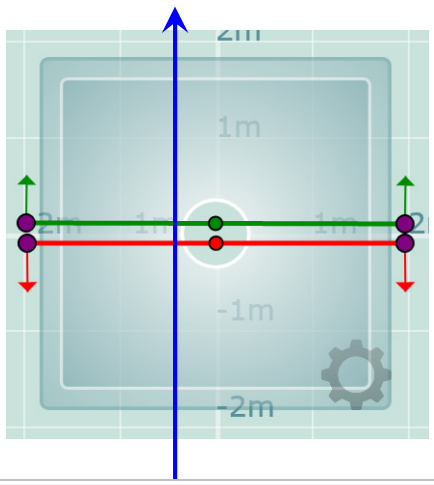
A. 'Immediate' Count Mode

With Immediate count mode, a count increment is given as soon as the first count line is crossed, in the correct direction. If the 'Anti-Dither' option is ON then that will be the only count, but if it is Off then every subsequent line crossing will also be acknowledged and an increment given for each crossing.



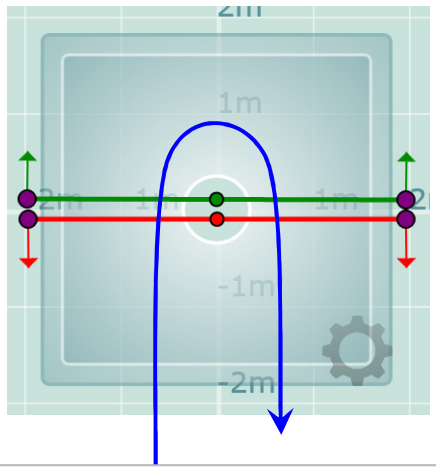
Line 1
1
Line 2
0

Immediate Mode with Anti-Dither ON



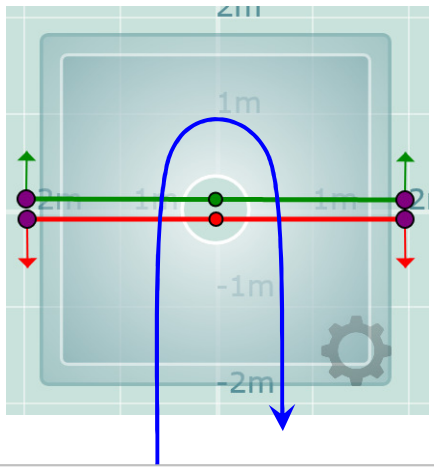
Line 1
1
Line 2
0

Immediate Mode with Anti-Dither OFF



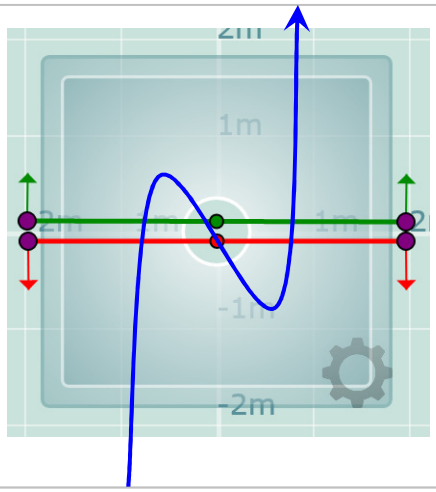
Line 1
1
Line 2
0

Immediate Mode with Anti-Dither ON



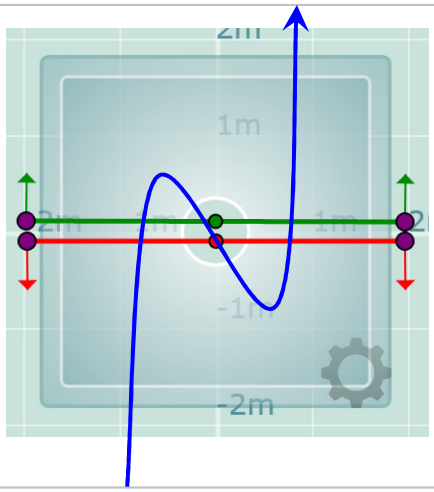
Line 1
1
Line 2
1

Immediate Mode with Anti-Dither OFF



Line 1
1
Line 2
0

Immediate Mode with Anti-Dither ON



Line 1
2
Line 2
1

Immediate Mode with Anti-Dither OFF

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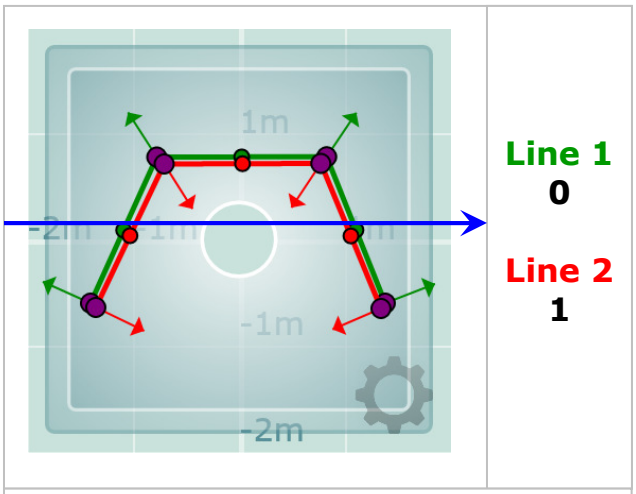
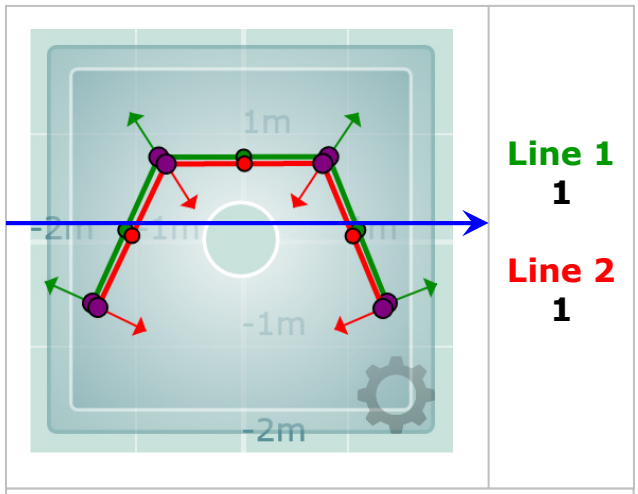
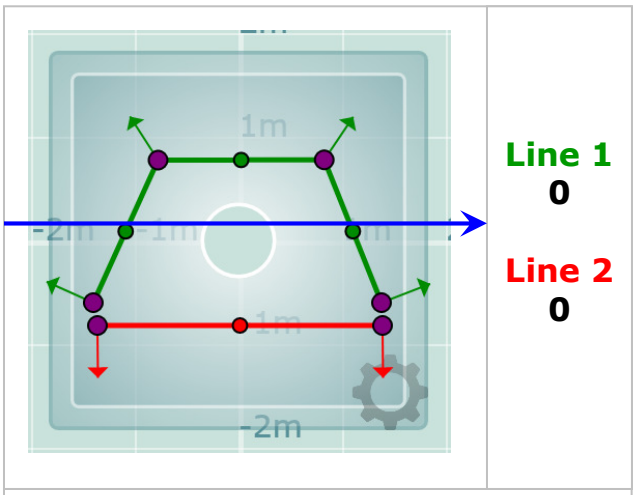


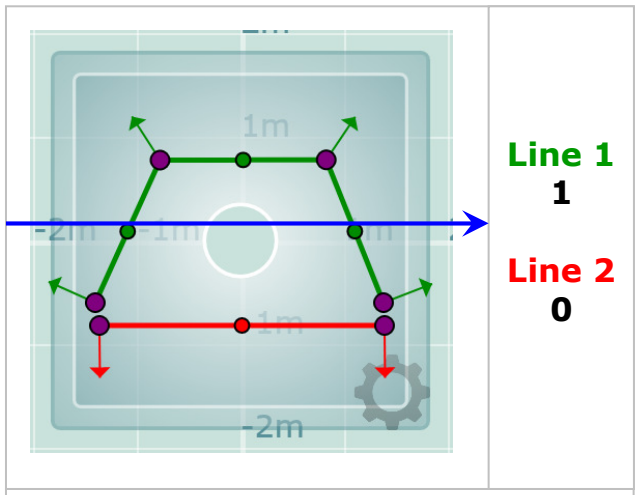
Immediate Mode with Anti-Dither ON



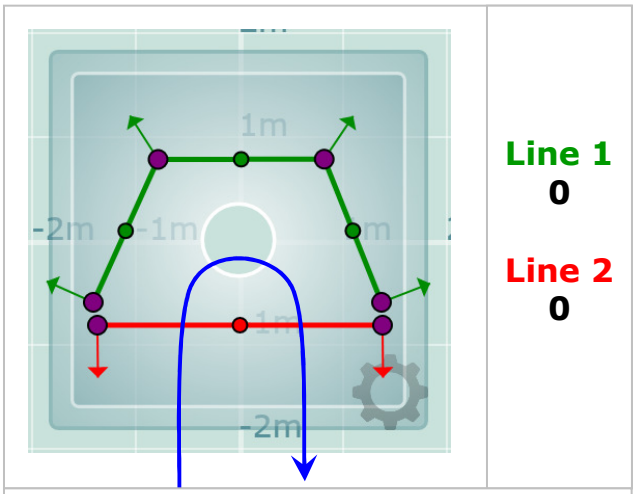
Immediate Mode with Anti-Dither OFF



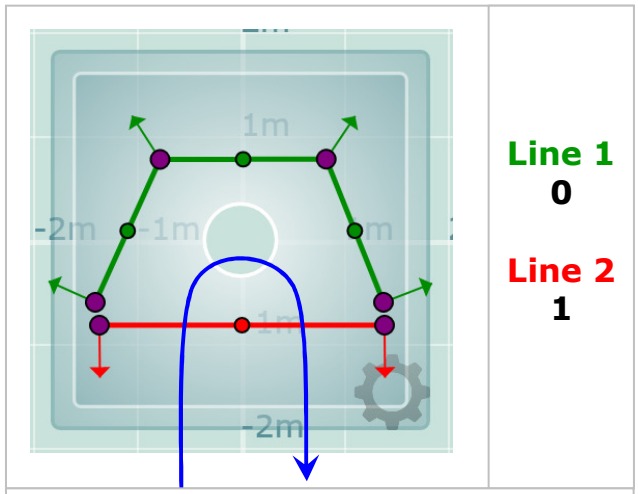
Immediate Mode with Anti-Dither ON



Immediate Mode with Anti-Dither OFF



Immediate Mode with Anti-Dither ON



Immediate Mode with Anti-Dither OFF

Immediate count mode is not recommended for standard people counting applications.

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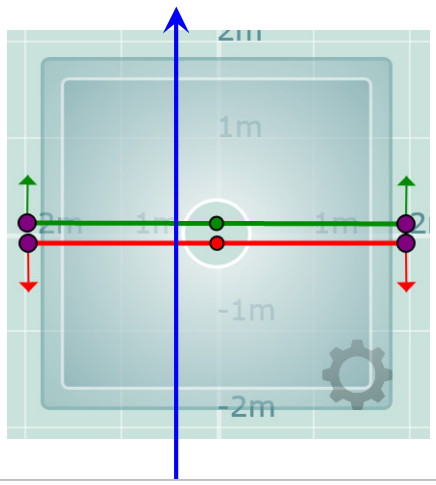
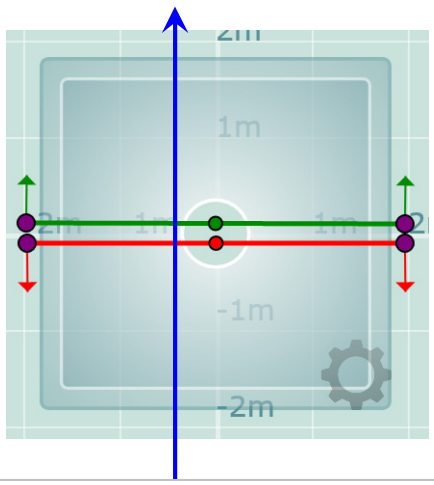
B. 'Deferred' Count Mode

With Deferred count mode, a count increment is given only when the person has left the field of view of the counter (all counters in the case of a wide opening network) and the master counter has considered all the line crossings, including any wrong way crossings.



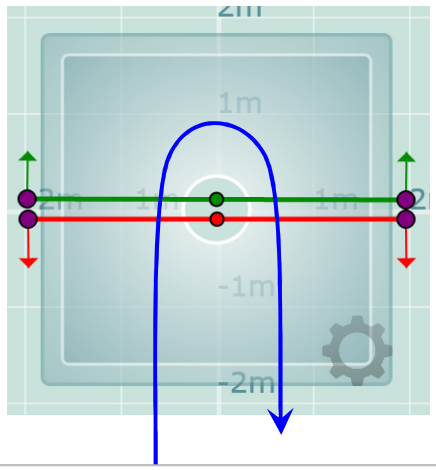
Line 1
1
Line 2
0

Deferred Mode with Count U-Turns ON



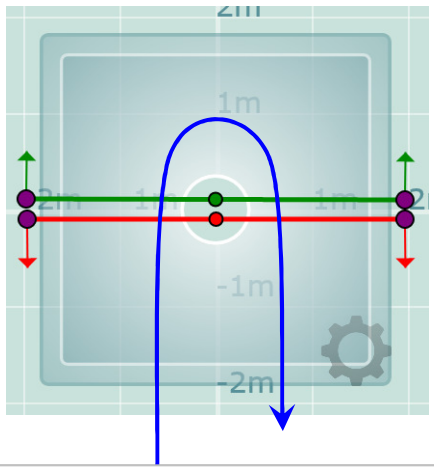
Line 1
1
Line 2
0

Deferred Mode with Count U-Turns OFF



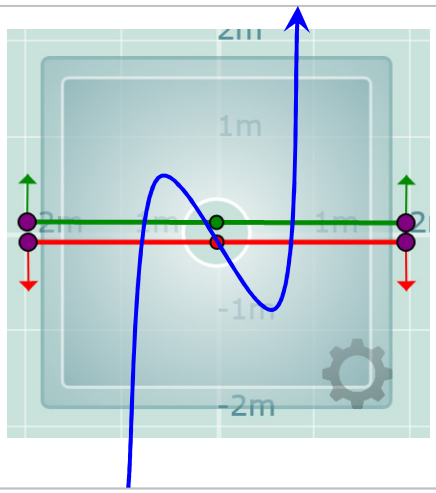
Line 1
1
Line 2
1

Deferred Mode with Count U-Turns ON



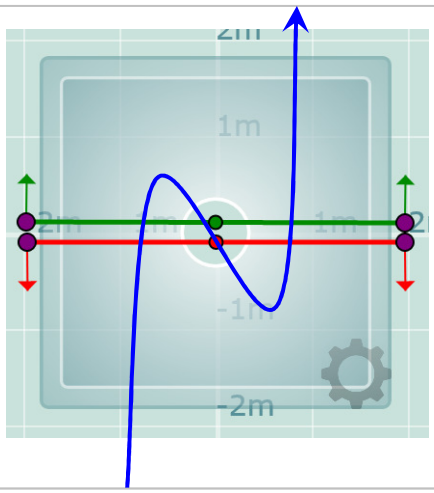
Line 1
0
Line 2
0

Deferred Mode with Count U-Turns OFF



Line 1
1
Line 2
0

Deferred Mode with Count U-Turns ON



Line 1
1
Line 2
0

Deferred Mode with Count U-Turns OFF

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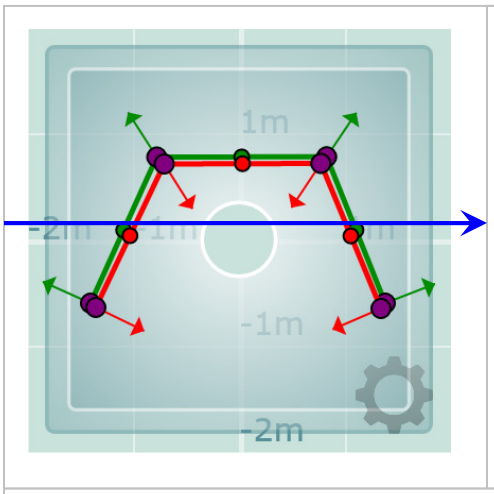
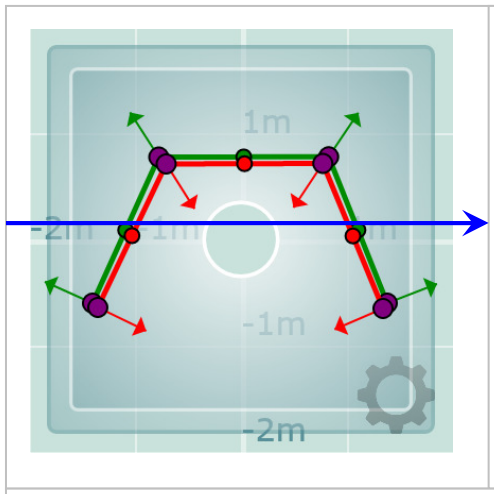


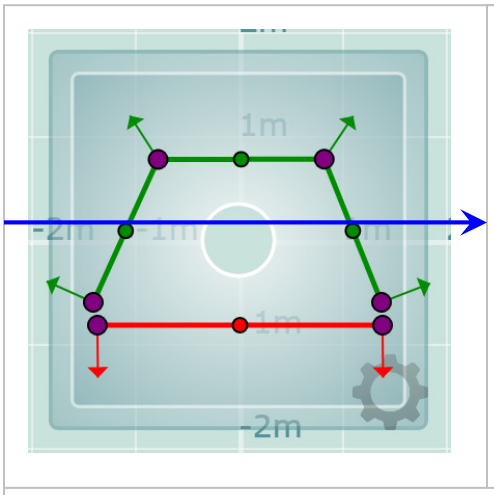
Line 1
1
Line 2
1

Deferred Mode with Count U-Turns ON



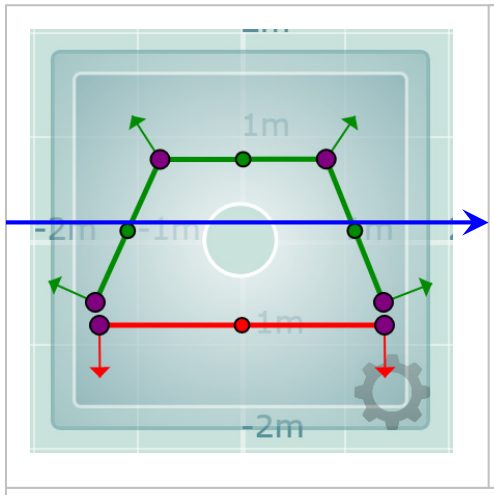
Line 1
0
Line 2
0

Deferred Mode with Count U-Turns OFF



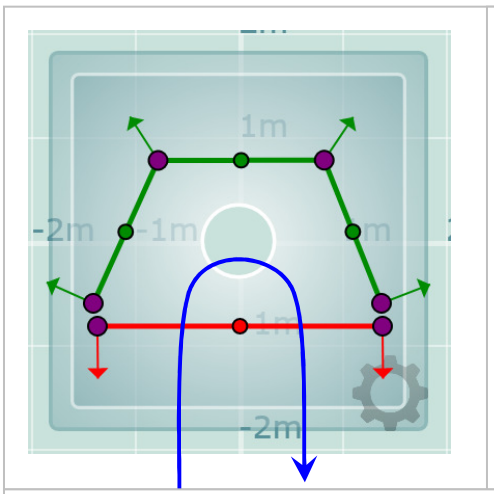
Line 1
1
Line 2
0

Deferred Mode with Count U-Turns ON



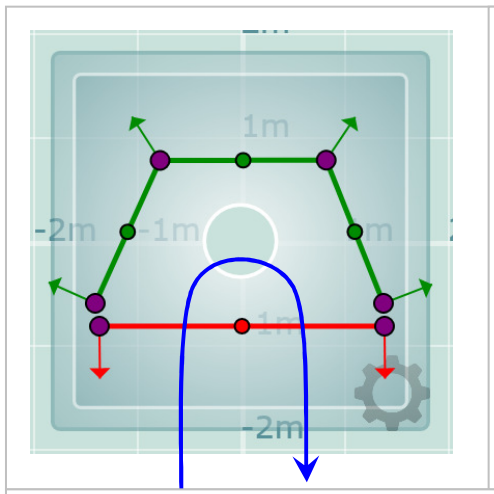
Line 1
0
Line 2
0

Deferred Mode with Count U-Turns OFF



Line 1
0
Line 2
1

Deferred Mode with Count U-Turns ON



Line 1
0
Line 2
0

Deferred Mode with Count U-Turns OFF

Deferred count mode with Count U-turns disabled, is the recommended count mode for the majority of people counting applications, although Deferred with Count U-turns enabled may be required for some installation types.

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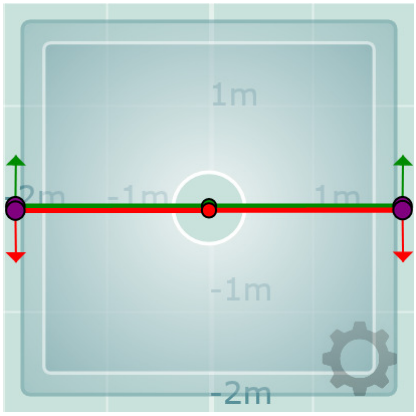
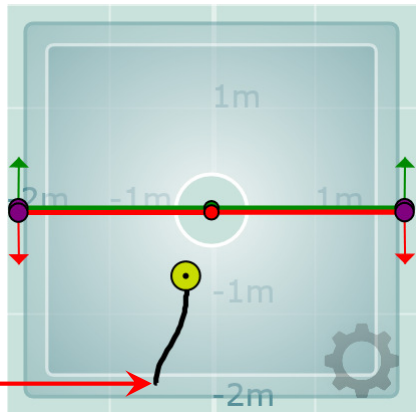
5.People Counter Principles: Initialisation

The counter requires a certain amount of time and space to detect a person entering the field of view. This is built-in to the counters tracking routines to make sure that they are reliable.



The sequence of events is as follows:

1. Temperature change detected – this is usually at the edge of the field of view but not always – this cannot be seen by the user.



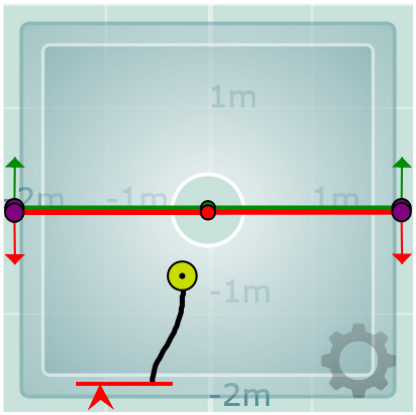
2. Counter Assigns Target – target initialised – and target tracking begins.
3. Target crosses count line and leaves field of view.

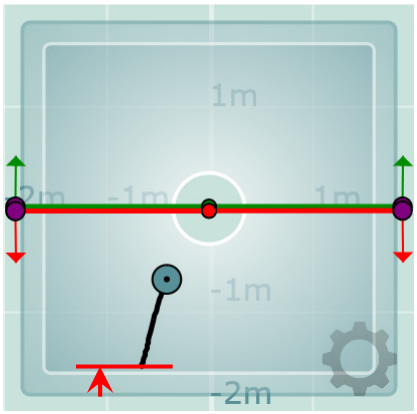
Target Initialised

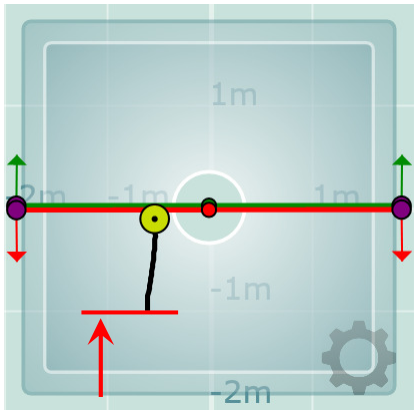
The time taken for a person to be initialised as a valid, track-able, target depends on a number of things, such as:

- The Speed person is moving
- The Temperature contrast between the person and the floor

Initialisation time can therefore vary from person to person and from day to day:







If the count lines were positioned so that it was possible for a person to cross a count line before the counter had initialised a target, then that person would not be counted.

Always allow sufficient space between the edge of the field of view and the count line to ensure that a person is detected as a target before the line is crossed. This space is called 'initialisation'. Initialised targets are shown by a circular identifier in the counter set-up software screen. The exact requirement is dependent on the particular environment. Use of the path map function in conjunction with walk testing is advised. Maximise the initialisation space by placing the count line as far away from the edge where the people enter as practically possible.

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6. People Counter Operation: Stopping In the Counters Field of View

The counters 'detection array' senses changes in temperature. As a person moves through the field of view of a counter they are detected and tracked because they are a different temperature to the floor – this can be hotter or colder than the floor.

Because of this detection mechanism, anyone who stops in the field of view of the counter will be lost from view after a number of seconds of inactivity. This can take up to 10 seconds of complete stillness. The problems associated with this are shown below.

Entrances with displays either side or shops with merchandise racks by the door will mean that some people will stop within the field of view and they could be not counted at all or, more likely, counted multiple times. In these cases, it is important to select a count line configuration and count mode which will minimise problems such as these.

Some entrances may prove to be challenging to install and configure so that they count accurately.

Security guards and 'meet and greet' staff at entrances - by their very nature and location within the store - could generate extra, unwanted, counts as they move near the entrance and across the count lines. Staff that are usually positioned at, or near, the doorway should be made aware that their movements could generate multiple unwanted counts. They should be told where it is ok to stand and about areas where they should avoid walking to minimise extra count increments.

The two problems associated with stopping in the field of view are explained in more detail over the page...

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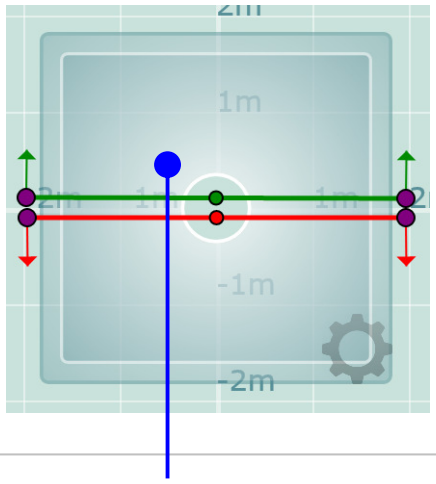


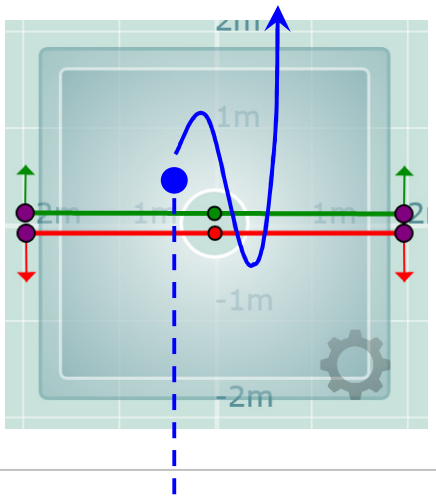
Line 1
1

Line 2
0

If someone walks through the field of view and stops after the count line (see figure, left), then they will generate a count. If the count mode is set to immediate then you will get an increment at the point the person crosses the count line. If the count mode is set to 'Deferred' then you will get a count increment at the point the person disappears from view.

(Disappearing from view is the same as physically walking out of the field of view.)

If a person disappears within the field of view, when they move again they will be seen again and will be initialised as a new target (see previous section for more details on initialisation). This can cause one of two problems:



Line 1
0 or 1
*****

Line 2
0 or 1
*****

A new target is never re-associated with a previously lost target; this means that it can generate a count if it crosses a count line.

Therefore, a person who has been counted already, but who then stops in the field of view, could be counted again.

This is regardless of the count mode selected (see figure, left).

* Dependant on count mode selected.

This would be an over count.

Correct placement of the count lines to help prevent this issue would involve watching, or anticipating, where people may stop and then ensuring that a person has been counted already before they stop, or ensuring that a person can be successfully counted after they stop, when they move again. See next page...

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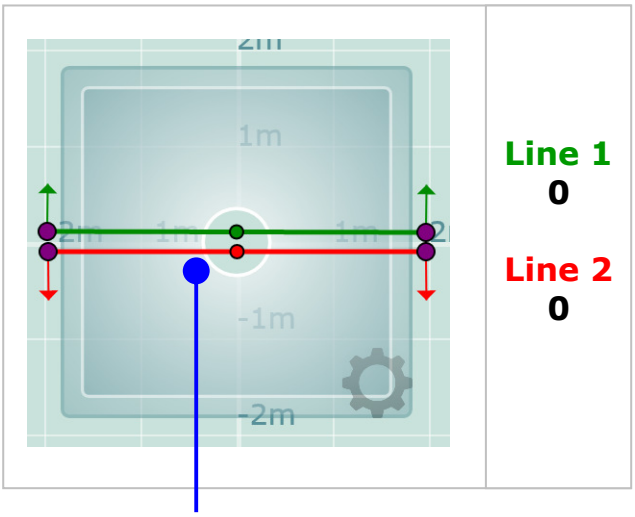
A new target must always be initialised, but if a person is already within the field of view at that point, the new target could be initialised after the count line, which could mean that they would not be counted at all, see below:

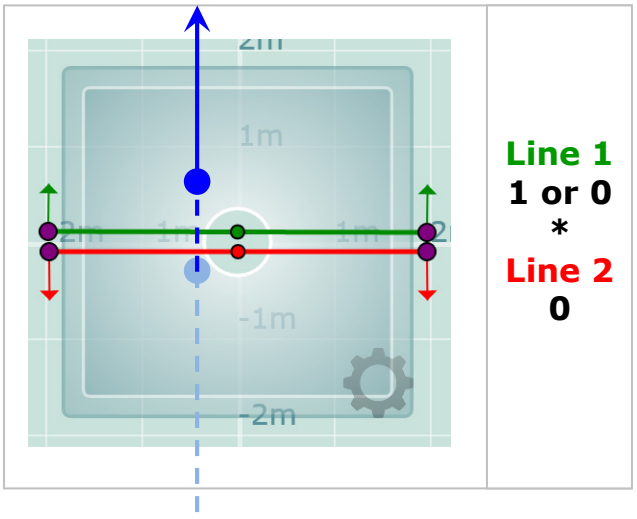


In this example, a person has walked in to the field of view of the counter and has stopped just before the count lines. If that person stops completely still for long enough then the counter will 'lose' them at this position. They will be deemed to have left the field of view but, as no count lines were crossed, no increments are given.

If that person moves again and continues through the field of view, they will be re-initialised as a new target.

But, because they appeared very close to the count line, they may not be initialised before crossing the line, which means they may not be counted at all.

(See previous section for more details of initialisation requirements.)



This would be an under count.

Correct placement of the count lines to help prevent this issue would involve watching, or anticipating, where people may stop and then ensuring that a person has been counted already before they stop, or ensuring that a person can be successfully initialised and counted after they stop, when they move again.

Because of the problems associated with people stopping in the field of view, it is always recommended that counters are mounted over areas where people flow through freely, and where they are unlikely to stop.

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7. People Counter Installation: Installation Basics

- The counter is typically installed near entrances or exits to count people entering and leaving an area.
- The counter is a downward looking device.
- Select a central location with a clear unhindered view of the scene. Visualise the counter as seeing a pyramid (see section 1) and attempt to locate the counter such that the count lines are at the centre of the field of view. This should allow for adequate initialisation in both directions (see section 5).
- Select a location where people move freely into an area; avoid queues, areas where people bunch or gather or areas where people are stationary (see section 6). For example, select an area inside the entrance where people have entered and are moving steadily away from the entrance.
- Avoid pinch points or areas where people bunch together or queue.
- Measure the mounting height; this should be above 2.2m and below 4.8m for the standard 60° lens unit - the ideal mounting height is in the middle of the height range (3.5m). Other lens options are available for mounting above 4.8m.
- Measure the width of opening (measure that part of the opening where people pass through). By comparing the height and width with that on the Mounting Height Graph (shown in document IPU40188), you will be able to judge whether one counter is sufficient for your particular environment. It is recommended that the field of view from a single counter should be the size of the width of entrance plus 1m in order to provide ½m coverage either side to allow for walkers from the left or right (see Initialisation Requirements section 5 above). If one counter cannot sufficiently monitor the width then more than one counter will be required to span the opening. Wide Opening Networks such as these can be up to 8 units (and greater in some circumstances – contact Irisys for guidance). All units connected as a wide opening network must be positioned in the same orientation.
- The counter can be mounted on solid, or suspended, ceilings.
- A 3-5cm hole should be drilled into the ceiling above the counter to allow connection cables to be fed through.
- Wiring to the counter should be kept away from fluorescent light fittings and other high voltage equipment and cables, in order to avoid possible interference.
- Install the counter at the selected location. If you have any doubts about the location then a temporary installation should be made and the people counter output should be carefully observed using the setup software.
- Shape and position the count lines as required. Remember, the optimum line positioning is the key to accurate counting. Always walk test thoroughly to confirm accurate counting.
- Observe the counter output and fine-tune the count line positions and sensitivity slider position to achieve optimum performance. This is best done by observing people moving through the scene and observing the counter operation.
- Lastly choose the correct count mode for your installation.

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8. People Counter Installation: Mounting Height Issues

- Mounting at heights of 2.5m or lower is NOT recommended, although 2.2m is the absolute minimum mounting height. Below 2.5m a person's arms and legs may be seen as separate targets and therefore, OVER-COUNTING may result. Because of this, the 'Discrimination Sensitivity' slider setting should be configured as appropriate, see section 11 for details.
- Survey the scene to see whether an alternative mounting point with height greater than 2.5m is available. If no alternatives exist, then a temporary installation should be carried out and judgement should be made as to whether the counting result is acceptable.
- Mounting above 4.5m may lead to problems in discriminating closely spaced people and UNDER-COUNTING may result, although 4.8m is the absolute maximum mounting height allowed which may require the 'Discrimination Sensitivity' slider to be adjusted appropriately, see section 11 for details. This is because the size of the target starts to approach the size of a single pixel and therefore the resolution of closely spaced people becomes difficult. Other lens options are available which should be used above 4.5m.
- Always measure the mounting height accurately and set correctly in the people counter software as part of the configuration process.

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9.People Counter Installation: Mounting Issues

Ensure a clear field of view is provided in order to maximise the potential line placement options and allow for sufficient target initialisation in both directions.

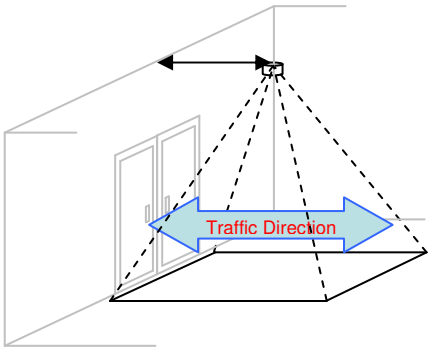

Figure 9.1

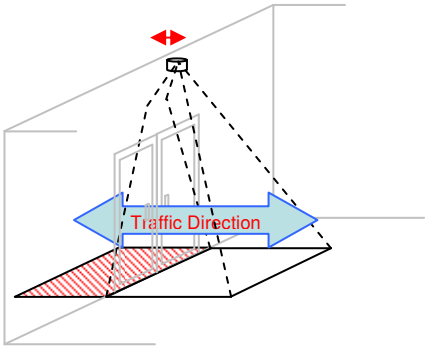

Figure 9.2

If possible, always avoid situating the counter too close to a wall, or other barrier (as shown in Figure 9.2), as this will reduce the amount of usable field of view available. Consequently, the initialisation and line placement choices will also be reduced (as shown in Figure 9.3).

Target initialisation from the direction of the blocked part of the field of view will also be affected as people will 'appear' further into the field of view and not at the edge of the field of view.

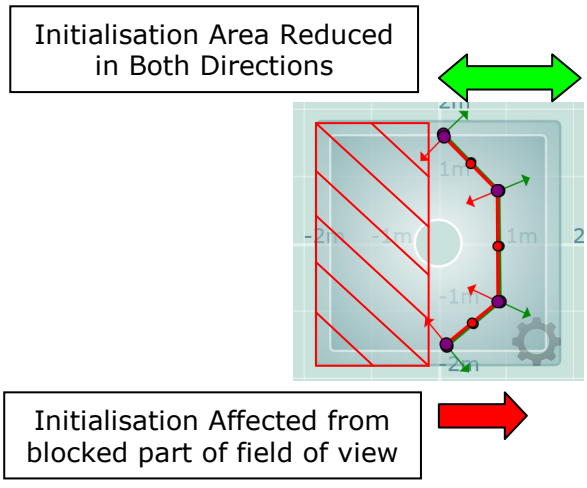

Figure 9.3

Positioning the counter in such a way that an obscured part of the field of view leaves an area that is not covered at all (Figure 9.4) will result in frequent under counting (Figure 9.5).

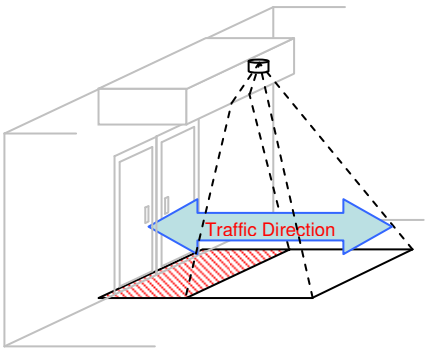

Figure 9.4

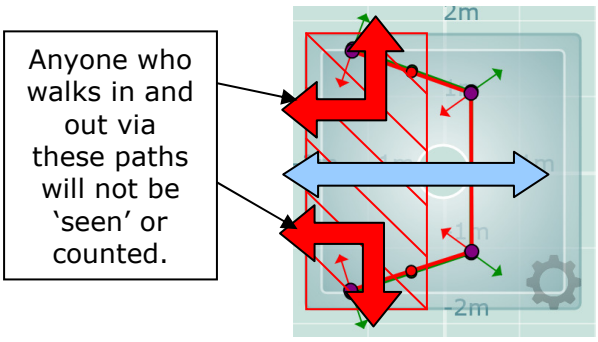

Figure 9.5

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Avoid installing into physically small rooms where the size of the field of view is reduced significantly. Locations such as vestibules and airlocks (Figure 9.7) can reduce the field of view to an ineffective size where it is not possible to provide enough initialisation AND position the count lines for accurate counting (Figure 9.6).

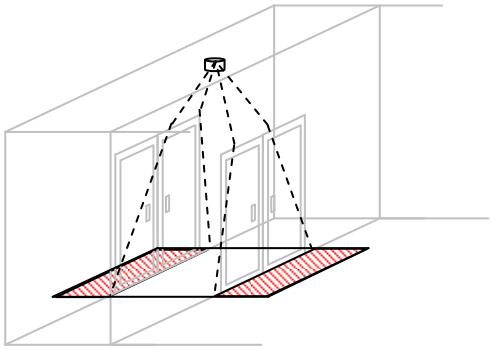

Figure 9.7

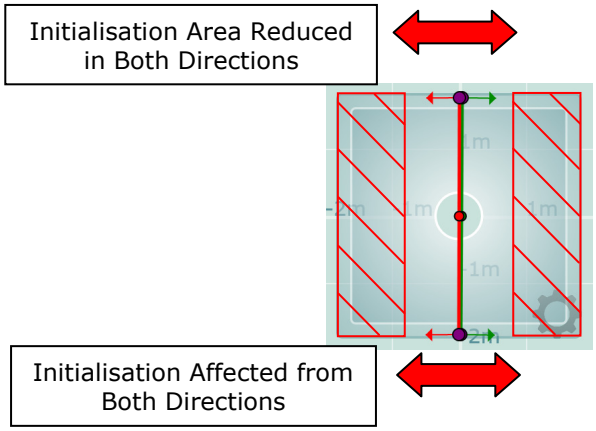

Figure 9.6

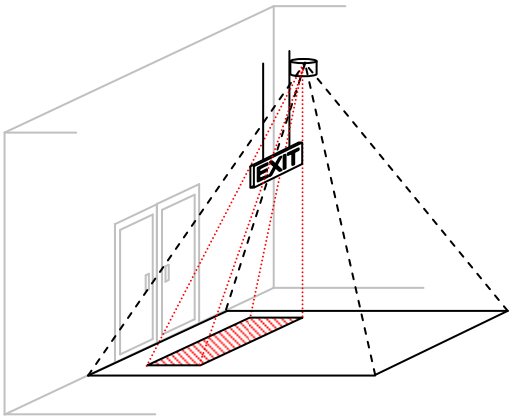

Figure 9.8

Obstacles in the field of view will create a 'gap' in the array view where people cannot be seen. Even a relatively small sign in the field of view (Figure 9.8) can obscure a large area of the ground (Figure 9.9).

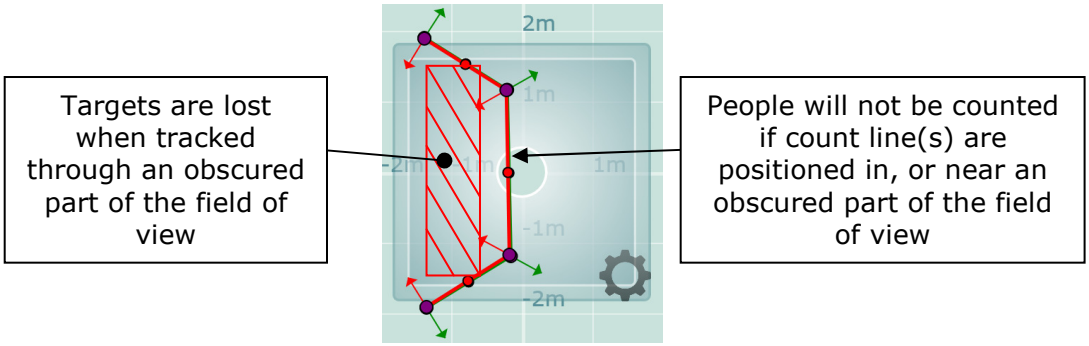

Figure 9.9

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When monitoring pedestrian flow up and down stairs, position the counter at the top or bottom of the staircase (Figure 9.10). Do not install the counter in the middle of a staircase – over the steps – as the natural movement of people closer to, and further away from, the counter, results in the targets altering in size which can confuse the counter. It may be possible to mount in the middle of a staircase over a flat 'landing area'.

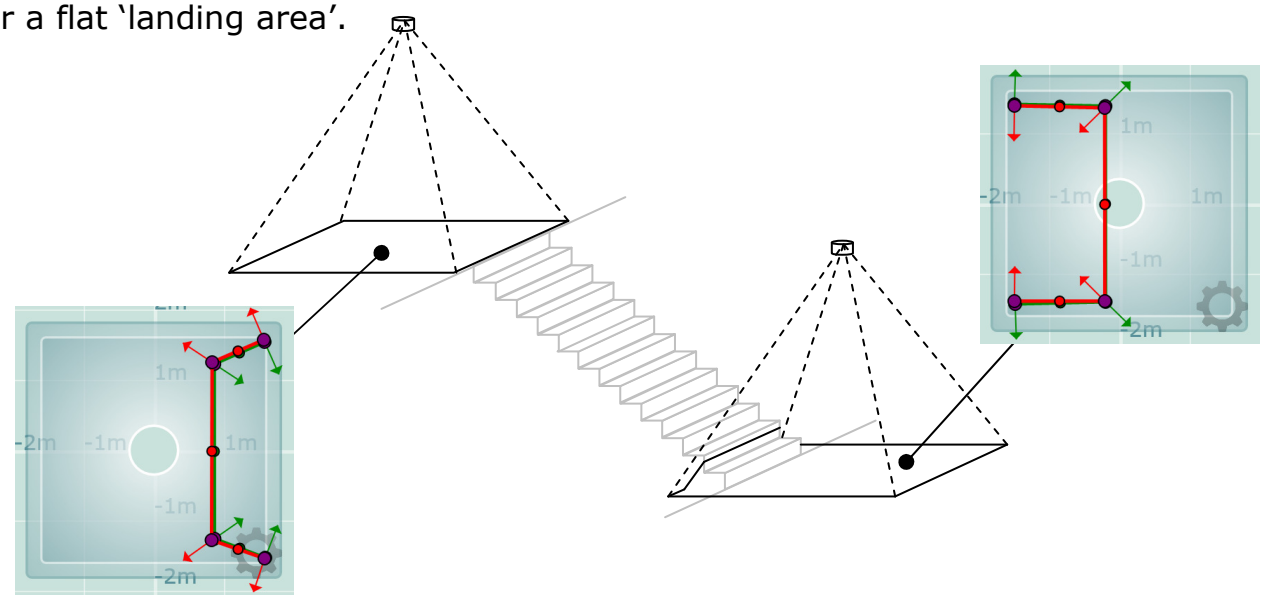

Figure 9.10

Escalators should be installed in the same manner as staircases, i.e. at the top or bottom and not in the middle (Figure 9.11).

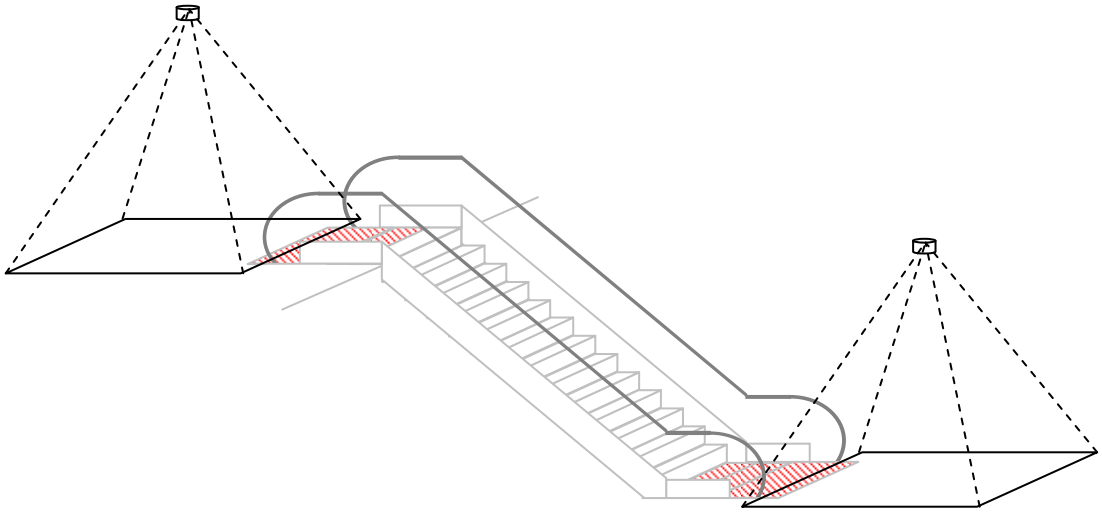

Figure 9.11

Additionally, thermal effects are occasionally observed above the 'landing plates' of escalators where people get on and off the steps. This is caused by the escalator steps moving underneath the metal plate. Also, as they are generally of a reflective material, they can also create hot or cold areas within the counters field of view originating from overhead light sources. The effects seen are either false 'ghost' targets or sometimes genuine targets being lost as they pass over the landing plate area. Because of this, counters should not be installed above these landing plate areas unless unavoidable. Care should be taken with line positioning and observing the counter operation for an extended period is recommended, in these examples, to avoid count inaccuracies.

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10. People Counter Installation: Doorways, Doors and Entrances

A door will interact with the count line in circumstances where a temperature difference exists between the outside of the door and the interior temperature (this is common, especially if the door opens from the outside).
Rotating doors and sliding doors should be catered for in the same manner (as again a temperature differential will exist).

- Avoid mounting the counter over a doorway where the door opens into the scene, where possible. In any case the counter should always be positioned optimally as shown in section 9, Figure 9.1.

- In some circumstances, the door will cause false counts, if the count lines are positioned incorrectly. See Figure 10.1.

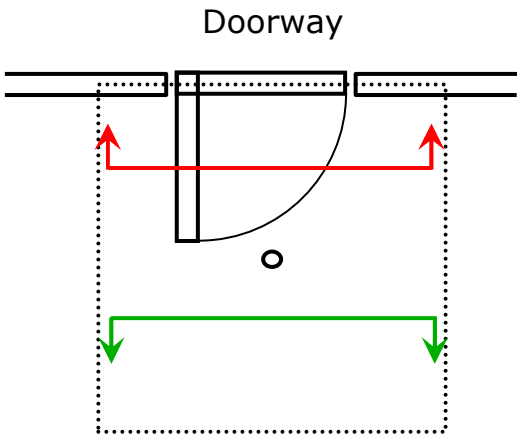

Figure 10.1

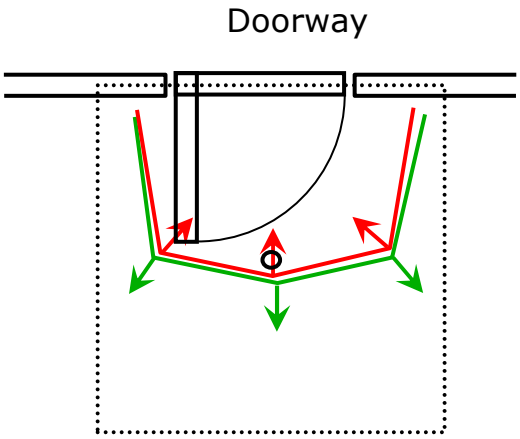

Figure 10.2

- Customise the count line to surround the doorway. This prevents the opening and closing of the door from generating false counts whilst ensuring that people who pass along the wall are also counted. See Figure 10.2.

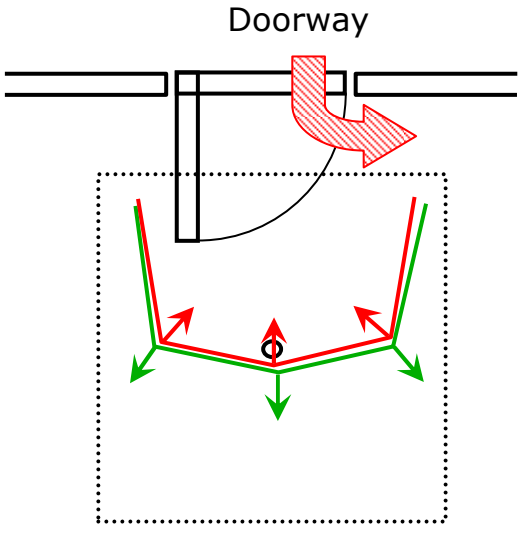

Figure 10.3

- Do not move the counter too far away from the door so that an opening is formed. People who are not seen in the field of view will not be counted and accuracy would therefore be affected. See Figure 10.3.

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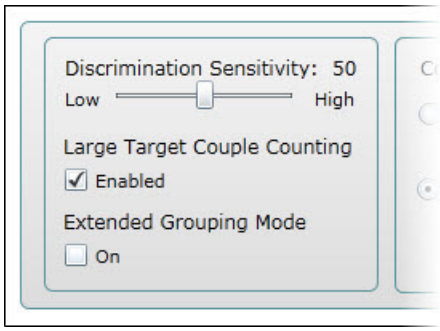
11. People Counter Installation: Discrimination Sensitivity

The discrimination sensitivity slider setting is utilised internally when the counter is identifying individuals from the thermal 'signature' that it sees as people walk underneath.

Sometimes a single person can be seen as more than one 'object'; this is more likely to happen at very low mounting heights where a person's arms and legs may be seen as separate thermal objects. Intelligently, and automatically, the counter will group together these targets and give the correct count of one. By adjusting the sensitivity slider position you can affect how far the grouping of targets goes. By lowering the slider, thermal objects are more likely to be joined together as one target, but by increasing the sensitivity, thermal objects are more likely to be kept as separate trackable targets.

Conversely, people who walk very close together can sometimes be seen as only one object; this is more likely to happen at very high mounting heights when the counter may be quite far from the people and so is not able to separate two people walking side by side. Again, by increasing the sensitivity setting, a large thermal object is more likely to be seen as two separate targets or will be considered a 'couple target' which will generate two counts if it crosses a count line. Couple counting can be manually disabled if required. This would normally only be required when over counting is being seen and lowering the sensitivity slider is not enough.

See Software User Guide documentation IPU40183 for more details of this functionality. It is the installer's responsibility to correctly set this slider position in order to maintain count accuracy.



The discrimination sensitivity slider is found in the advanced section of the setup tool. Alongside the slider are two tick boxes which will affect the targets which are initialised, tracked and counted.

- Large Target Couple Counting

Depending on the Discrimination Sensitivity setting and what the counter is seeing, occasionally a target will be counted as two. This is when the counter considers the target to be two people walking close together – a couple – and these targets will be shown in blue instead of yellow for a single person. The higher the setting the more likely a blue, couple, target will be seen. If disabled, all targets will be single, yellow, targets. Disable only if extreme over counting has been observed.

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- Extended Grouping Mode

When enabled the discrimination sensitivity sliders range is altered to allow more extreme grouping of targets. This is intended for situations where a person pushing a supermarket cart is being counted twice, for example - by enabling this option and setting the slider correctly – all the thermal objects seen by the counter which are generated from the cart and the person will be grouped together into one target. If this target crosses a count line the correct count of one person is given.

If over counting is seen and the cause is shopping carts being counted, the first course of action should be to lower the discrimination sensitivity and disable couple counting (see above), but if this does not work, the extended grouping mode option should be enabled, and the slider repositioned as required.

The lower the discrimination sensitivity slider is set, the more extreme the target grouping will become, and so the more likely that people walking in groups will be grouped together and counted as only one. In this way a basic form of 'shopping group' counting can be provided.

When enabled the Extended Grouping Mode:

- modifies how the slider position is interpreted,
- provides much more grouping when the discrimination sensitivity slider is in the middle default position (slider position 50),
- allows extreme levels of grouping to be selected if required (slider positions < 50),
- still allows the same degree of discrimination to be selected if required (slider positions > 50),

It is intended to be used in scenarios in which couple counting would normally be disabled.

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12. People Counter Installation: Groups, Crowds and Queues

- Always observer the counters operation using the setup tool software in order to see what is going on. The Dualview counter in conjunction with the validation tool software is ideal for this purpose.
- The counter works best for free-flowing groups of people.
- If people stop in the field of view or bunch up in such a way that there is no observable separation between people then the counting accuracy will fall. Mount the counter in a more suitable location and/or increase the sensitivity slider setting as required.
- Stationary people, who come to a standstill due to obstructions or queues in their path, may not be counted, or could be counted multiple times (see section 6). Be careful where count lines are positioned relative to the area where people are seen to stop.
- Mount the counter to avoid the following situations wherever possible:
  - Static groups of people or queues.
  - Very dense groups of people or crowds.
  - Bunching or queuing caused by pinch points or obstructions.
  - Door security staff, meet and greet staff, floorwalkers etc.
  - Tills, service desks, kiosks etc.
  - Security checkpoints and 'stop & search' areas.
- Always check the position of the 'Discrimination Sensitivity' slider to ensure correct counter operation and therefore count data accuracy. If groups of people are being under counted then the sensitivity should be increased so as to pick out individuals. Conversely, it should be lowered if individuals are being incorrectly recognised as two or more targets. See the software user manual IPU40183 for more details of this function.
- The IRC3000 series counters incorporate an automatic couple counting function enabled by default (this can be disabled if necessary). When enabled, and using the height information and Discrimination sensitivity slider setting, two people walking next to each other will be recognised as one large target thermal mass. The couple counting algorithm will activate and treat that one 'target' as two people which will generate an increment of two if it crosses a count line. A target which is deemed to be two people is coloured blue. A target which is deemed to be a single person is coloured yellow. Correct setting of the discrimination sensitivity slider is required for this function to behave correctly.

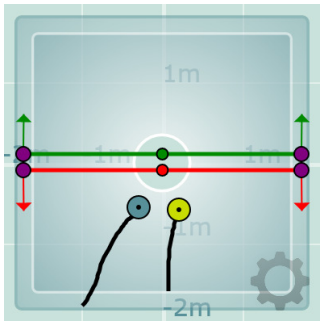

Figure 12.1

- For counting individuals in groups, the 'Extended grouping Mode' option should be disabled. For counting a group of individuals as one, it should be enabled, and the sensitivity slider adjusted as required.

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13. People Counter Installation: Supermarket Trolleys & Airport Baggage

The counter will detect changes in temperature caused by other moving objects such as shopping trolleys in supermarkets and luggage trolleys in airports. Moving objects like this will initialise as a target and will be counted if they cross a count line. To avoid counting things other than people, the 'Discrimination Sensitivity' slider should be set at 'Low' discrimination and 'Large Target Couple Counting' should be disabled. 'Extended Grouping Mode' may also need to be enabled. Evaluation of the data is strongly advised. See section 11 for more details of the available advanced options.

Figure 13.1

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14. People Counter Installation: Thermal Issues

The detector provides optimum performance in stable thermal environments. Situations where the thermal background in the field of view of the detector can have marked localised temperature differences (hot spots) or can change temperature rapidly, should be avoided if possible, as these circumstances can lead to a reduction in performance.

Examples of such situations are: -

- Locations where machinery or lighting may cause significant localised heating of the floor, such as the top or bottom 'landing zones' of escalators or walkways (see next section for escalator issues), or under high power lights.
- Areas where intense sunlight falls on the floor within the field of view of the detector **and** where the following circumstances exist:
  - The detector is close to doors which separate two areas with very different temperatures, e.g. those which separate an indoor air-conditioned area from an extremely hot (or cold) exterior, particularly where the floor surface can change temperature rapidly, e.g. where the flooring material is carpeting. Where these circumstances cannot be avoided, care must be taken over the positioning the count lines to avoid over-counting.
  - The flooring materials in the field of view are of different types and any of these is able to change temperature rapidly, e.g. carpeting over tiles. Particular care should be taken with rubberised floor mats which may become hot in direct sunlight and cause localised hot-spots in the field of view. Where these circumstances cannot be avoided, care must be taken over the positioning the count lines to avoid under-counting.
  - There are areas of sunlight and shadowed areas within the field of view of the counter which have substantially different measured temperatures.
- Floors made of reflective material which could reflect other heat sources into the lens of the counter. This can cause false target to be initialised which could be counted, or can create localised hot or cold areas within the field of view. E.g. the top or bottom 'landing zones' of escalators with lights above.

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15. People Counter Installation: Other Issues

- The counters should be powered using a grounded power supply. See installation document IPU40182 for more details.
- An IP enabled counter uses very little IP bandwidth and it is recommended that the port speed of any managed switches is fixed at 10Mbps or Auto negotiation is enabled (at which point a 10Mbps connection will most likely be established). Port speed should not be set to 100Mbps.
- Ensure that there are no hanging signs, decorations, fans, or other objects anywhere in the field of view of the counter, as these will mask part, or all, of the field of view. On site staff should be informed of the effect of hanging product signage or seasonal decorations beneath the counter also.
- The counter is intended to be ceiling mounted. If this proves impossible, the counter may be wall mounted. If this is required, then a bracket or mounting arrangement should be used that the counter will look down on the scene with a clear field of view not too close to the wall – an extended pole of 1-1.5m dependant on height is recommended (remember the issues of initialisation).
- Do not mount the unit adjacent to vibrating equipment or in contact with heating ducts or pipes where temperature changes will be encountered.
- Wiring to the counter should be kept away from fluorescent light fittings and other high voltage equipment, and cables, in order to avoid possible interference.
- The counter requires a 'settling time' at switch on; this is between 45 seconds and 2 minutes, dependant on conditions. This is effective on first power on and subsequent power up cycles. Resetting the counter by cycling the power supply should be avoided as this settling time will begin after each power on (counts will also start again from zero). Counting only starts after the settling time has completed.
- On-site staff should be informed of the operation of the counter in order to avoid any unwanted counts caused by staff movements. This especially refers to security guards who may walk through the entrance to a shop for example and whose movements will be counted if they cross a count line. Also staff should be made aware of the impact on the counting figures of entering through a door where counting occurs but then leave through a door which is not monitored – a staff door, for example – or vice versa. This can cause large discrepancies between IN and OUT counts.

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

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16. People Counter Verification: The Interpretation of Count Data

- When installed the people counter output should be compared to visual observations from the scene to ensure that the performance is as good as expected. The Dualview people counter is ideal for this as it provides side by side thermal ground plane view and video view of the area beneath the counter. This allows real time (remote) viewing of the counter in operation, and additionally allows scheduled recordings to be made for later download and playback. Alternatively, when the Dualview unit is not available, accompanying video tape recordings may be taken for later corroboration in the same way.
- Care should be taken to ensure synchronisation between corroborative counting methods. Manual counts should be carefully done to ensure all people passing through are counted. See document IPU 40175 for manual count procedures.
- Care should always be taken with the interpretation of count data. The people counter counts everyone who passes over the count lines provided the installation requirements of mounting height, line crossing and initialisation are met.
- Counted objects will include adults and children, dogs, babies & infants in buggies and carriers, and shopping trolleys in some circumstances (particularly where the trolley has a thermal difference to the background – see section 13 for details of how to deal with the issue of counting shopping trolleys). The counter does not discriminate differences between objects; if an object has a thermal difference to the background and has the appropriate size and shape it will be counted as a person. Staff members, security guards and the like will be counted if their motion is comparable to that of valid people entering the premises.
- Remember that the counter will count all people - it will not ignore staff and only count customers! Also, if a person enters and then leaves but then returns later, they will be counted again – the counter does not recognise each person individually and cannot ignore them if they have been counted previously!
- Groups of people are counted as individuals as long as there is sufficient distance between everyone for the counter to recognise each person individually. If people are merging into a single target then correct setting of the Discrimination Sensitivity slider should be confirmed and adjusted as necessary. If sufficient distance between individual people cannot be demonstrated then a different counter mounting location may be required.
- Ensure that the position of the count lines is suitable to capture all the people entering or leaving the scene. Ensure, in particular, that people cannot pass around the ends of the lines without being captured. Equally, care should be taken to place the count lines only in areas where you want to count people and to avoid unwanted traffic counts were applicable, for example do not count people already in a store who are walking past the entrance.

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17. People Counter Data Usage: Safety and Occupancy Issues

- Irisys does not recommend the use of the people counter in any safety critical environment, e.g. fire safety, building evacuation etc. Be extremely careful about using any automated counter for occupancy and safety issues – this applies to any counting technology, not just Irisys counters. This is because no automated counter will be 100% accurate.
- In the case of occupancy - where occupancy is defined as the number of people within a building or area - you are effectively subtracting OUT traffic from IN traffic. Even a very small inaccuracy on the IN and/or OUT counts will build up very quickly throughout the course of a day (or even an hour where throughput is very high), and eventually the occupancy figure may be so inaccurate that the number is meaningless. This can occur even with very small error percentages but is more likely to occur if the IN and OUT accuracies are different from each other, and/or throughput is very high.
- If using count data for evacuation counting then the data should be considered a guide rather than a measure of the exact numbers of people left in a building. People will move much more quickly and may be packed together more tightly if forced to evacuate a building in an emergency situation and this will affect accuracy.

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