installation manual.

LPR cameras

This guide takes you through the steps to install our License Plate Recognition (LPR) Camera. The installation stages consist of.

site inspection.

positioning the cameras.

internet power connection.

gate connection.

inugo installation methods.

Inugo supports two installation methods, both of which are Power of Ethernet.

1. **cable to ethernet connection.**

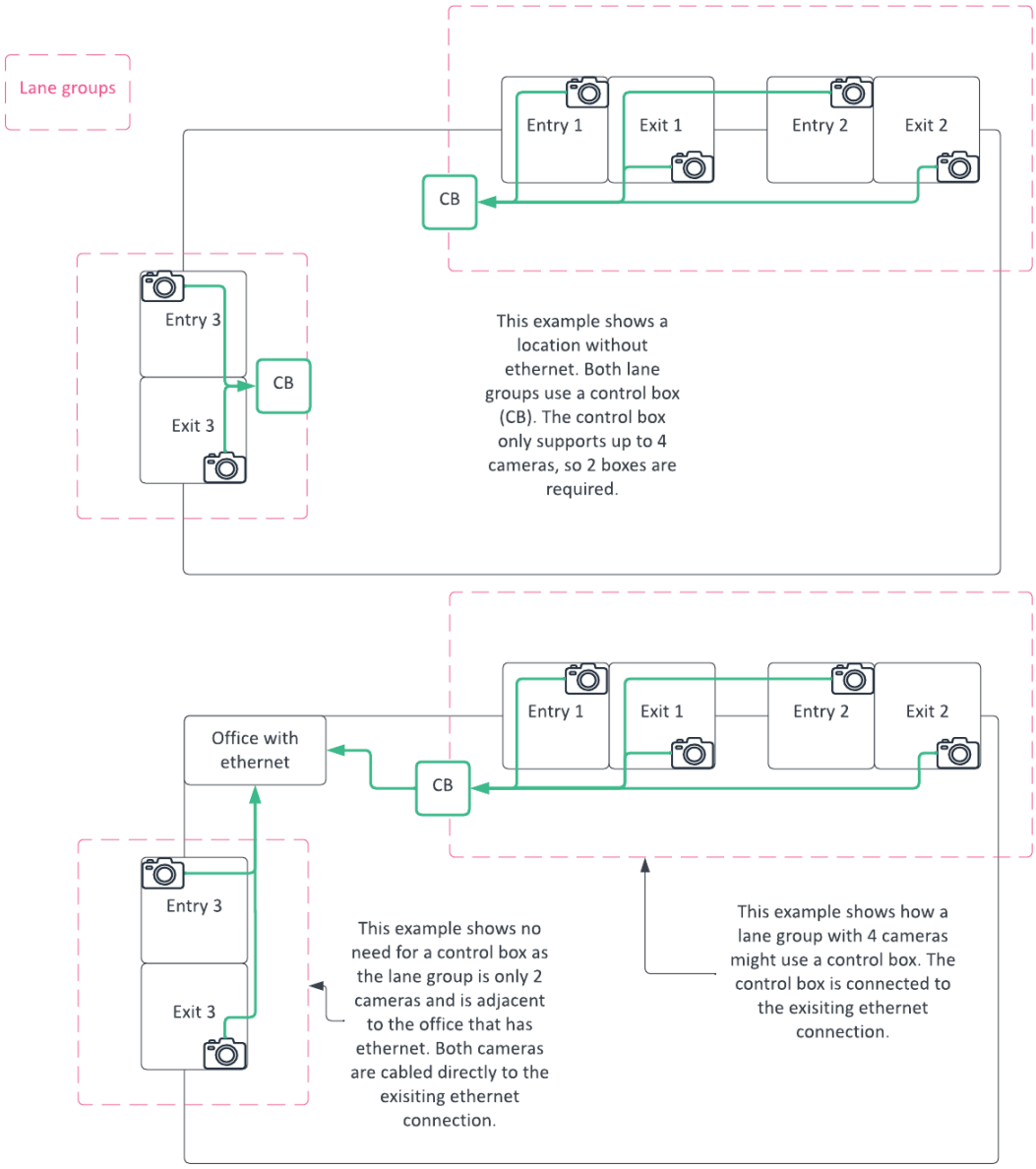
Where there is an existing ethernet connection on the location, you might consider using this to as the power for the cameras. This is suitable when there are 2 cameras or less; the ethernet connection is within 50ft of the cameras; the ethernet is Power over Ethernet. Cabel will be run from the camera to the existing ethernet switch on site.

2. **control box.**

Where there is no ethernet internet connection on site, but there is 4G cellular coverage, an Inugo Control Box is available that has a cellular router. The control box supports up to 4 cameras. The control box can be used to minimize cable requirements for the cameras. The Control box can also be connected to existing ethernet connection to minimize cabling requirements.

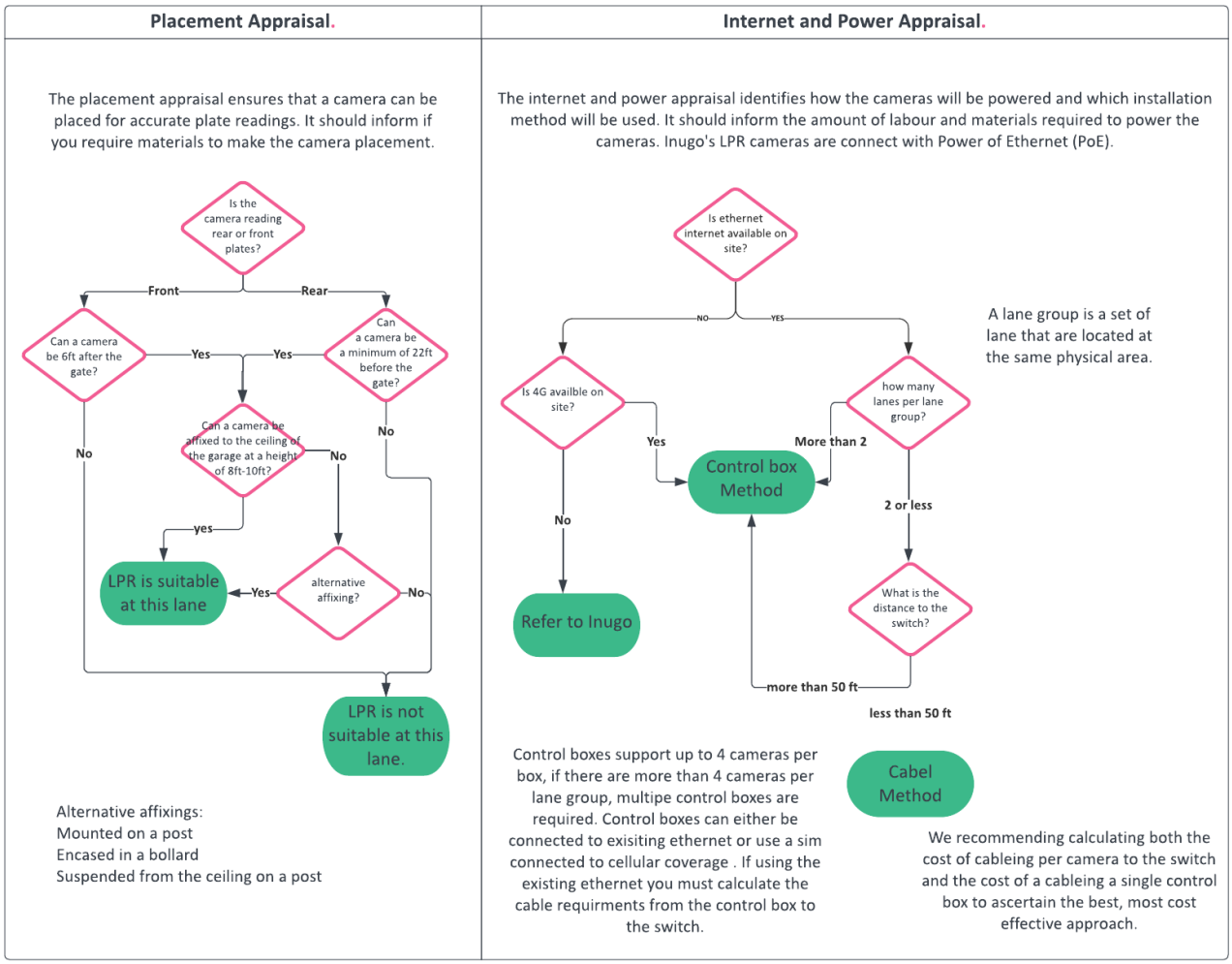
All cabling connections should be housed within appropriate conduit, securely fastened to surfaces and located and labelled clearly to minimize any chance of interference. Inugo's cameras are Power of Ethernet (POE). If there is no internet connection, then this must be provisioned before an Inugo solution can be installed.

examples.


Lane groups
Entry 1
Exit 1
Entry 2
Exit 2
CB
Entry 3
Exit 3
CB
This example shows a location without ethernet. Both lane groups use a control box (CB). The control box only supports up to 4 cameras, so 2 boxes are required.
Entry 1
Exit 1
Entry 2
Exit 2
Office with ethernet
CB
Entry 3
Exit 3
This example shows no need for a control box as the lane group is only 2 cameras and is adjacent to the office that has ethernet. Both cameras are cabled directly to the exisiting ethernet connection.
This example shows how a lane group with 4 cameras might use a control box. The control box is connected to the exisiting ethernet connection.

site inspection.

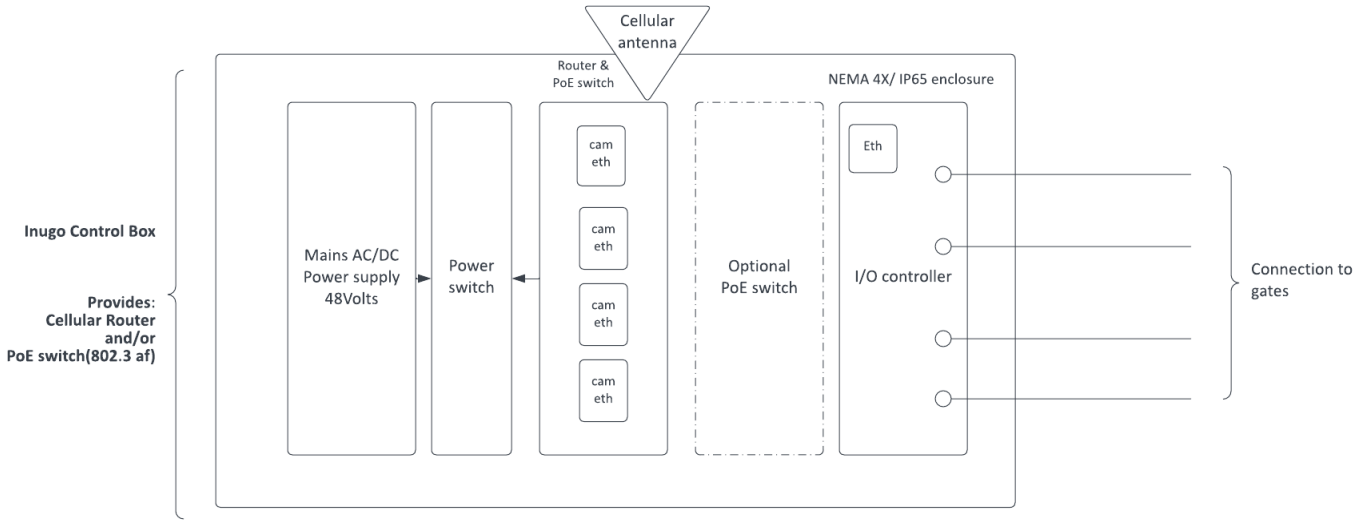
The below diagram explains the process for your site inspection prior to installation. You should complete a Placement Appraisal that confirms LPR can be suitably placed for an accurate read and you should complete an Internet and Power Appraisal to determine the most efficient method for powering the cameras. This includes determining whether Inugo Control Boxes are required.



Use our site inspection form to record all the information on your appraisals. The form can be found here: [Site Inspection Form].

inugo control box.

The Inugo control box allows you to connect up-to four cameras to the box as a means of powering the cameras. The control box can also be used as the internet connection.



positioning the camera.

When placing the camera, the distance from where a vehicle is expected at a gate and the height at which the camera is fixed must be considered.

rear reads.

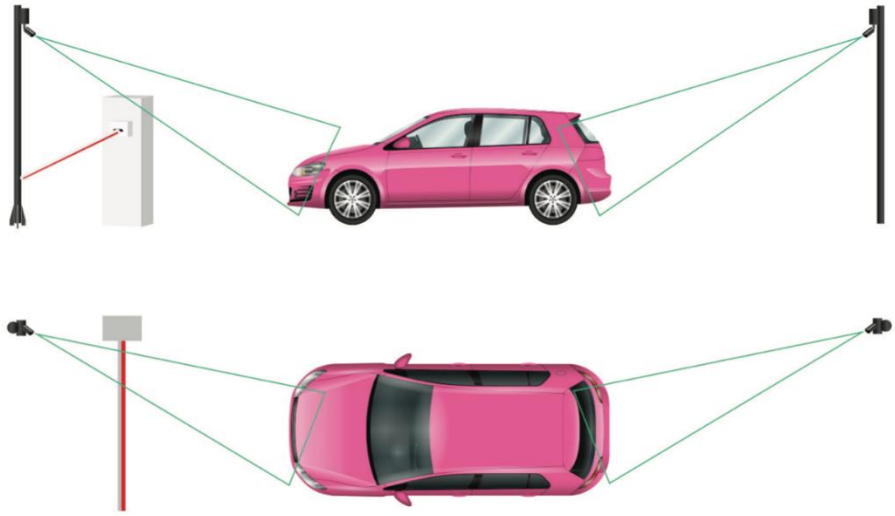
- The camera should be mounted at least 2 meters from the closest position of the license plate to be read. In practice, for rear reading, this means that the camera should be mounted between 22 and 24 feet from the gate. This is based on an average vehicle length of 17 feet.
- The viewing angle from the camera to the license plate should not exceed 30° in any direction.
- The camera contains two infra-red LEDs, and these should be parallel with the parking surface. If this is not the case, meaning the image of the plate will be angled, it can be angled up to 20° clockwise or counterclockwise.
- The camera should be mounted no higher than 2.7m(9ft), this allows for the optimum angle for reading plates and protects to some degree, from a second vehicle obscuring the rear plate of a first vehicle.

front reads.

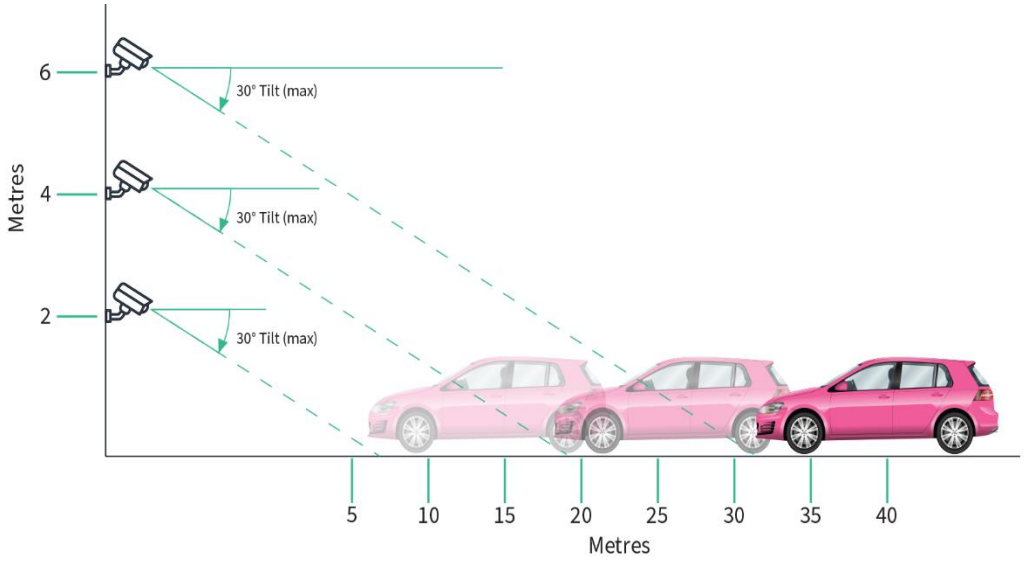
- The camera should be mounted at least 2 meters from the closest position of the license plate to be read. In practice, for front reading, this means that the camera should be mounted between 6 ft and 8ft feet from the gate.
- The viewing angle from the camera to the license plate should not exceed 30° in any direction.
- The camera contains two infra-red LEDs, and these should be parallel with the parking surface. If this is not the case, meaning the image of the plate will be angled, it can be angled up to 20° clockwise or counterclockwise.
- The camera should be mounted no higher than 2.7m(9ft), this allows for the optimum angle for reading plates and protects to some degree, from a second vehicle obscuring the rear plate of a first vehicle.

diagrams.

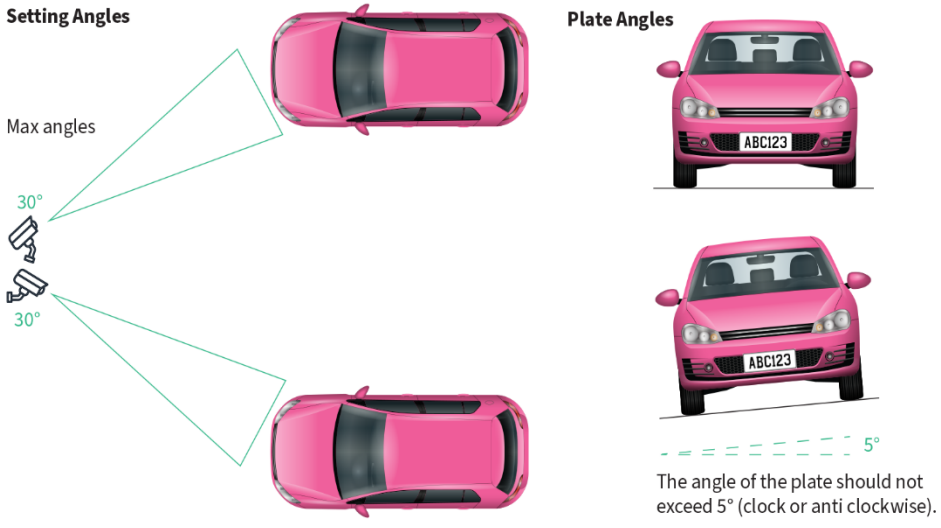
distance from gate.



height distance and angle.



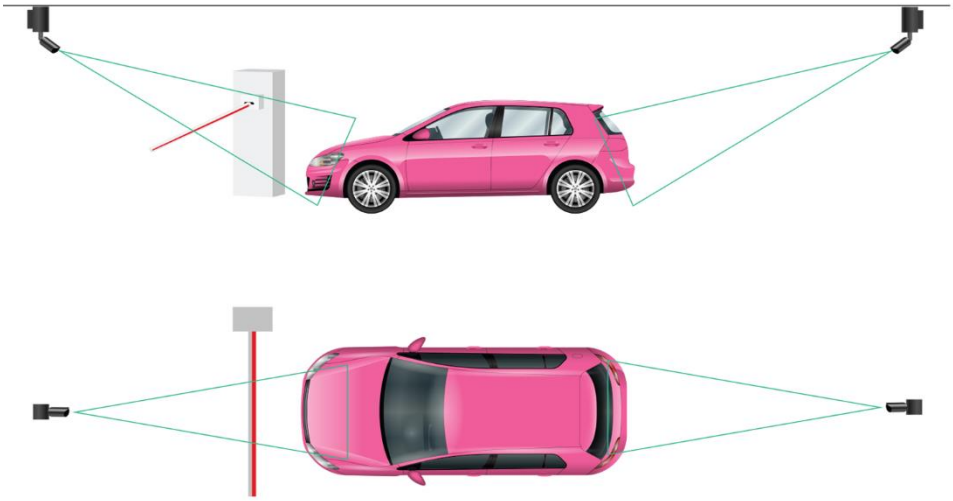
rear angle considerations.



affixing.

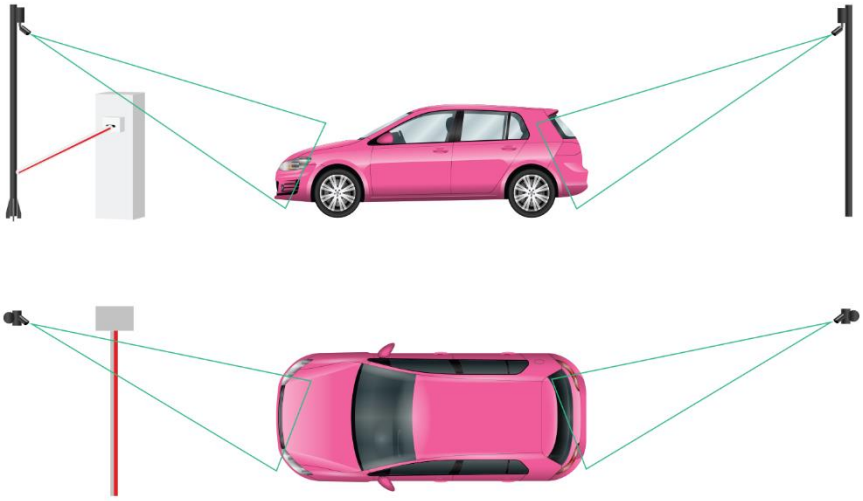
affixing example a.

Camera mounted on ceiling before the gate directly in line with vehicle. [Highest plate read accuracy]



affixing example b.

Camera mounted on pole.



internet power connection.

After mounting the camera, attach the PoE LAN cable using the Ethernet connector of the camera. It is important that the other end of the ethernet cable is connected to a router or switch that supports the 802.3af standard and can access the internet.

When considering any network security, note that only outbound connections are made from the camera to servers on the Internet.

By default, the camera will attempt to acquire an IPv4 address from the local LAN using DHCP.

The local LAN must therefore have a DHCP server accessible from the cameras. Until the camera has an address allocated it will not function.

corporate network domain whitelisting
The following host names should be whitelisted if the LPR cameras are installed on a network with restricted outbound network traffic.

hostnames
*.amazonaws.com *.inugo.com *.pool.ntp.org

gate connection.

Where you are not using a control box, a separate wiring harness (minimum 4 wires/conductors) is required to be installed from the camera to the gate or barrier arm that will be used to signal an open when the camera performs a successful license plate read. When using a control box, a wiring harness from the control box to the gate is required.

The camera provides a ‘dry contact’ style interface. This means that it contains an optically isolated switch which is normally open and will close when the gate is required to open.

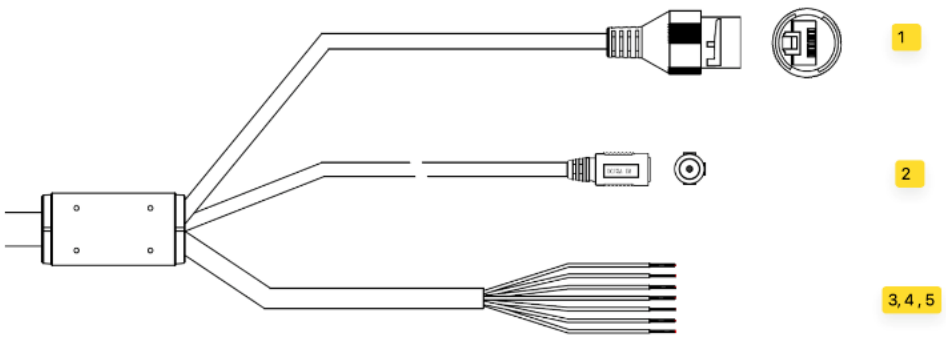
Due to the many different gate manufacturers, the specifics of the gate connection are not included in this document. When you complete the site inspection, you will supply the gate manufacturer to Inugo. We will then give you the relevant gate installation instructions.

hardware interfaces.

The Inugo camera incorporates two interfaces – Ethernet (RJ45 female) and a wiring harness which has various input and outputs wires. The minimum output connection required is the gate open signal. Connection to the loop status circuit is to be installed where it is available.

wiring harness – no control box	
wire color	**function**
yellow (alarm out)	gate open signal, dry contact
green (common)	gate open signal, dry contact
blue (alarm in)	presence loop active (high is active)
purple (alarm gnd)	camera ground
gray	unused
black	unused
white	unused
red	unused
orange	unused
brown	unused

powering on the camera.



Power to camera is supplied via Power over Ethernet (PoE) and it complies with the 802.3af power standard.

A CAT6 ethernet cable should be used and wired in the following way

Pins at switch	T568A color	T568B color	mode B	mode A	mode A MDI-X
Pin 1	White/green stripe	White/orange stripe		DC +	DC -
Pin 2	Green solid	Orange solid		DC +	DC -
Pin 3	White/orange stripe	White/green stripe		DC –	DC +
Pin 4	Blue solid	Blue solid	DC +		
Pin 5	White/blue stripe	White/blue stripe	DC +		
Pin 6	Orange solid	Green solid		DC –	DC +
Pin 7	White/brown stripe	White/brown stripe	DC –		
Pin 8	Brown solid	Brown solid	DC –		

electrical specification: camera power (via PoE)

voltage/current overview	
What	**How much**
Nominal voltage	+48V
Absolute voltage limits	+52V
Minimal nominal operating voltage	+48V
Maximum nominal operating voltage	+52V
Operating current (typical)	150mA[1]
Nominal power consumption (typical)	1.1W[1]

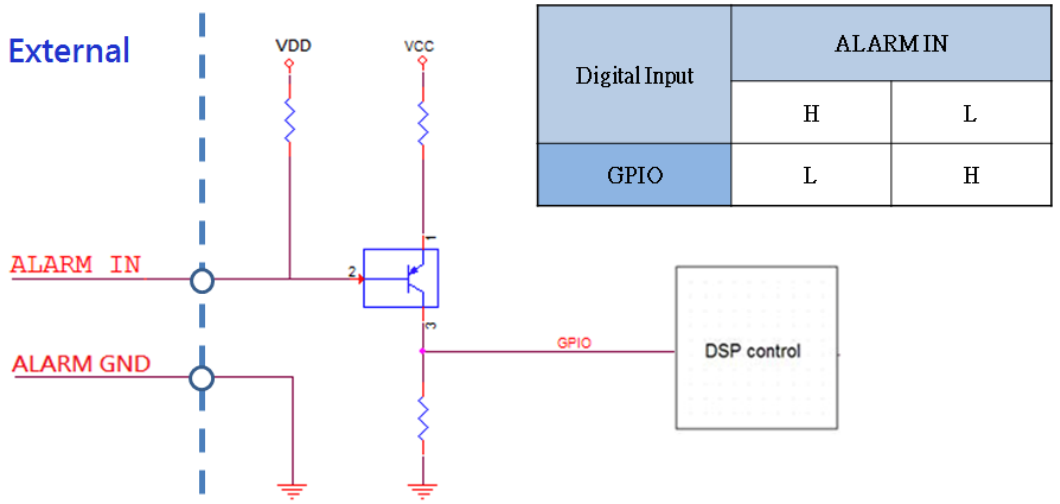
[1] The power consumption relies on a setup with internal LED illumination and without I/0 current

electrical specification: digital I/0

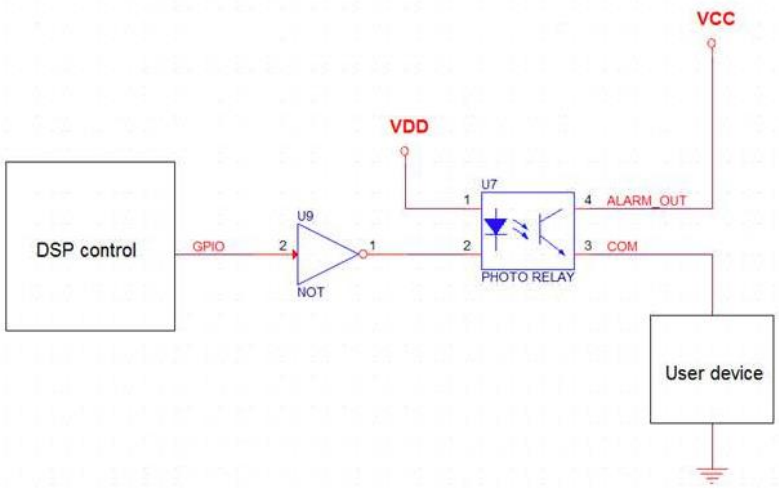
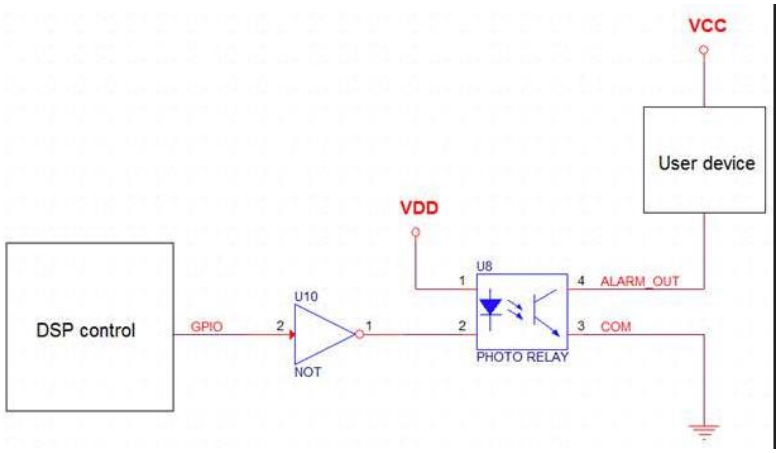
electrical specifications	
Separation of PLC/trigger output voltage	PLC outputs supply not separated from power supply
Input voltage	5 - 24V
Input current (max)	3mA @ 24V
PLC output voltage	24V
PLC output current (max)	2 X 200 mA
Max current for 1 power/PLC connector pin	200 mA
Power failure detection	Yes, overcurrent protection with poly fuse on each output

WARNING: If power failure is detected, each PLC output may switch off regardless of output state

connection of inputs (e.g., loop status)



Digital Input	ALARM IN	
	H	L
GPIO	L	H

connection of outputs (e.g. gate open/vend)
Max Load 40 V, 300 mW, 300 mA. 
or


calibrating the camera.

Once the camera is online, call your inugo agent to complete the calibration. You will need to provide inugo with the serial number of the camera and which lane the serial number is associated to.

As an example:

cameras		
serial number	**lane**	**direction**
000-0000-0000-00000	ABC street left lane	Entry

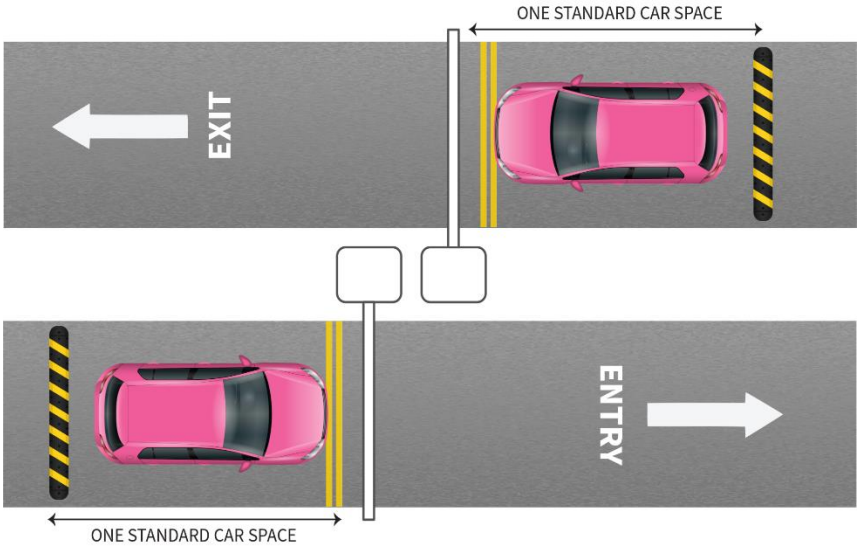
other considerations.

speed humps.

It is recommended that speed bumps be installed on approach to the gate. This will aid with:

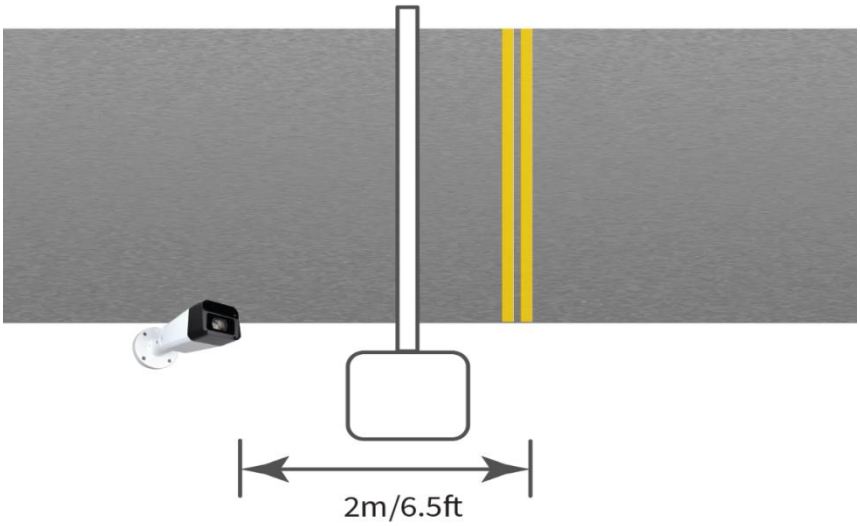
slowing vehicles to improve LPR read accuracy.
improve accuracy for rear plate only reads.

speed bumps should be installed one standard car length from the gate.



stop lines.

We recommend painting stop lines at the approach to the gate. For highest plate read accuracy, we recommend two solid yellow lines painted 2m/6.5ft from the lens of the camera.



LPR camera symbol.

We recommend painting an LPR camera symbol on approach to the gate to alert parkers that there is an LPR camera ahead. We recommend that this be 1.5m/4.9ft wide in yellow paint.