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USER MANUAL

PCN-1001

Passenger & People Counter

Rev 4.0 – 23 December 2011 – PCN-1001_UserMan_En_4.0

Trademarks

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Revision history

REVISION	DESCRIPTION	DATE
2.0	• Joined together the programming and the Installation manuals into “PCN-1001_Manual_2.0”	September 2007
2.1	• Corrected M1 & M2 pinouts	November 2007
2.2	• Minor changes	November 2007
2.3	• Added “The maximum suggested number of Counters to connect together is 5” on note on page 19 • Added cable kit note on pages 20 and 21	February 2008
2.4	• Added Notes on page 49 • Removed “testin0/1” command from “The RS485 protocol” table on pag76	April 2008
2.5	• Relevant changes applied to pages: 15, 36, 40, 46 to 48, 53 to 55	August 2008
2.6	• Manual layout update • “Installing/Updating the software” paragraph updated • *WinClient* screenshots updated to rev 2.3.3	May 2009
2.7	• Updated CRC16 Algorithm on page 80 • Updated RS485 information on page 67 and 68	February 2010
2.8	• Small corrections on pages 11 and 68	March 2010
2.9	• Updated *WinClient* features to reflect version 2.3.5	May 2010
3.0	• General contents review • Updated *WinClient* features to reflect version 2.3.6	June 2010
3.1	• Added paragraph *Cleaning* on page 7 • Updated paragraph *The “Wide-Gate” tab* on page 63 • Updated paragraph *Notes about the Digital I/O interface* on page 61	September 2010
3.2	• Minor changes	April 2011
4.0	• General contents review	23 December 2011

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Important user information

Please carefully read and understand the instructions in this manual before using the device.
Whenever you have any doubts regarding the operation of this device, first consult this manual, and then if you are still unable to resolve your issue, contact the Eurotech Technical Support Team for assistance.

To lower the risk of personal injury, electric shock, fire or damage to equipment, you must observe the following precautions, as well as using good technical judgment, whenever installing or using this device.

Eurotech has made every effort to ensure the accuracy of this document; however, Eurotech assumes no liability resulting from any error/omission in this document, or from the use of the information contained herein.
Eurotech reserves the right to revise this document or to make changes to its content at any time without any obligation to notify any person of such revisions or changes.

Alerts that can be found throughout this manual

Symbol	Meaning
	**DANGER!** Information highlighting potential electrical shock hazards: • Personal injury or death could occur. • Damage to the system, connected peripheral devices, or software could occur. Appropriate safety precautions should always be used; these should meet the requirements set out for the environment that the equipment will be deployed in.
	**WARNING!** Information highlighting potential hazards: • Personal injury or death could occur. • Damage to the system, connected peripheral devices, or software could occur. Appropriate safety precautions should always be used; these should meet the requirements set out for the environment that the equipment will be deployed in.
	**NOTE** These will highlight important features or instructions.

Safety notices and warnings

Users must observe the following safety precautions during all phases of operation, service, and repair of the device. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the device.

Eurotech assumes no liability for the customer's failure to comply with these requirements.

The safety precautions listed below represent warnings of certain dangers of which Eurotech is aware. You, as the user of the device, should follow these warnings and all other safety precautions necessary for the safe operation of the device in your operating environment.

Do not operate in an explosive atmosphere

WARNING!
Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Antistatic precautions

WARNING!
To avoid ESD (Electro Static Discharge) damage, always use appropriate antistatic precautions when handing any electronic equipment.

Connection to power supply or other devices

DANGER!
Before applying power to the system, thoroughly review all installation, operation, and safety instructions.
Failure to install the system power supply correctly or to follow all operating instructions correctly may create an electrical shock hazard, which can result in personal injury or loss of life, and/or damage to equipment or other property

- To avoid injuries, always disconnect power and discharge circuits before touching them.
- Only start the device with a power supply that meets the requirements stated on the voltage label. In case of uncertainties about the required power supply, please contact the Eurotech Technical Support Team or the electricity authority
- Before connecting other equipment carefully read any supplied instructions
- Always disconnect the power before connecting or disconnecting cables
- Do not perform connections with wet hands
- Check any power cords for damage before use
- Use certified power cables. The power cable must meet the requirements (voltage and current) of the device.
- Position cables with care. Avoid positioning cables in places where they may be trampled on or compressed by objects placed on them. Take particular care of the plug, power-point and outlet of power cable
- Avoid overcharging any power outlets
- Only apply power to the device or connected equipment after checking that all the above conditions have been met

Installation

WARNING!

- **Verify that the mounting location can withstand the added loads caused by the addition of the device, it should be firmly secured so that it will not cause any potentially hazardous situations (e.g. falling down due to vibration or shock)**
- **Do not operate the device near heat sources or flames.**

NOTE:
If the device must be moved from one place to another with different ambient temperatures, ensure sufficient time for the temperature of the device to stabilize before repowering.

Ventilation

WARNING!
Ensure adequate ventilation to avoid overheating, Eurotech suggests the following steps:

- **When installing the device within a cabinet, rack or other enclosed space, be sure to leave sufficient space to allow adequate air circulation**
- **Do not block any ventilation openings**

Maintenance

DANGER!

- **Never open, dismantle or repair the device!**
- **For your maintenance or repair requirement please contact a qualified Eurotech engineer.**

If the device does not function correctly and you are unable to find a solution, feel free to contact the Eurotech Technical Support Team.

If the equipment does not work properly, especially if smells unusual, unplug it immediately and contact Technical Support Eurotech (see fourth cover of this manual for details).

Cleaning

WARNING!
When cleaning the device, remember to:

- **Ensure sufficient ESD protection during the cleaning process**
- **Remove any power from the device**
- **Use a dry cloth to remove dust and fingerprints from the external casing**
- **Do not use detergents, aerosol sprays, solvents or abrasive sponges**

To clean the lenses:

1. Use a blower to remove any dust
2. Use water-based, non-flammable, glass/plastic cleaner products to remove all types of dirt; grease, oil, nicotine etc. from the lenses
3. Gently wipe the lenses with a lint-free cloth.

WARNING!
The PCN-1001 should not be used for extended periods of time with the service plate removed. Doing so can cause dust and other particulates to enter the system thus causing degradation to the optics.
If it is necessary to have extended access to the Mini-USB connector, take appropriate precautions to stop any particulates from entering.

Life support policy

WARNING!
Users must not use Eurotech products as critical components of life support devices or systems without the express written approval of Eurotech.

Warranty

Please contact your local Eurotech Sales Office for detailed warranty terms and conditions.
Refer to the back covers of this manual for full contact details.

CE Notice

This product is marked CE.
The CE Mark on the product indicates that the system has been tested and conforms to the provisions of the 2004/108/EC Electromagnetic Compatibility (EMC) Directive and the 2006/95/EC Low Voltage Directive (LVD).
Eurotech shall not be liable for use of our products with equipment (i.e., power supplies, personal computers, etc.) that are not CE marked and that do not meet the PCN-1001 technical requirements indicated in this manual.

WEEE

The information below complies with the regulations set out in the 2002/96/EC directive, subsequently superseded by 2003/108/EC. It refers electrical and electronic equipment and the waste management of such products.
When disposing of a device, including all of its components, subassemblies and materials that are an integral part of the product, you should consider the WEEE directive.

The use of the following symbol, attached to the equipment, packaging, instruction literature, or the guarantee sheet, states that the device has been marketed after August 13th 2005, and implies that you must separate all of its components when possible, and dispose of them in accordance withal waste disposal legislations:

- Because of the substances present in the equipment, improper use or disposal of the refuse can cause damage to human health and the environment.
- With reference to WEEE, it is compulsory not to dispose of the equipment with normal urban refuse; an arrangement for separate collection and disposal is essential.
- To avoid any possible legal implications users should contact the local waste collection body for full recycling information.

RoHS

This device, including all the components, subassemblies and the consumable materials that are an integral part of the product, have been manufactured in compliance with the European directive 2002/95/EC known as the RoHS directive (Restrictions of the use of certain Hazardous Substances). This directive targets the reduction of certain hazardous substances previously used in electrical and electronic equipment (EEE).

Technical assistance

For any technical questions, or if you cannot isolate a problem with your device, or for any enquiry about repair and returns policies, feel free to contact your local Eurotech Technical Support Team.

See the back cover for full contact details.

Transportation

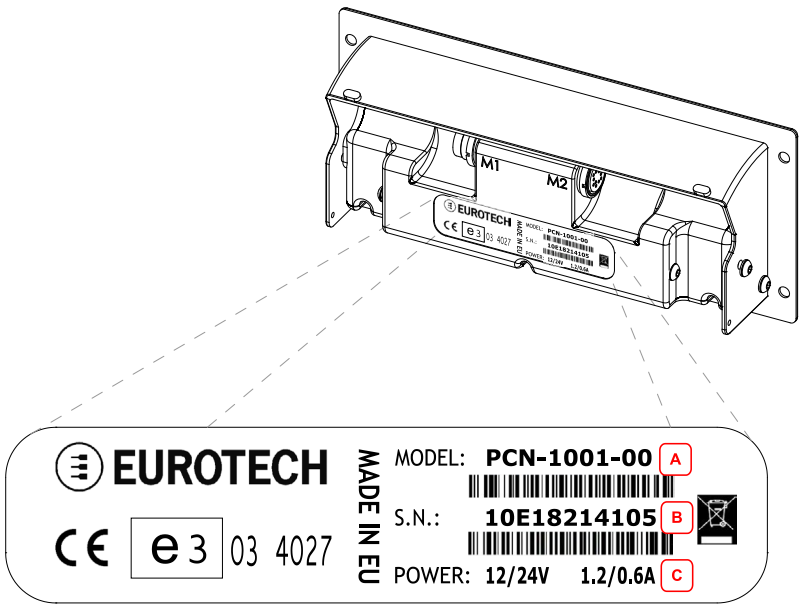
When transporting any module or system, for any reason, it should be packed using anti-static material and placed in a sturdy box with enough packing material to adequately cushion it.

Warning:
Any product returned to Eurotech that is damaged due to inappropriate packaging will not be covered by the warranty!

Device labelling

On the rear side of the device you can find a label displaying the following information:

- A Model Number
- B Serial Number
- C Power Requirements



Conventions and definitions used within this Manual

The following conventions and definitions are used throughout this manual:

The "Mode" of the register:

SYMBOL / TEXT	DEFINITION
RW	Readable and Writable register
RO	Read only register
W	Meaning of the register when written
R	Meaning of the register when read

Hexadecimal numbering:

Hexadecimal numbers are indicated like this: 0x01.

Control Unit, Host PC

The terms "Control Unit" and "Host PC" are used to describe a computer connected to the PCN-1001 for maintenance and configuration activities.

PCN-1001, Device, Counter, Master, Slave

In this manual the terms:

- "PCN-1001"
- "Device"
- "Counter"
- "Master"
- "Slave"

are used to describe the PCN-1001 people/passenger counter.

PART 1 – INTRODUCTION

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Contents of the box

Two part numbers are available:

1. **PCN-1001-00.** This contains:
   - 1x PCN-1001 device
   - 1x PCN-1001 Extender. For further information refer to 'To mount the front panel with angles from 20° up to 45°' paragraph on page 34
   - 2x hexagonal socket screws (M3 x 6) and 2x split washers. These allow you to mount the Extender

PCN-1001 Passenger Counter

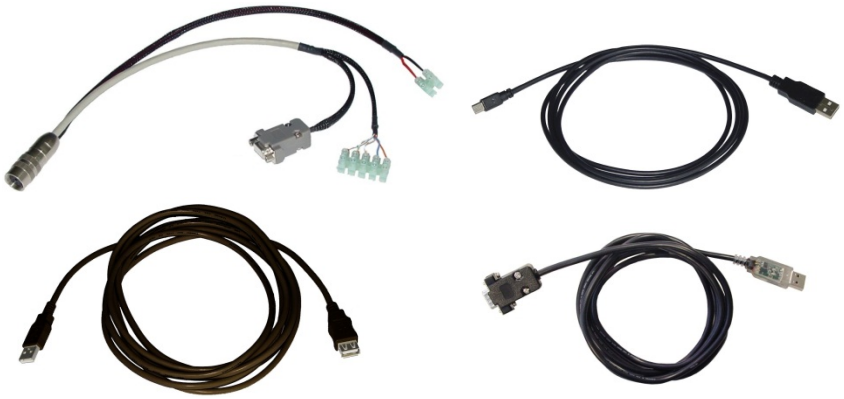
PCN-1001 Extender with screws and washers

2. **DTK-1001-00.** This is the PCN-1001 development kit and contains:
   - 1x PCN-1001-00 (as described above)
   - 1x CD-ROM with software, utilities and documentation
   - 1x CBL-1001-00 Cable Kit. For further information refer to the 'CBL-1001-00 cable kit' paragraph on page 100

PCN-1001 with extender, screws and washers

CD-ROM

CBL-1001-00 Cable Kit



NOTE:
With both order codes the installer has to provide suitable fixing screws or bolts. This will depend on the location, material, and any applicable regulation.

PCN-1001 general description

The PCN-1001 is a compact and autonomous device based on non-contact stereoscopic vision technology. It has been designed to count passengers entering and exiting the doorways of buses and trains, but can also be used to count people as they enter or leave buildings or any other area with restricted access.

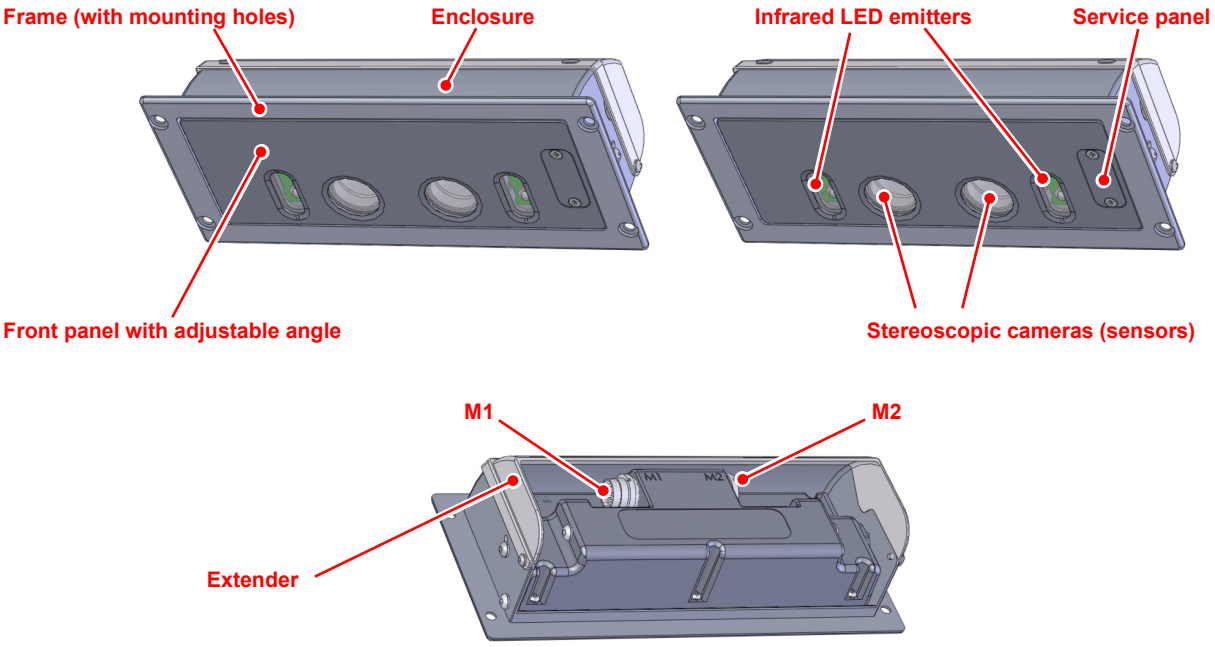
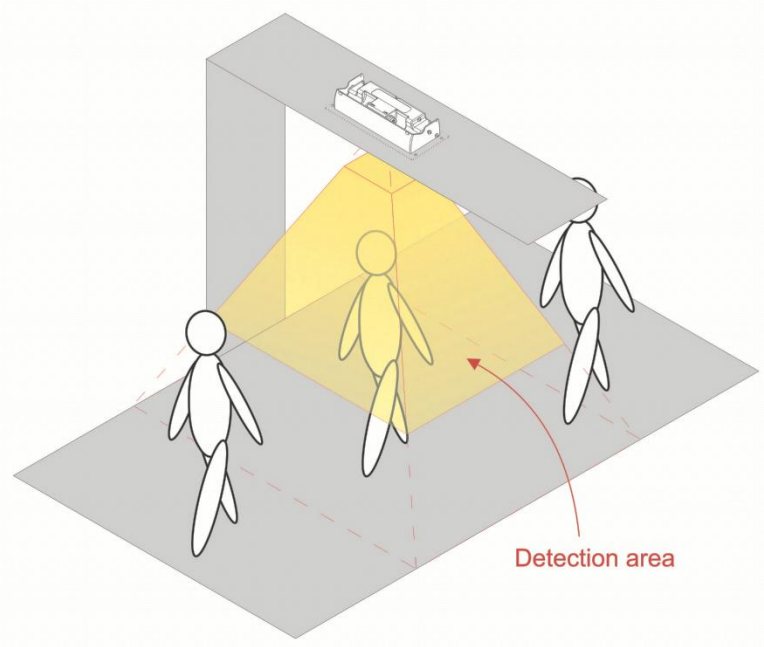


Figure 1. PCN-1001 front and rear

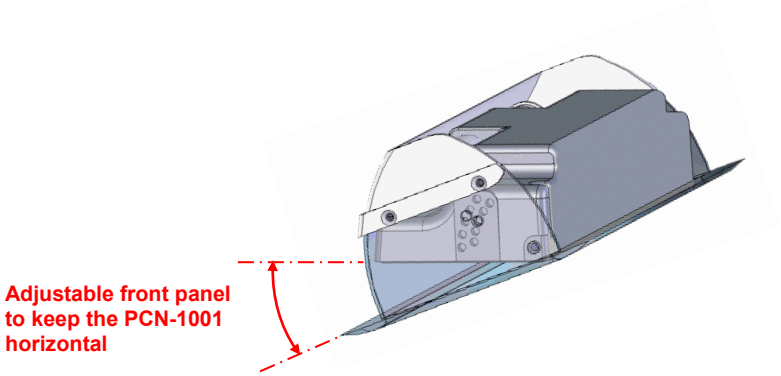
The stereoscopic cameras capture images of the area below the device (Detection area); the built-in high luminosity infrared LED emitters allow for reliable operations in any type of lighting condition.

The PCN-1001 analyses any objects moving within the Detection area, considering height, shape and direction. After determining if an object is a person entering or leaving, the incoming or outgoing values are stored accordingly, along with time and date information.

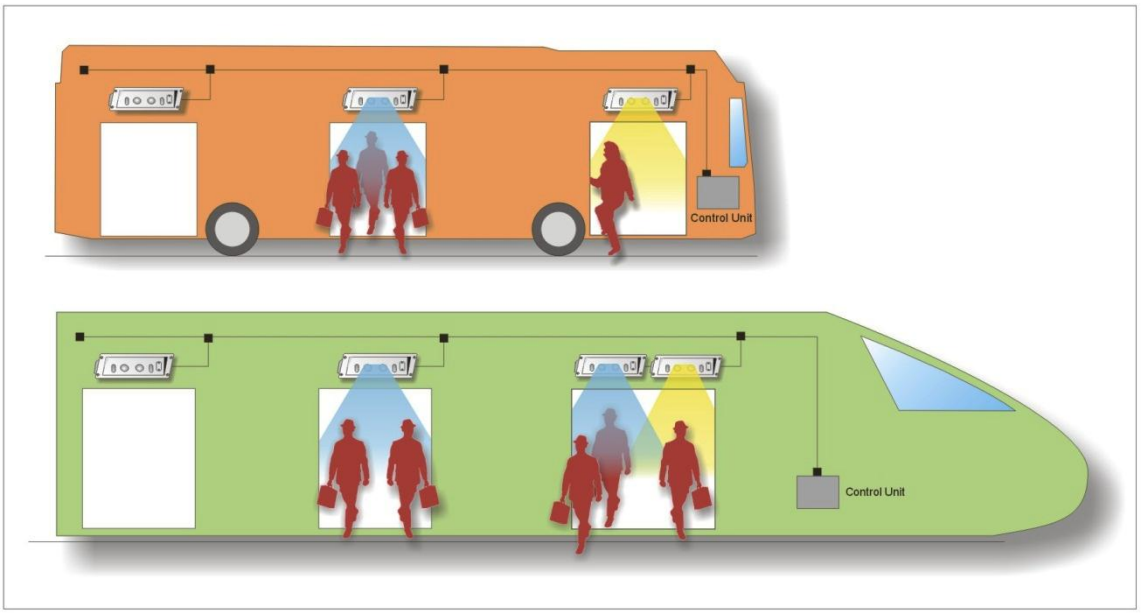
This information is immediately available via RS485 or downloaded at a later date for analysis.



The PCN-1001 has to be installed so that the front panel is placed horizontal to the floor. To achieve this, the angle between the front panel and the enclosure can be adjusted from 0° to 20° (up to 45° using an extender: the extender also increases the protection of the rear side). Thanks to these characteristics the PCN-1001 can be mounted in a variety of locations, even on non-horizontal surfaces.



Many PCN-1001 systems can be installed in a vehicle, working stand-alone or networked together with a vehicle server - the Control Unit - that can pre-process, store, and upload information from all the passenger counters.



To increase accuracy, door sensors can be used in combination with the PCN-1001.

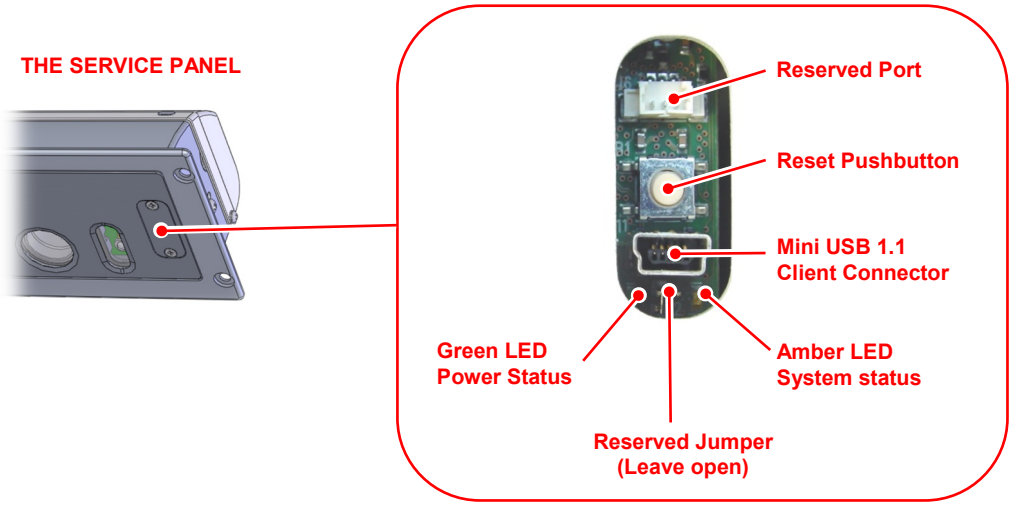
NOTE:
For further information about PCN-1001-00 operating accuracy you can refer to Application Note An0074 (http://www.eurotech.com/DLA/AN/An0074.pdf).

Front interfaces. The service panel

A Service panel, located on the front of the PCN-1001, gives access to some interfaces used for configuration, maintenance, and development of applications.

NOTE:
The service panel is held in place by 2 Torx M3 * 6 screws, these should be removed using a Torx T9 screwdriver.

WARNING!
The PCN-1001 should not be used for extended periods of time with the service plate removed. Doing so will cause dust and other particulates to enter the system, causing degradation to the optics. If it is necessary to have extended access to the Mini-USB connector, take appropriate precautions to stop any particulates from entering.



LED indicator assignment

LED COLOUR	MEANING	LED STATUS
Green	Power status	ON: PCN-1001 turned ON OFF: PCN-1001 turned OFF
Amber	System status	Blinking: Boot in progress ON: Boot finished and PCN-1001 ready to operate

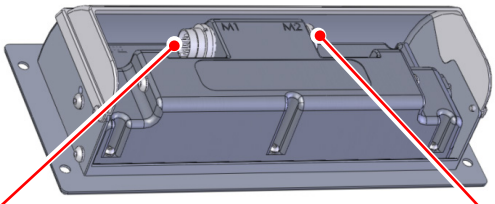
Notes about the Mini USB port

This is a standard Mini-USB type “B” 1.1 client port and is used to connect the PCN-1001 to a Host PC for maintenance and configuration.

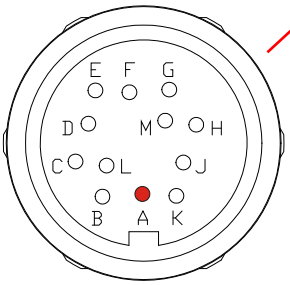
For further information refer to the paragraph ‘Step 3.2: Connect the PCN-1001 with the Host PC’ on page 36.

Rear interfaces

The PCN-1001 has the following interface connectors on the rear panel:



M1

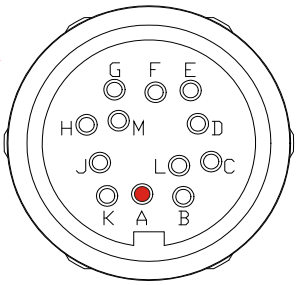


CONNECTOR CHARACTERISTICS:
Type: 12-pin male circular connector
P/N: Lumberg 031512

COUNTERPART CHARACTERISTICS:
Type: 12-pin female circular connector
P/N: Lumberg 032212

PIN	SIGNAL	DIRECTION
A	Power supply +	IN
B	Power supply -	IN
C	Digital IN 1 +	IN
D	Digital IN 1 -	IN
E	Digital OUT 1 V+	OUT
F	Digital OUT 1	OUT
G	Digital OUT 1 GND	OUT
H	RS485_1 GND	IN/OUT
J	RS485_1 +	IN/OUT
K	RS485_1 -	IN/OUT
L	Power supply + (For the secondary PCN-1001 - Wide gate)	IN
M	Power supply – (For the secondary PCN-1001 – Wide gate)	IN

M2



CONNECTOR CHARACTERISTICS:
Type: 12-pin female circular connector
P/N: Lumberg 031512

COUNTERPART CHARACTERISTICS:
Type: 12-pin male circular connector
P/N: Lumberg 032212

PIN	SIGNAL	DIRECTION
A	Power supply + (To the secondary PCN-1001 - Wide gate)	OUT
B	Power supply – (To the secondary PCN-1001 – Wide gate)	OUT
C	Digital OUT 2 V+	OUT
D	Digital OUT 2	OUT
E	Digital IN 2+	IN
F	Digital IN 2-	IN
G	Digital OUT 2 GND	OUT
H	RS485_2 GND	IN/OUT
J	RS485_2 +	IN/OUT
K	RS485_2 -	IN/OUT
L	Not Connected	-
M	Not Connected	-

Power Supply Specifications

CHARACTERISTIC	MINIMUM	NOMINAL	MAXIMUM
Power input	9 V dc	12 / 24 V dc	32 V dc
Power consumption	--	--	15 Watts

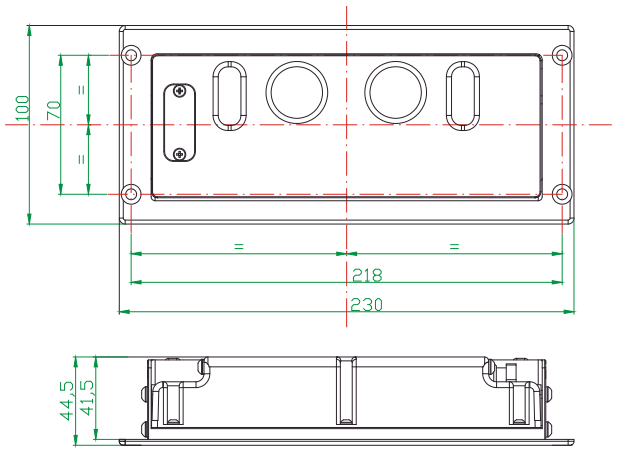
Mechanical Characteristics

PCN-1001	
Weight:	515 grams

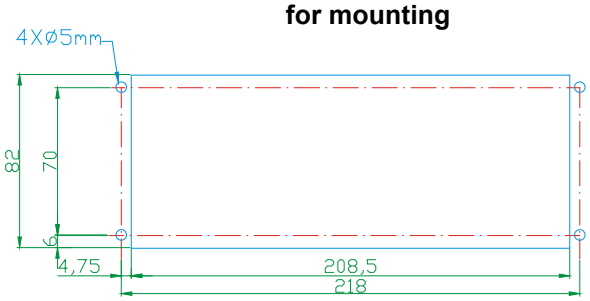
PCN-1001 FRAME	
Height:	100 mm
Width:	230 mm
Thickness:	3 mm

REQUIRED CUT OUT DIMENSIONS	
Height:	82.0 mm
Width:	208.5 mm
Depth:	41.5 to 70.0 mm, depending on optical panel angle

PCN-1001 dimensions



Required cut-out dimensions for mounting



Dimensions are in millimetres

WARNING!
PROVIDE SUFFICIENT ANCHORAGE WHEN MOUNTING THE PCN-1001.
THIS MUST BE DONE TO ENSURE THAT THE PCN-1001 DOES NOT BECOME DETACHED DURING TRANSIT CAUSING A SAFETY HAZARD.

PART 2 – PCN-1001 INSTALLATION PROCEDURE

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Step 1: Find the best mounting location

To find the best location to install thePCN-1001, pay particular attention to the following considerations:

- **Check the installation height**

  Ensure that the PCN-1001 installation height is suitable for your application, also taking into consideration the local population's average height. *The ideal installation height is 225 cm*.
  The installation height of the PCN-1001 should allow sufficient distance between the front panel and the average users' height.
  This should be done for the following reasons:
  - If the PCN-1001 is installed too low, a high person passing under the PCN-1001 may hide another person that is close to him.
  - If the PCN-1001 is installed too low the detection area may not cover the entire width of the door.
  - The velocity of a high person will appear to increase as its head gets closer to the cameras; this may cause an inaccurate detection, and the person may not be counted correctly.

- **Check the distance from the gate**

  The distance between the PCN-1001 and the gate should be large enough to prevent the inclusion of the upper area of the gate's frame.
  The recommended distance between the PCN-1001 and the gate is about 50 cm.

- **Check the gate width**

  Measure the width of the gate and evaluate:
  - how many PCN-1001 devices you need to install
  - if you need to use a Wide-gate configuration

- **Check the centrality**

  Verify that you can place the PCN-1001 in the middle of the gate (if you are using the Wide-gate configuration, the group of PCN-1001 devices has to be placed in the middle of the gate; refer also to "Number of PCN-1001 devices required" on page 27).
  If not, the area in front of the gate may not be entirely seen by the cameras: if the detection area is shifted to the right or to the left, some people may not been seen and therefore counting errors may occur

- **Check that the front panel is horizontal**

  Verify that you can keep the front panel of the PCN-1001 horizontal (you can adjust the angle of the front panel respect to the frame from 0° to 45°). If the front panel is not placed horizontal, this may cause counting errors.

- **Check the cameras coverage area**

  The PCN-1001 must be placed in a way that any person crossing the gate, also passes under the PCN-1001. It is recommended to install the PCN-1001 with a maximum distance of 50 cm from the gate. If not, the area in front of the gate may not be entirely seen by the cameras (the detection area will be too far from the gate)

- **Check you have the required installation space**

  The PCN-1001 shape allows it to be mounted unobtrusively in the roof space over a gate or door.

  You need to prepare a recess with the following dimensions:
  - Height: 82.0 mm
  - Width: 208.5 mm
  - Depth: 41.5 (70.0 mm with optical panel at 45°)

  The frame of the PCN-1001 has four mounting holes which allow the PCN-1001 to be secured using four M5 screws

  You will have to provide all necessary fixing screws or bolts. This will depend on the location, material, and any applicable regulations. We suggest using anti-vandalism screws to increase security.

The PCN-1001 field of view and the Detection area

The PCN's field of view

The two PCN-1001 stereoscopic cameras have a specific field of view:

- The viewing angle relative to the long side of the front panel is about 70 degrees
- The viewing angle relative to the short side is about 55 degrees

The field of view can be seen as a pyramid with a rectangular base. The dimensions of the base will change according to the PCN-1001 installation height and follow these formulas:

D = 2H tan(55/2) = 2H * 0.52

W = 2H tan(70/2) = 2H * 0.70

EXAMPLE:

If H = 225 cm then D = 234 cm and W = 315 cm

The Detection area

The Detection area is the zone where the PCN-1001 detects people.

The Detection area is contained in the cameras' field of view, and can be seen as a truncated pyramid having two parallel rectangular bases (a frustum).

- The height of the Detection area is always 100 cm, no matter which the PCN-1001 installation height is
- The Detection area can be shifted along its vertical axis.
  The distance between the upper base of the Detection area and the front panel of the PCN-1001 can be software-adjusted in two software-selectable ranges:
  - 25 - 30 cm
  - 31 - 40 cm

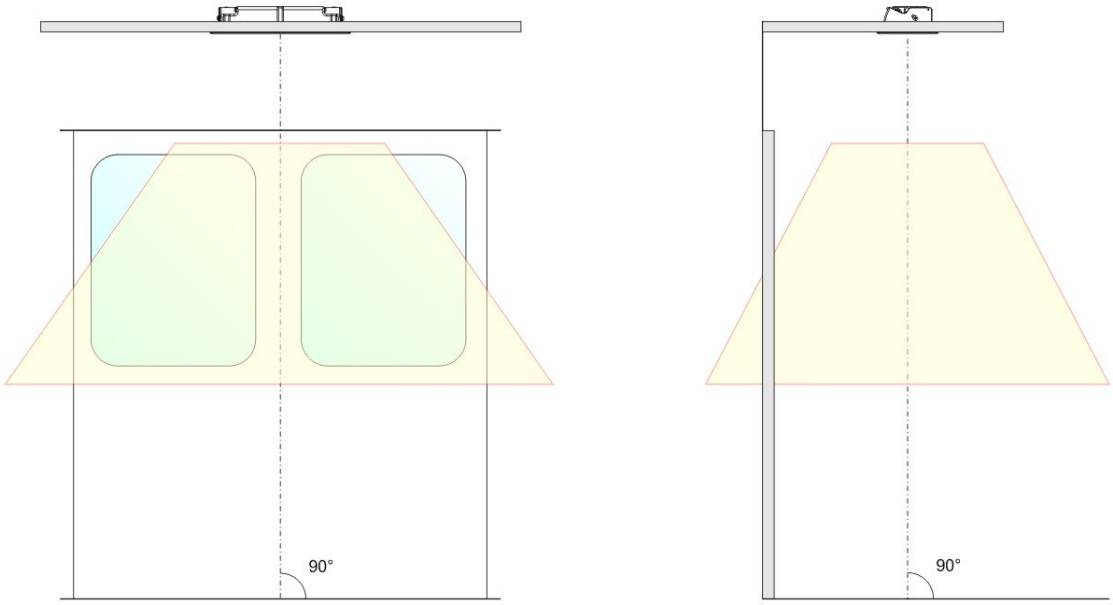
(See also 'The "Distance Configuration" panel' on page 61)

EXAMPLE:

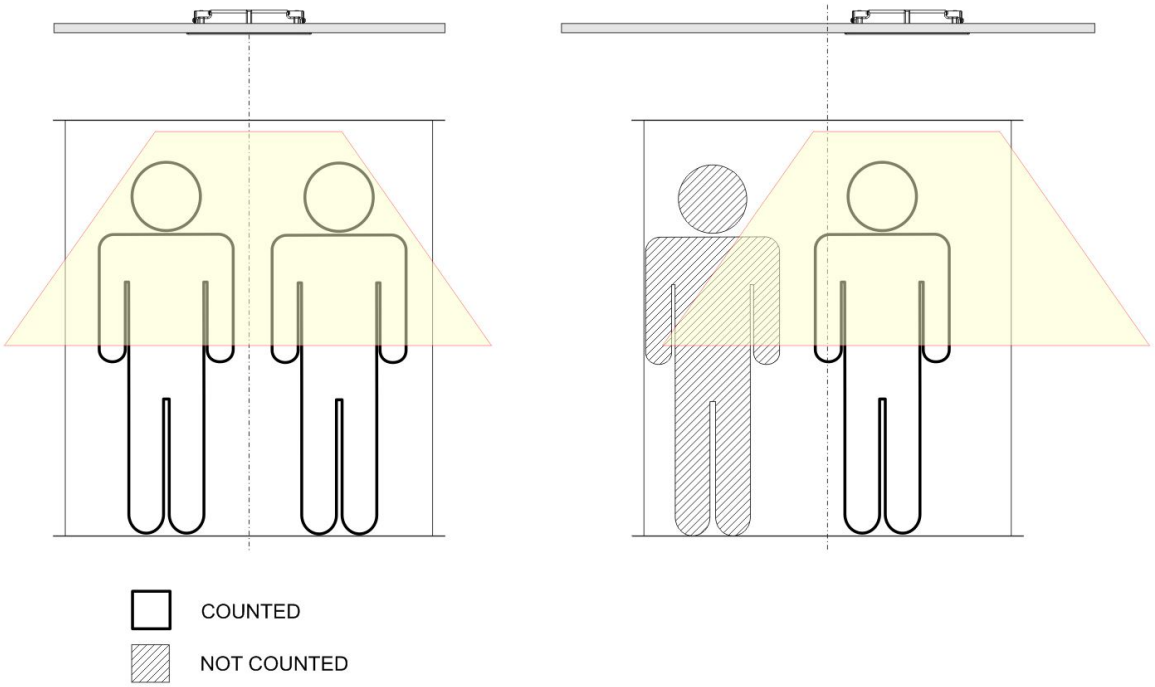
If H = 225 cm and the "25-30 cm" range is selected the PCN-1001 will count - with the maximum precision - people having heights from around 100 cm to around 200 cm. People outside this range (very tall or very short) probably will not be detected correctly and will not be counted.

According to people's average height you have to select the suitable PCN-1001 installation height and the right Detection area distance.

The following picture gives you an example of frontal and lateral views of the installation.



When installing the PCN-1001, make sure that all the people crossing the gate are also crossing the Detection area. If the detection area is shifted to the right or left, some people may not be seen and therefore counting errors may occur.
The following picture gives you an example of this issue.



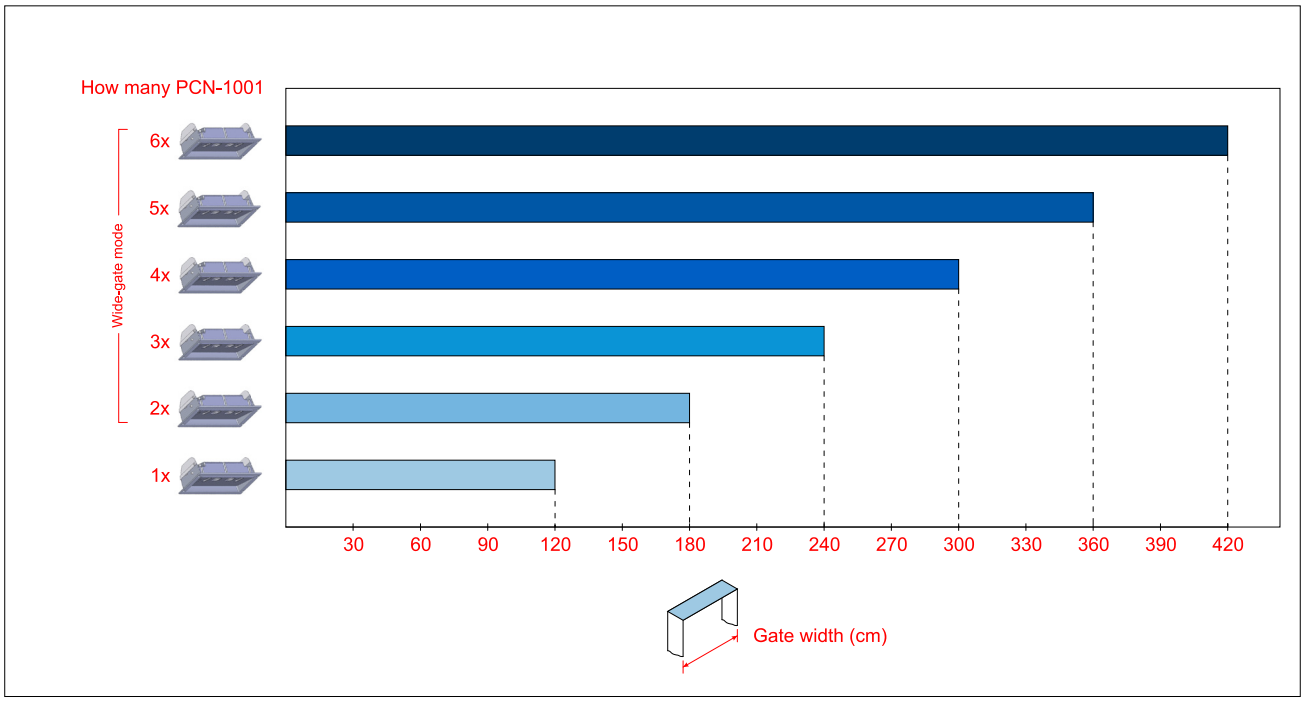
Number of PCN-1001 devices required

The number of PCN-1001 devices required depends on the width of the gate.

For gate widths up to 120 cm you need only one PCN-1001.

For gates wider than 120 cm you need to install a supplementary PCN-1001 for each additional 60 cm, and connect the devices in Wide-gate configuration.

A maximum of 6 PCN-1001 devices can be connected together in wide-gate configuration. Please contact Eurotech if you need more than this quantity.



Example

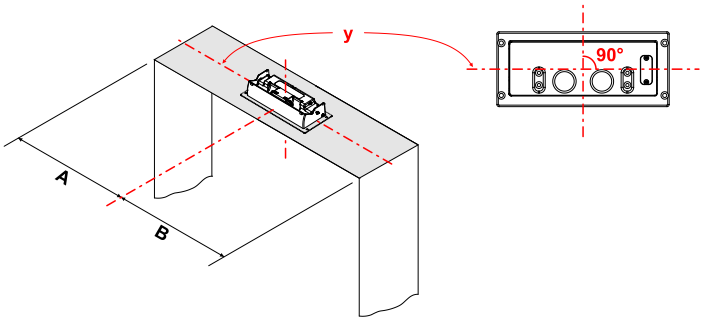
- To monitor gates up to 120 cm wide you will need one PCN-1001
- To monitor gates up to 180 cm wide you will need two PCN-1001 devices connected in Wide-gate configuration
- To monitor gates up to 240 cm wide you will need three PCN-1001 devices connected in Wide-gate configuration

NOTE:
When choosing how many counters you need to install, consider that a small tolerance is admitted (about 1-2 centimetres) with respect to the gate width.

How to connect one PCN-1001

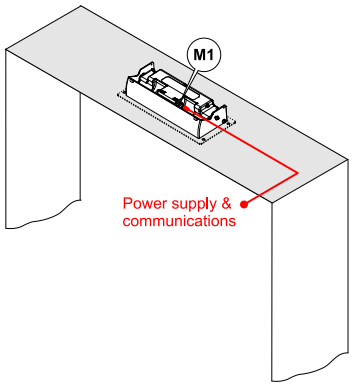
Essential requirements:

- The counter must be aligned with respect to the gate
- A = B. The Counter must be placed in the middle of the gate



Procedure:

- Make sure M1 of the counter receives the power supply and the communication interfaces (for example from the data bus of the vehicle)

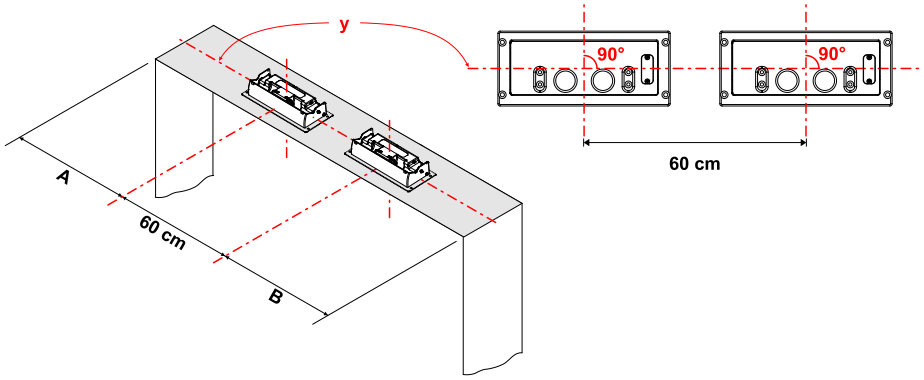


NOTE:
For demonstration applications the CBL-1001-00 cable kit can be used to connect the Master (see page 100).

How to connect two PCN-1001 devices in Wide-gate configuration

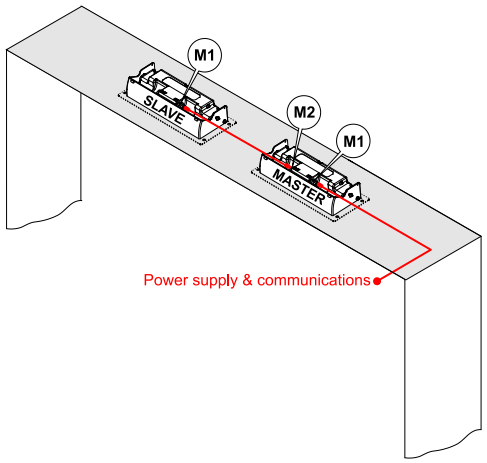
Essential requirements:

- Both counters must be aligned with the other, and both with respect to the gate
- The distance between the centres of each counter must be 60.0 cm
- A = B



Procedure:

1. Make sure M1 of the Master receives the power supply and the communication interfaces. Power MUST be available on pins L & M of the M1 Connector of the Master as this supplies power to the Slave.
2. Make sure M2 of the Master gives power and the communication interfaces to M1 of the Slave.



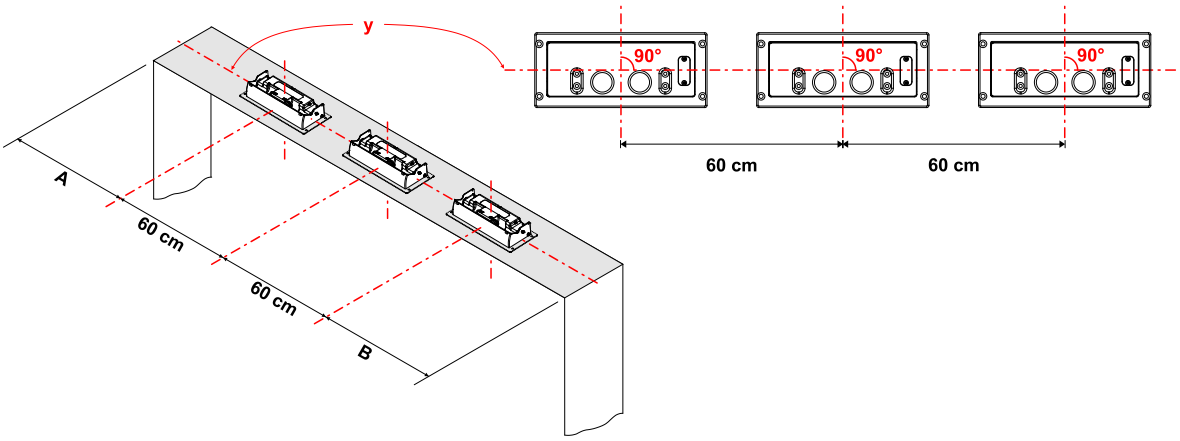
NOTE:
For demonstration applications the following cable kits can be used to simplify the connections above:

- The CBL-1001-00 cable kit can be used to connect the Master (see page 100)
- The CBL-1001-01 cable kit can be used to connect the Slave to the Master (see page 103).

How to connect three or more PCN-1001 devices in Wide-gate configuration

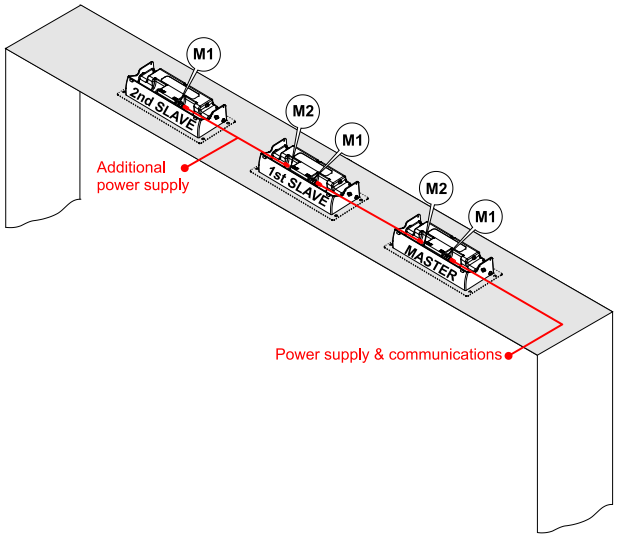
Essential requirements:

- The counters must be aligned with each other and with respect to the gate
- The distance between the centres of each counter must be 60.0 cm
- A = B



Procedure:

1. Make sure M1 of the Master receives the power supply and the communication interfaces. Power MUST be available on pins L & M of the M1 Connector of the Master as this supplies power to the 1ST Slave.
2. Make sure M2 of the Master gives power and the communication interfaces to M1 of the 1ST Slave.
3. Make sure M2 of the 1ST Slave gives only the communications interfaces to M1 of the 2ND Slave. It is necessary to give a separate power supply feed - usually from the Data Bus of the vehicle - to M1 of the 2ND Slave. The same separate connection - power and communication interfaces - has to be realized for each Slave connected after the second.



NOTE:
For demonstration applications the following cable kits can be used to simplify the connections above:

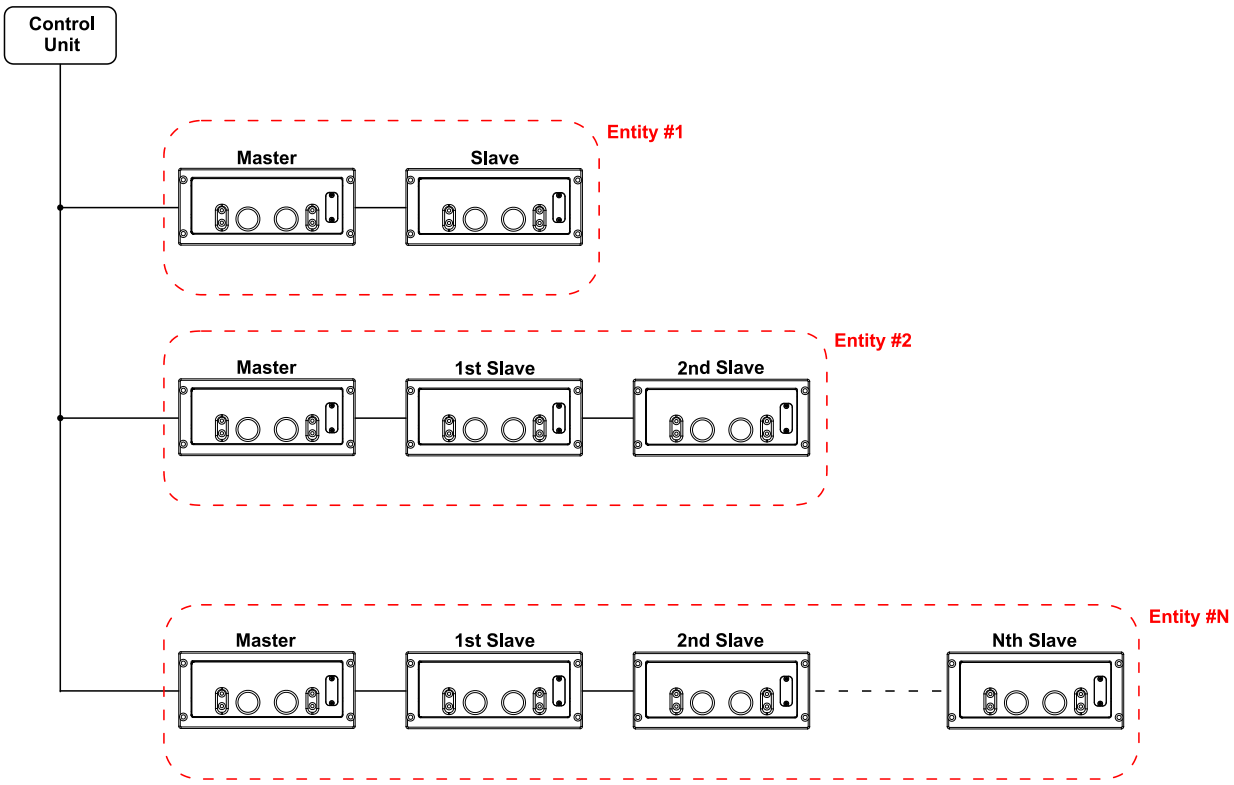
- The CBL-1001-00 cable kit can be used to connect the Master (see page 100)
- The CBL-1001-01 cable kit can be used to connect the 1st Slave to the Master (see page 103)
- The CBL-1001-02 cable kit can be used to connect the 2nd Slave to the 1st Slave (see page 105).

Note about PCN-1001 devices connected in Wide-gate configuration

The figure below shows different PCN-1001 devices in Wide-gate configuration, all managed by the same Control Unit (for example the Host PC).

The Control Unit sees each Wide-gate configuration as a single entity: Entity #1, Entity #2, …, Entity #N.

While the Master devices can be set with user-defined parameters the Slave devices have to remain with the factory default parameters, as these are configured by the Master device upon power-up.



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Step 2: Install a PCN-1001

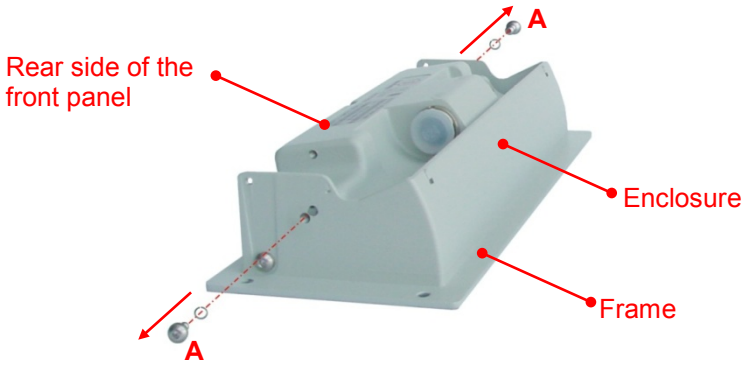
Step 2.1: Connect the rear side interfaces and adjust the angle of the front panel

The M1 and M2 connectors are available on the rear side of the PCN-1001; these are used to connect the PCN-1001 to the vehicle data bus or to another PCN-1001.

Two M4 x 6 stainless steel hexagonal head screws and two split washers (**A**) keep fixed the angle between the front panel and the frame.

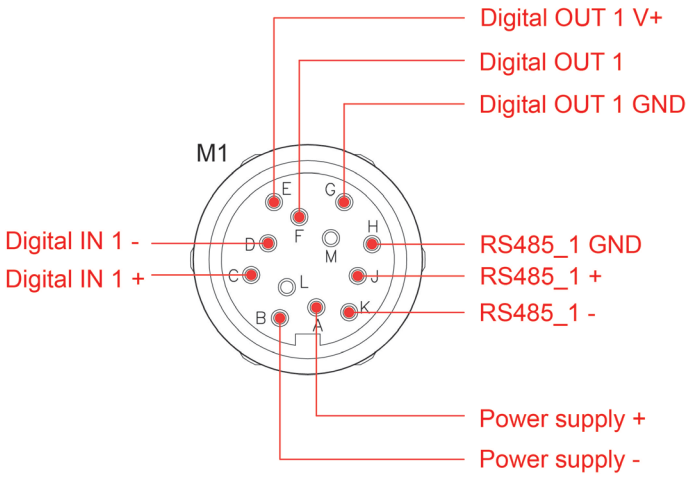
1: Loosen the front panel to simplify the cabling procedure:

1. Keep the PCN-1001 with the rear side facing up
2. Using a hexagonal 2.5 mm (7/64") key/driver remove the lateral locking screws and washers at each end (**A**)



2: Connect all the interfaces and prepare the power connections to M1

1. Prepare a cable to supply all the interfaces and the power to the PCN-1001 via the M1 connector respecting the following schematic:



M1 CONNECTOR CHARACTERISTICS:

- Type: 12-pin male circular connector
- P/N: Lumberg 031512

COUNTERPART CHARACTERISTICS:

- Type: 12-pin female circular connector
- P/N: Lumberg 032212

NOTE: Pins L (Power supply +) and M (Power supply -) are used to supply power to a slave PCN-1001 in Wide-gate.

Optionally, for demonstration applications, you can use the Multifunction cable contained in the CBL-1001-00 Cable Kit (refer to "CBL-1001-00 cable kit" paragraph on page 100.

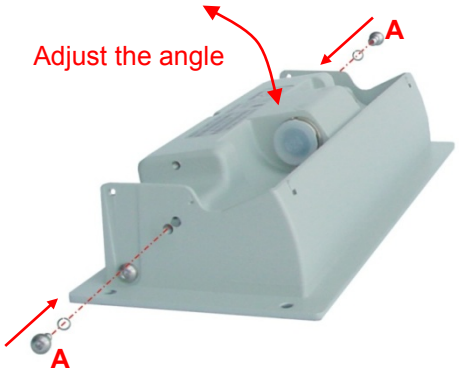
2. Set up a DC power source to meet the PCN-1001 power requirements:

CHARACTERISTIC	DESCRIPTION
Power input:	Input range: 9 ~ 32 V dc Typical: 12 or 24V dc
Power consumption:	< 15 Watts

3. Make sure this DC power source is turned OFF

3: Adjust the angle of the front panel and secure the front panel

1. Adjust the angle between the front panel and the frame of the PCN-1001.
   The front panel should be as horizontal as possible when the PCN-1001 is in its final installed location
2. Secure the front panel by reinserting and tightening the two locking screws and washers at each end (A)



IMPORTANT NOTE!
Once the PCN-1001 is installed, the angle of the front panel cannot be modified and the rear connectors cannot be accessed without removing the entire PCN-1001 from the ceiling.

NOTE:
To mount the front panel with angles from 20° up to 45° refer to “Note for mounting the front panel with angles from 20° up to 45°”on page 99.

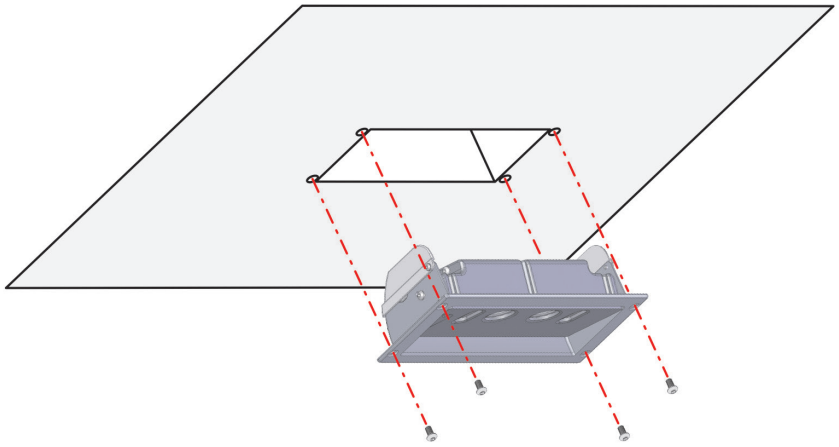
Note about installing 2 or more PCN-1001 in Wide-gate configuration

The procedure to install two or more PCN-1001 in Wide-gate is similar to that described in the Step 2.1 above. Before proceeding, refer to “Number of PCN-1001 devices required” on page 27.

Step 2.2: Fix the PCN-1001 to the ceiling

The frame of the PCN-1001 has four mounting holes which allow fixing the PCN-1001 using four M5 screws.

You will have to provide all necessary fixing hardware. This will depend on the location, material, and any applicable regulation. Use anti-vandalism screws to increase security.



WARNING!
When mounting the PCN-1001 ensure sufficient anchorage in order to firmly fix it to the ceiling. This will avoid any hazardous potentially situations (i.e. dropping down) during normal service.
If the PCN-1001 is used within transportation vehicles and it is not firmly fixed, its steadiness may be affected by vibrations or other influences typical of transportation vehicles. This may cause counting errors.

Step 3: Configure the network between PCN-1001 and Host PC

Step 3.1: Turn on the PCN-1001power

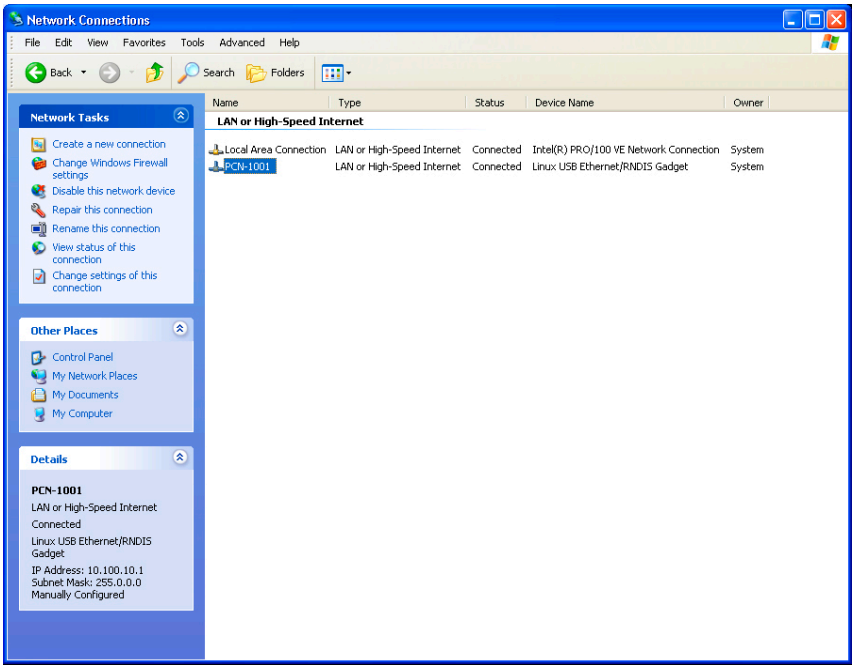
1. Enable the DC power supply output
2. The PCN-1001 will turn ON: the green LED will be ON
3. The PCN-1001 will start to boot: the amber LED will blink
4. When the PCN-1001 is ready to operate both the green and amber LED indicators will be ON (not blinking)

Step 3.2: Connect the PCN-1001 with the Host PC

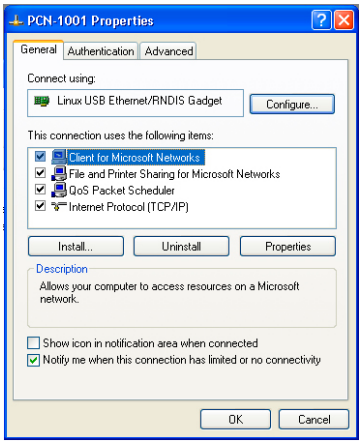
1. Make sure both the PCN-1001 and the Host PC are turned on and ready to operate before connecting them together
2. From the Host PC access the CD-ROM and open the “\Software\Drivers” folder and extract all the files contained in the “pcn-1001-drivers.zip” file
3. Locate:
   - the standard Mini-USB type “B” connector under the service plate of the PCN-1001
   - a free standard USB type “A” connector on the Host PC
4. Use a Male Mini USB -B to Male USB type “A” cable to connect the Mini USB port of the PCN-1001 to the USB port of the Host PC.
   You can also use the Male Mini-USB B to Male USB Type “A” cable contained in the CBL-1001-00 Cable Kit.
5. Once the USB connection has been established the Host PC will detect the new hardware and display the following message: “Found New Hardware”
6. Shortly after, the Window "Found New Hardware Wizard" will start
7. Select "No, not at this time" and click "Next"
8. Select "Install from a list or specific location (Advanced)" and click "Next"
9. Select "Don't search. I will choose the driver to install" and click "Next"
10. Click "Have Disk"
11. Click "Browse"
12. Open the folder “drivers” that has been created when extracted the zip file (see step 3)
13. The hardware wizard will find the file “linux.inf”; click "Open"
14. Select "OK" in the screen that will appear
15. Click "Next" in the screen that will appear
16. The hardware wizard will now install the driver. Select “Finish” in the screen that will appear
17. The installation procedure will start. Follow the instructions that will appear on the Host PC.
18. Windows will automatically find and install the drivers that are located in the path: \drivers\win2000

Step 3.3: Configure the network on the Host PC

1. Open the “Network Connections”. A dialog-box similar to the one shown below will appear



2. Double-click on the appropriate “Local Area Connection”, in the example above we have named the connection “PCN-1001” for clarity
3. The “Status” dialog box will appear
4. Click on the “Properties” button
5. A “Properties” dialog box similar to the one on the right will appear
6. Ensure that the following components are installed:
   - Client for Microsoft Networks
   - Internet Protocol (TCP/IP)

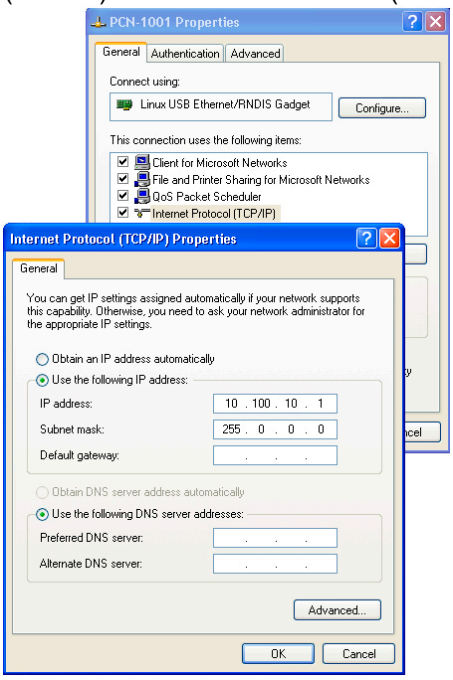


Note:

- If any of the components listed in step 6 are missing, add them before proceeding any further.
- If in any doubt, contact your system administrator for further instructions.

Step 3.4: Configure the TCP/IP Properties

1. Double-click “Internet Protocol (TCP/IP)” The “Internet Protocol (TCP/IP) Properties” dialog box will appear.



2. Select “Use the following IP address” radio button

3. In the “IP address” field enter the following:

10 . 100 . 10 . 1

4. In the “Subnet mask” field enter the following:

255 . 0 . 0 . 0

5. Click on the “OK” button of each Dialog Box” until all are closed.

NOTE:
By default the IP address of the PCN-1001 is [10.100.10.100]
The Host PC network IP address can be altered to meet the end users requirements; the first field must be 10, the last three fields should be numbers ranging from 0 to 254.
The Host PC address must be different from the PCN-1001 address. In this case, you cannot insert [10.100.10.100] as the connection between the two systems would not function.
If in any doubt, contact your system administrator for further instructions.

6. A message similar to the following should appear according to the OS installed on the Host PC when the PCN-1001 has successfully connected:

Step 3.5: Configure the Host PC firewall

WARNING!
If the host PC has a firewall running, the following ports MUST be open. If not, even if the PCN-1001 is properly connected no image will appear within the WinClient.

PORT	PROTOCOL	DIRECTION
5400	TCP	◄►
5402	UDP	◄
5403	UDP	◄

Step 4: Use WinClient to network PCN-1001 & Host PC

"*WinClient*" is a Graphical User Interface (GUI) that allows you to configure/debug the PCN-1001.

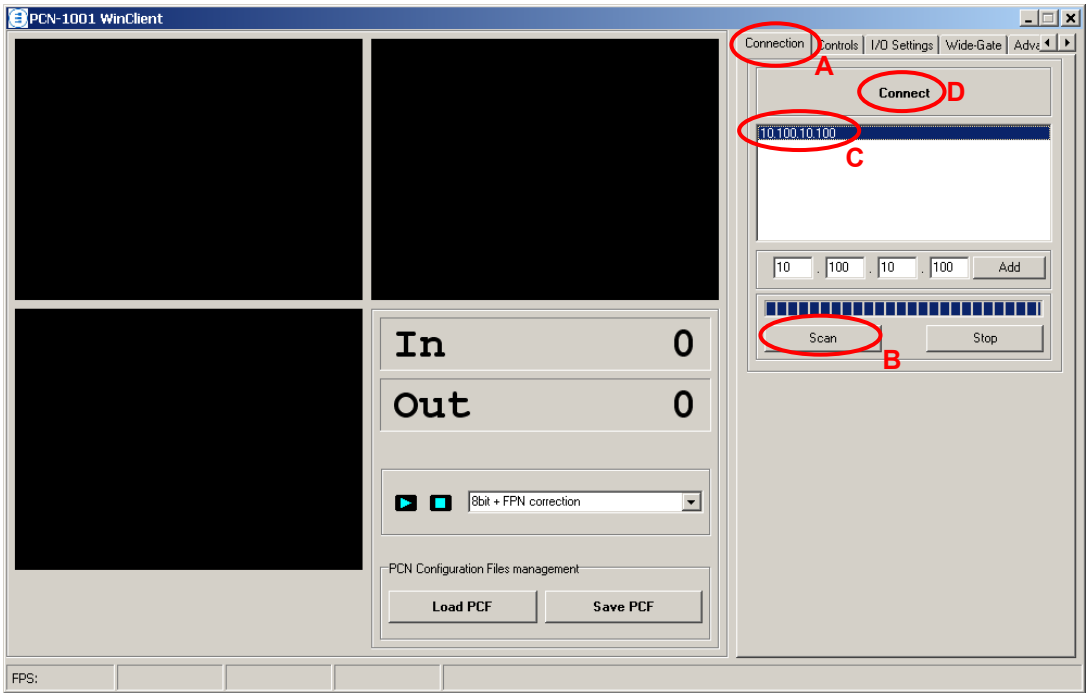
The *WinClient* software has been created to access and configure a single PCN-1001 at a time.

Before proceeding, make sure you have already installed WinClient on your Host PC. If not please refer to "Install/update the software" on page 51 for further details.

After the PCN-1001 has been turned on and properly connected the *WinClient* has to detect it. In this way the PCN-1001 and the Host PC will form a network. Follow these steps to detect the PCN-1001.

NOTE:
If the Host PC network has been setup correctly, when you open the *WinClient* you will see the next available address in the IP Add dialog boxes.
For example if the Host PC Network IP address is [10.100.10.1] the Add dialog boxes will display [10.100.10.2]; this is a good sign that the network has been correctly configured and is functional.

1. Select the "Connection" tab (**A**). Click the "Scan" button (**B**) and select the address of the PCN-1001 when it appears (**C**)
2. Click the "Connect" button (**D**). Now the PCN-1001 is networked to the Host PC



NOTE:
If WinClient does not identify the IP address of the PCN-1001 automatically (e.g.: 10.100.10.100) you may need to insert it manually

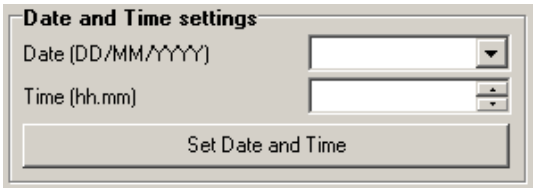
Step 4.1: Set the main parameters in the “Controls” tab

The “Controls” tab allows you to change the main settings of the PCN-1001 in order to obtain a good resolution on windows 1, 2 & 3.

Any modifications to the settings will be automatically saved to the internal flash memory of the PCN-1001 and takes immediately effect (a reset is not needed).

For further information about the “Controls” tab parameters refer to “The “Controls” tab” paragraph on page 61.

1: Set the “Date and Time settings”



Displays and allows you to set the system time and date.

Set date and time correctly!

This is extremely important especially in stand-alone installations where the user periodically downloads data via the USB using the “Save Records” feature.

2: Set the “Distance Configuration”

Allows you to set the distance between the PCN-1001 and the upper border of the Detection area

Example:

If the installation height is 225-230 cm above the floor and you want to count people high between one and two meters, you have to select the radio-button “25-30 cm”.

3: Set the “Light intensity”

Leave the checkbox unchecked.

For installations within buildings:

In these kinds of installation, it is assumed that the environment has a constant illumination.

It may be best to try several settings to find the one that best works for your individual requirements.

For on-board installations:

Slide the bar completely to the right to put the light intensity to maximum.

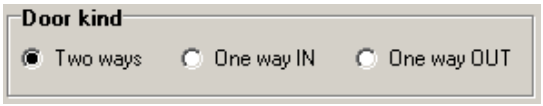
This will increase the counting accuracy even in installations where the environmental lighting conditions are always changing and can suddenly vary.

4: Set the "In/Out direction"

Be careful to set the direction for incoming and outgoing people correctly. The best method is to have a person enter the door, and verify that the correct counter In or Out is updated.

Changing the direction will reset the in/out counters.

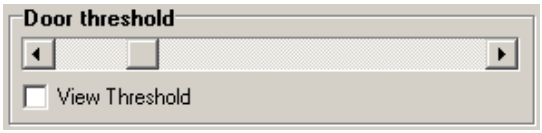
5: Set the "Door kind"



When, on-board a transportation vehicle, a door is dedicated for entering only or exiting only, this option allows the explicit declaration of the kind of door.

This declaration does not disable the incoming or outgoing counters but increases the sensitivity to people traversing the detection area in a certain direction.

6: Set the "Door threshold"

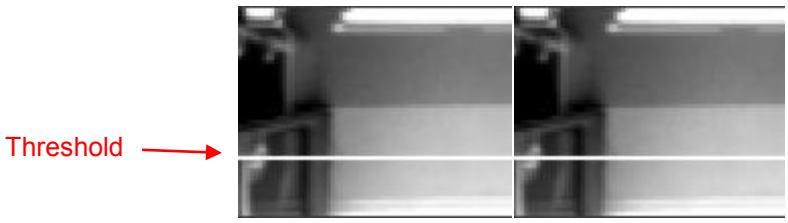


Together with "Scene background" (point 7), "Door threshold" is one of the two most important parameters that has to be set properly to increase accuracy.

During the tracking process, the two counters are incremented only if a person enters the detection area, crosses the door threshold and then exits from the detection area on the opposite side.

By default, the threshold is placed at row 60 (the image height is 120 rows). The position of the line can be set between row 30 and row 89.

In each visualization mode, except for "Tracking", flagging the "View Threshold" checkbox will display the current threshold (a white horizontal line) in Windows 1 and 2.



Guidelines to find the best threshold position:

- Place it in a way that any person entering or exiting has to cross it.
- Place it away from high reflective surfaces (i.e. the steps on a bus/train). If the detection area includes also a portion outside the transportation vehicle, the door threshold should not be set outside.
- Place it away from door-opening mechanisms
- It should be placed in the middle of the detection area, which if the PCN-1001 has been installed correctly above the door, should correspond to a central position of the "Door threshold" slide bar

If a door is intended to be used in a single direction, for example "in only" or "out only", it may be useful to move the threshold towards the exit edge of the detection area.

7: Use the "Scene background" button to acquire and store the background

Scene background

Together with "Door threshold", "Scene background" is the most important parameter that has to be properly set to obtain a reliable counting process.

The acquisition and storage of the background is a fundamental and sensitive issue.

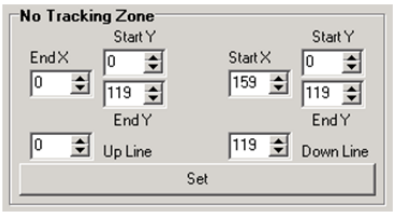
A bad background acquisition can seriously affect the counting process.

IMPORTANT NOTE:
Acquire the background in the following circumstances:

- **Once the PCN-1001 has been installed**
- **When the PCN-1001 has been relocated**
- **If the background has altered**

Pay attention to the following issues:

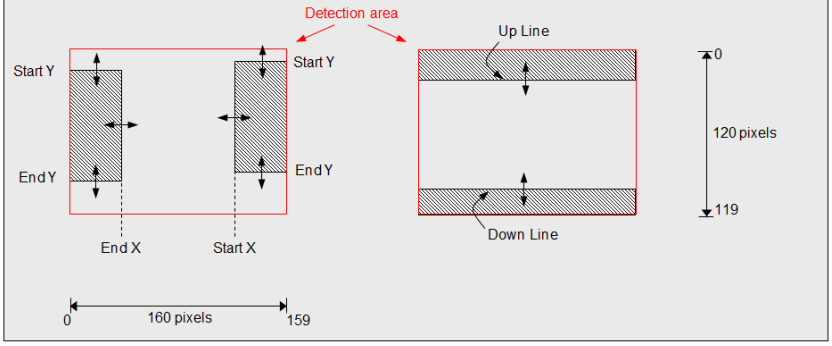
- The background has to be taken with no foreign removable objects in the detection area
- The background has to be taken with doors open, especially if the doors would block the PCN-1001s' field of view as frequently occurs within buses or trains
- Lighting of the detection area should be diffused as much as possible. No spot lighting (e.g. solar reflections or strong lighting) should be present in the detection area during background acquisition
- Highly reflective, geometric structures situated on or near the floor, such as the metallic parts of a door mechanism, which cause extreme patterns of light and darkness when illuminated by strong light (e.g. direct sunlight or directional halogen lighting) could lead to flawed distance measurements. To avoid performance degradation due to these effects the structures and any highly reflective surfaces should be avoided as much as possible in the detection area
- Metallic or shiny objects (such as handles, bars, glass, etc.) should not cover a significant part of the detection area. If this is not avoidable, the reflectivity of these items should be reduced by means of non-reflective materials or modifying the "No Tracking Zone"
- If necessary, use the features of the "No Tracking Zone" panel in "The "Advanced (1/2)" tab" (page 73). The "No Tracking Zone" feature allows you to define rectangular zones in the detection area where tracking will not be performed. This feature can be used to mask surfaces that are very reflective or with spot lighting



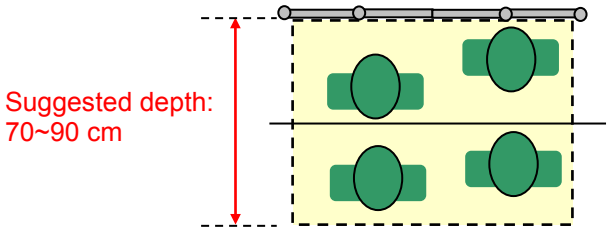
RANGES:

End X =	pixel 0 to 70
Start X =	pixel 159 to 91
Start Y =	pixel 0 to119
End Y =	pixel 119 to 0
Up Line =	pixel 0 to 59
Down Line =	pixel 119 to 60

Example:
The picture below shows the detection area with no tracking zones (represented as dashed areas):



- Exclude as much as possible the area outside the transportation vehicle
- Verify that all the entrance area is detected properly. Make a person move under the PCN-1001s and verify the correct detection
- The PCN-1001 can't track more than 10 people at a time. In particularly crowded conditions, i.e. on-board buses, 10 people can be compressed in less than 1 m^2, so the detection area should be smaller. In these conditions a depth of 70~90 cm at floor level is fine to guarantee a good tracking of people.



Follow these steps to save the background:

1. Connect the PCN-1001 by pressing the "Connect" button
2. Select "8bit Disp. + median + FPN + ODC" in the drop-down list. In this way Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN) and the Optical Distortion Correction (ODC). Window 3 will display the disparity map and a median filter will be applied for reducing noise
3. Press the "►" button.
4. **Ensure the doors of the gate are open!**
5. **Check that the PCN-1001 is correctly set up!**
   This means that in windows 1 and 2 you must see the scene as captured by the two cameras while in window 3 the image has to be completely black or dark grey-scaled.
   If for any reason it does not appear dark or any white spot appears, this will be recognised as one or more objects present in the detection area. A background stored in these conditions may reduce counting accuracy during the tracking process. Refer to the "Pay attention to the following issues:" paragraph above for possible solutions
6. Press the "■" button
7. Select the "Controls" tab and click the "Scene Background" button. Ensure that window 3 remains completely dark or dark grey-scaled until the process has completed. If not restart from step "5"

Wait for the progress bar to complete. When completed, the "Scene background Saved!" dialog box will be displayed.

NOTE:
Pay careful attention that the USB cable or any part of your body, especially feet, are not visible in the detection area

Step 5: Use WinClient to test the tracking of people

The “tracking” process consists of a 3D image displayed in window 3 that is the differences between the images from the left and right cameras.
The image in window 3 is also called “Disparity map”. As objects become closer to the cameras they will appear lighter in colour.

To verify the tracking process:

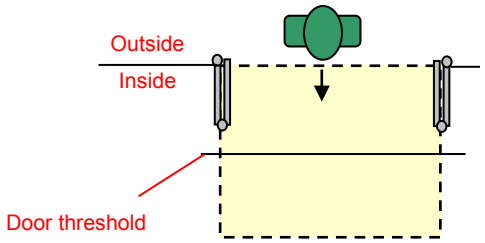
1. Select “Tracking” in the drop-down list
2. Click the “►” button
3. Check if the images in window 3 are correctly displayed when somebody is enters into the detection area.

Figure 2. The tracking process

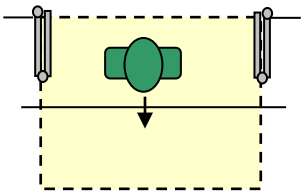
When the WinClient is closed, the system will continue counting according to the user’s configuration.

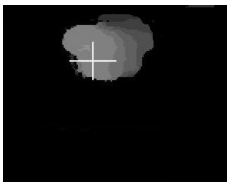
NOTE:
When closing the WinClient you MUST first Disconnect using the Disconnect button in the Connection Tab

Example of counting

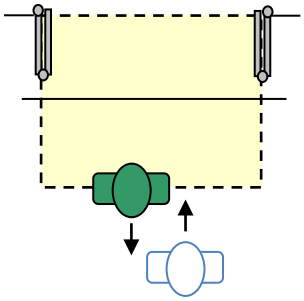


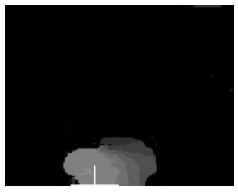
In	0
Out	0



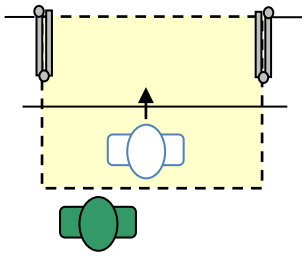


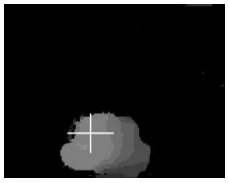
In	0
Out	0



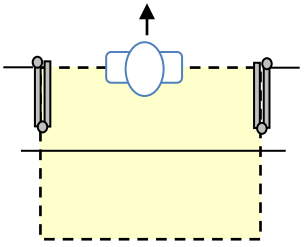


In	1
Out	0





In	1
Out	0



In	1
Out	1

Normal view **Disparity map** **Counters**

Remember:

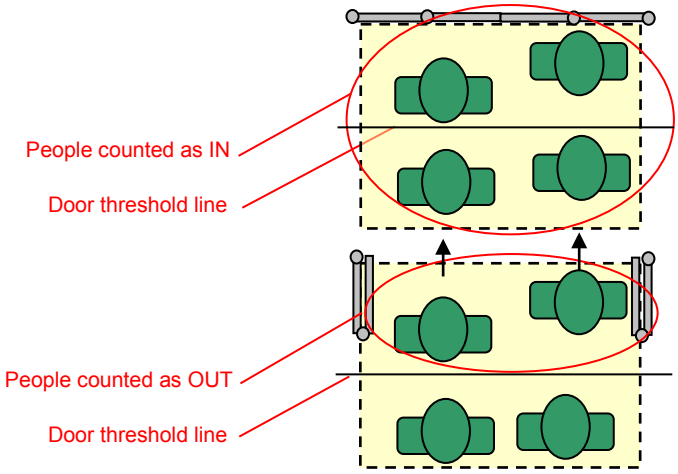
During the tracking process, the two counters are incremented only if a person enters the detection area, crosses the door threshold and then exits from the detection area on the opposite side.

How the threshold works when using digital inputs

NOTE:
Refer to 'Notes about the Digital I/O interface' on page_69 for further information about the digital inputs.

When the counting process is disabled (i.e. when the door is closed), people remaining anywhere in the detection area will be counted as IN, and the counter will be amended accordingly.

When the counting process is enabled (when the door is open), every person already within the door threshold line and the portion of detection area facing the door, will be counted as OUT if they leave the detection area; again, the counter will be amended accordingly.



WARNING!
The commutation time of digital inputs is extremely important because any propagation delay in the signal may affect severely the precision of the counting.
The digital inputs should enable the PCN-1001 as soon as the door starts opening and should disable it after the door is closed completely.

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PART 3 – THE PCN-1001 SOFTWARE

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Install/update the software

The software to use with the PCN-1001 is contained on the CD-ROM that comes with the development kit of the PCN-1001 (the DTK-1001-00).
For the latest software releases, please refer to www.eurotech.com/en/download/PCN-1001.

The main software packages to be used with your PCN-1001 are:

- pcn-1001-Imgserver
- pcn-1001-demo-win32

The pcn-1001-Imgserver

"*Imgserver*" is a daemon program that runs on the PCN-1001, it starts at boot time and performs the people counting tasks. It accepts remote connections using both the RS485 and USB ports.
The PCN-1001 comes with *Imgserver* ready installed and ready to work.
A copy of this program is also contained in the CD-ROM.

The pcn-1001-demo-win32

"pcn-1001-demo-win32" is a package (supported by Windows XP, Vista, and 7) that, when run on the Host PC, installs both the "*WinClient*" and the "*RS485_GUI*" programs:

The WinClient

"*WinClient*" is a Graphical User Interface (GUI) that allows you to configure/debug the PCN-1001.
The *WinClient* software has been created to access and configure one PCN-1001 at a time.

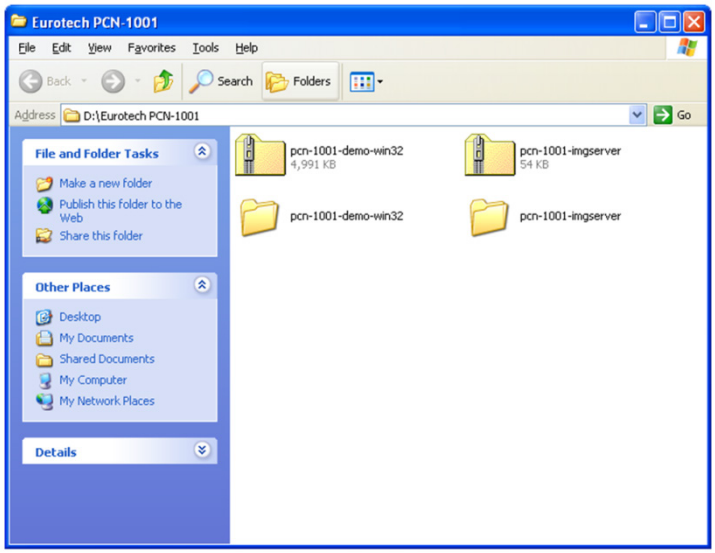
The RS485_GUI

"*RS485_GUI*" is a program that can be used to simulate real working conditions where the Host PC or the Control Unit (the main on-board computer, for example a Eurotech DuraCOR system) sends/receives commands via an RS485 connection to/from one or more PCN-1001.

WARNING!
IT IS IMPORTANT TO NOTE THAT THE SAME VERSION OF "PCN-1001-DEMO-WIN32" AND "*IMGSERVER*" MUST BE INSTALLED RESPECTIVELY ON THE HOST PC AND ON THE PCN-1001.
INCOMPATIBILITIES WILL OCCUR AND THESE WILL CAUSE PROBLEMS IF OLDER AND NEWER VERSIONS OF EITHER THE "PCN-1001-DEMO-WIN32" OR "*IMGSERVER*" ARE USED TOGETHER.

Install/update the software on the Host PC

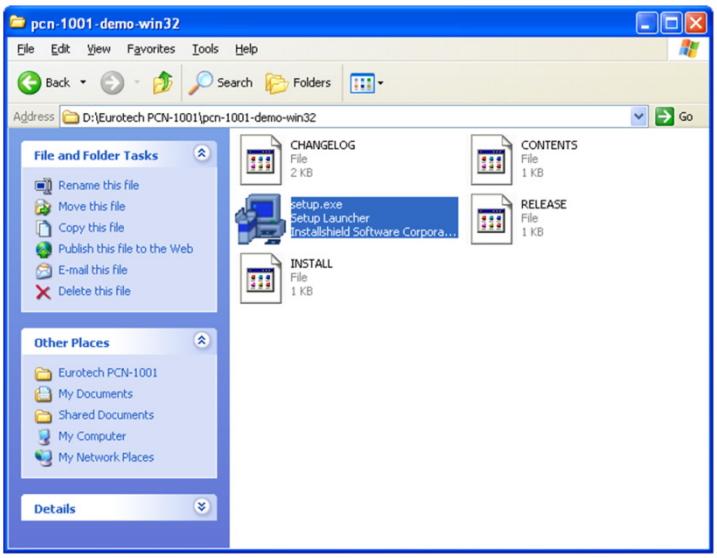
Before starting, save and unzip both the “pcn-1001-*Imgserver*” and the “pcn-1001-demo-win32” packages on your Host PC into a specific folder (i.e. name it “Eurotech PCN-1001”).



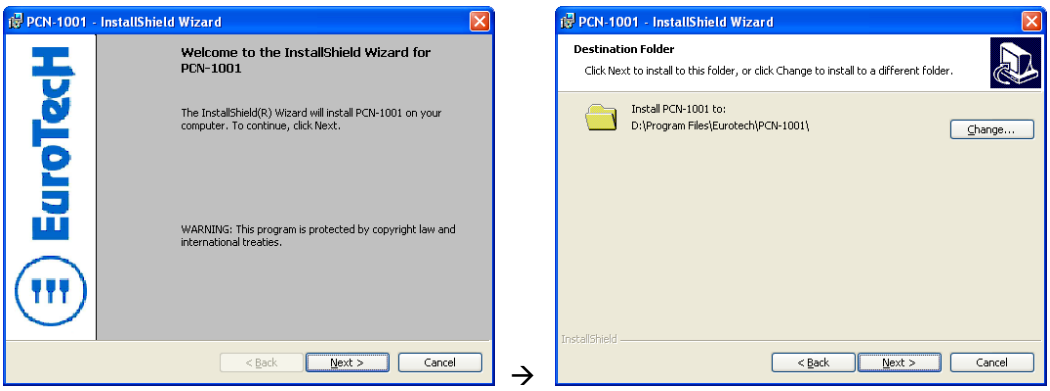
Install / Update WinClient and RS485_GUI on the PCN-1001

WARNING!
Installing, uninstalling, or updating the *WinClient* on the Host PC will also cause the automatic installation, uninstallation, or update of *RS485_GUI*.

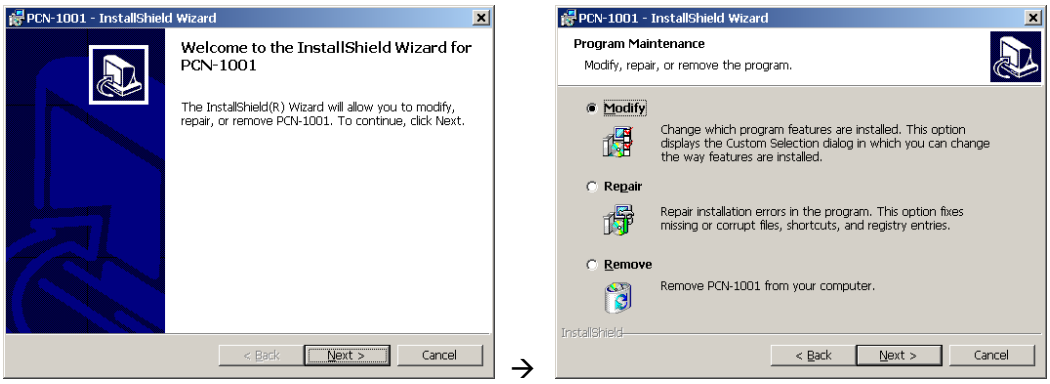
1. If present, uninstall any previous versions of the WinClient and RS485_GUI before installing the new one
2. Navigate to the **pcn-1001-demo-win32** folder. Double-click the “setup.exe” icon



3. The InstallShield Wizard will guide you through the following installing/updating procedures:
   - **NEW INSTALLATION:**
     If you are installing the "*WinClient*" and "*RS485_GUI*" on the Host PC for the first time, you will obtain the following messages:

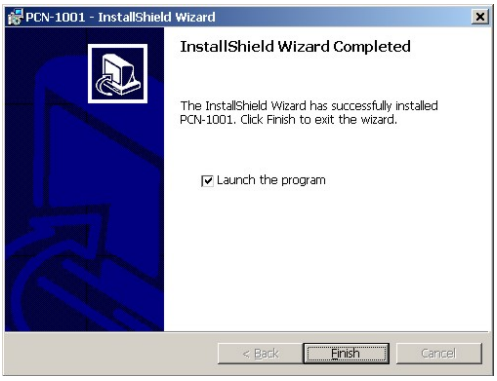


   - **UPDATE:**
     If the "*WinClient*" and "*RS485_GUI*" are already installed on the Host PC, you will obtain the following messages that allow you to modify, repair or remove them from the Host PC:



4. Follow the instructions that will appear

5. When completed click "Finish"

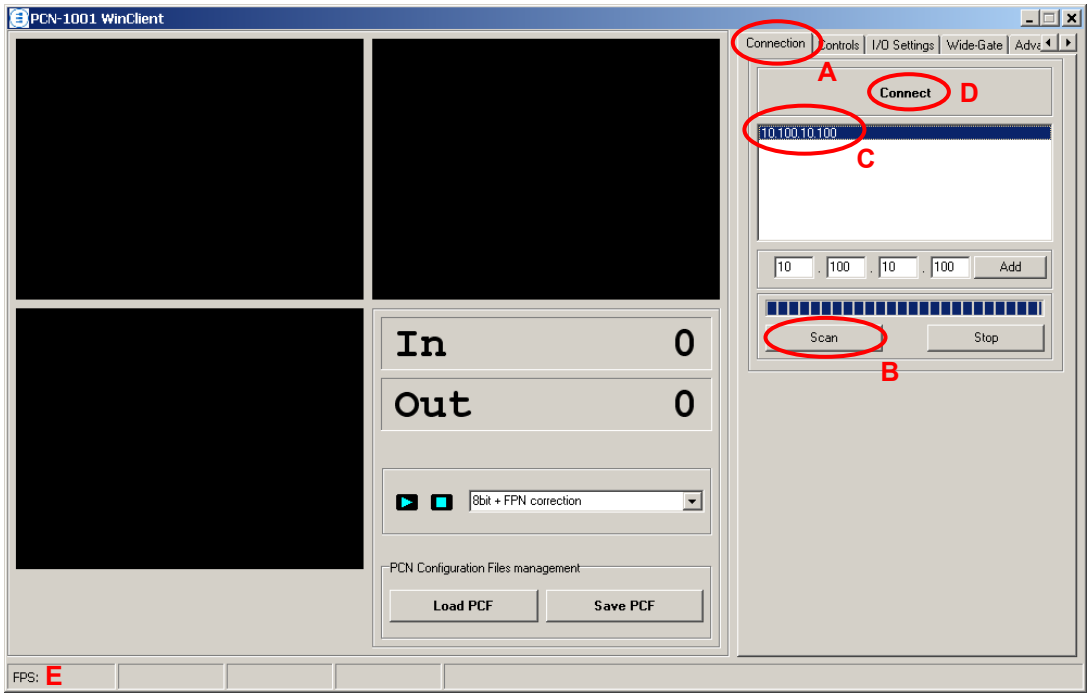


6. The new versions of *WinClient* and *RS485_GUI* programs have now been installed on the Host PC. The related shortcuts icons will appear on the desktop.

Updating Imgserver on the PCN-1001

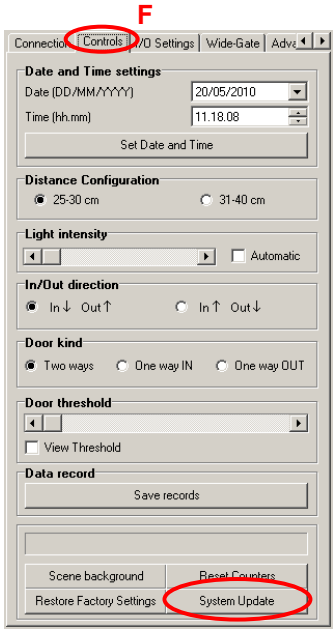
The PCN-1001 comes with *Imgserver* already installed and ready to work.
When available, new versions of the *Imgserver* can be installed in the following way:

1. The PCN-1001 has to be turned on and connected to the Host PC via USB. Refer to "Install a PCN-1001" 33 and "Step 3: Configure the network between PCN-1001 and Host PC" on page 36 for further information
2. Start WinClient

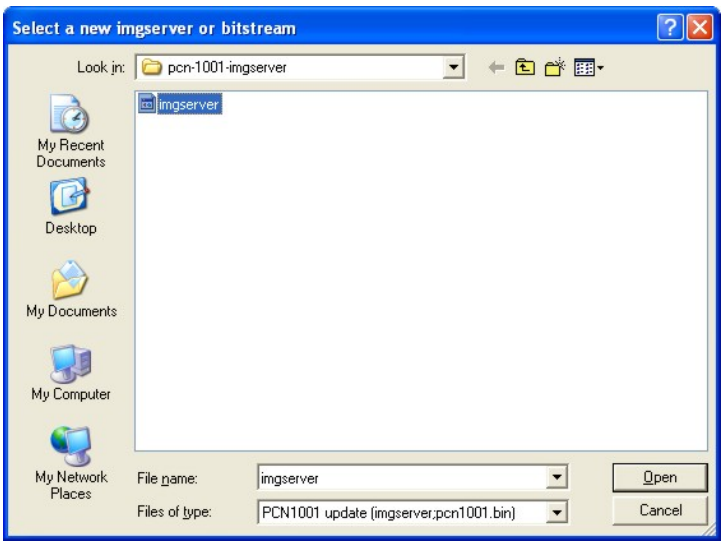


3. Select the "Connection" tab (**A**) and click the "Scan" button (**B**).
   Select the address of the required PCN-1001(**C**). Click the "Connect" button (**D**).
   When connected, the *Imgserver* version will be displayed on the bottom line (the Status bar; **E**)

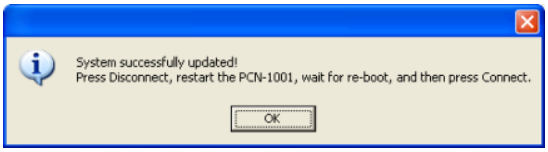
4. Select the "Controls" tab (**F**) and click the "System Update" button (**G**)



5. A dialog box will appear.
   Open the folder with the latest *Imgserver* file. Select the *Imgserver* file. Click “Open”

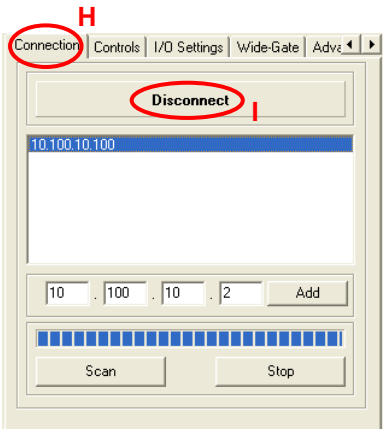


6. The *Imgserver* will be updated on the PCN-1001.
   When done the following confirmation message will appear:



   Click “OK”

7. Select the "Connection" tab (**H**) and click the “Disconnect” button (**I**)



8. Close the *WinClient* program

9. **IMPORTANT! Disconnect power to the PCN-1001 (turn it off)**

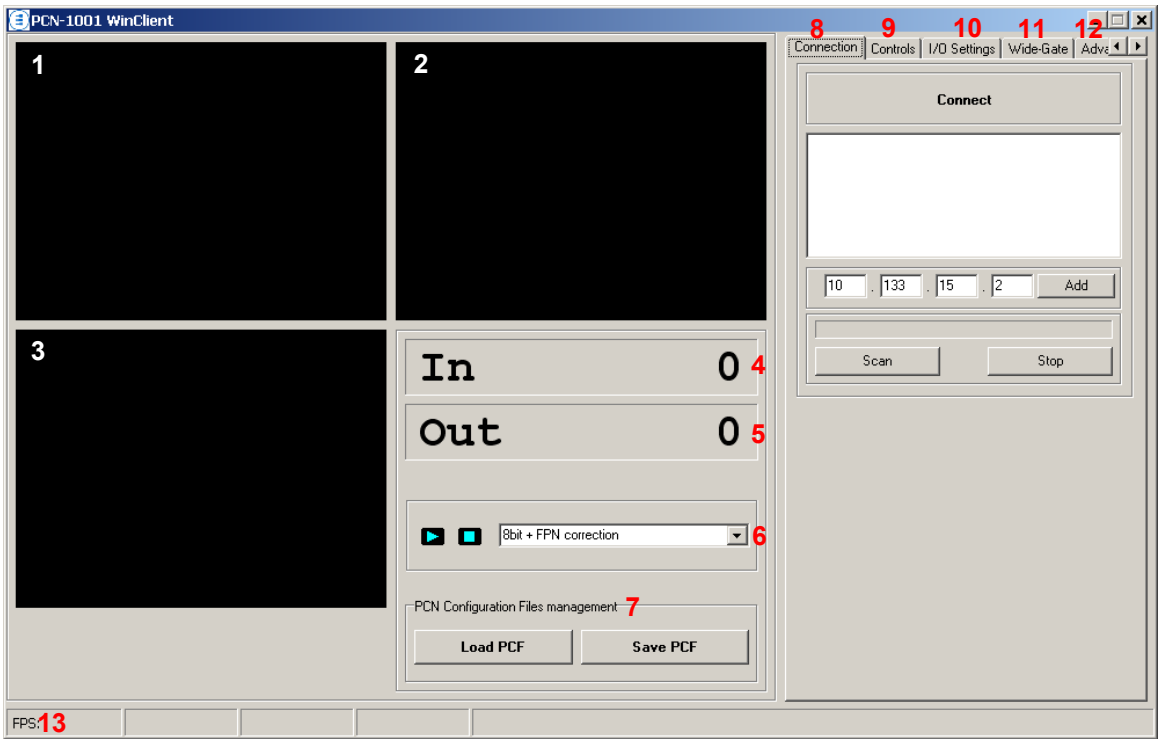
10. Reapply power to the PCN-1001 (turn it on). Allow sufficient time for the system to start. A message like the following will appear when the PCN-1001 has successfully rebooted and reconnected:

11. Restart the *WinClient* program
12. Reconnect (as done at steps 3 and 4).
13. Verify that the *Imgserver* has been updated by looking at the versions in the status bar

Note:
Refer to the download area of www.eurotech.com to download the most updated software version.

Know WinClient

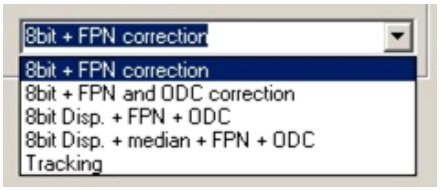
After you have properly connected and configured both the Host PC and the PCN-1001 as described above, if you click the *WinClient* shortcut on the Desktop you will obtain the *WinClient* graphical interface:



1 & 2	Window displaying the left and right images acquired from the individual cameras
3	Window displaying the tracking process and the disparity map
4	Incoming counter
5	Outgoing counter
6	Drop-down list
7	PCN Configuration Files Management
8	“Connection” tab
9	“Controls” tab
10	“I/O Settings” tab
11	“Wide-Gate” tab
12	“Advanced” tabs 1/2 and 2/2
13	Status bar

The drop-down list

The drop-down list offers a choice of visualization modalities for the windows 1, 2 and 3:



- **8bit + FPN correction** — Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN)
- **8bit + FPN and ODC correction** — Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN) and the Optical Distortion Correction (ODC)
- **8bit Disp. + FPN + ODC** — Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN) and the Optical Distortion Correction (ODC).
  Window 3 will display the disparity map
- **8bit Disp. + median + FPN + ODC** — Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN) and the Optical Distortion Correction (ODC).
  Window 3 will display the disparity map and a median filter will be applied for reducing noise
- **Tracking** — This is the only modality that activates the counting. Window 3 will display the disparity map and a median filter will be applied for noise reduction. Furthermore some white crosses will appear to indicate the detected people and trace their movement

The Start and Stop buttons

The Start (“►”) and Stop (“■”) buttons allow you to respectively start and stop the counting process.

PCN Configuration Files management (PCF)

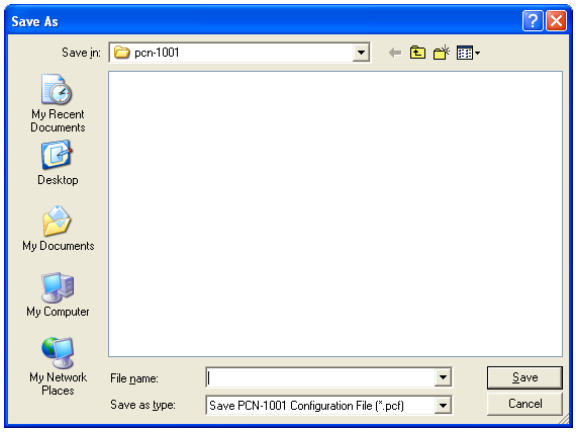
This feature is useful when you have several PCN-1001 devices that have to be installed and all will have the same operating conditions (i.e. same door on different buses of the same type).
It allows you to save the current configuration and load it to other PCN-1001 devices without setting each PCN-1001 individually.

Note:
The PCN-1001 configuration that is going to be saved will contain all the setup parameters except for the “RS485 Setup ID” and “Scene Background”.

How to save a PCF

1. Make sure that the PCN-1001 is not running (click the “■” button)
2. Click the “Save PCF” button

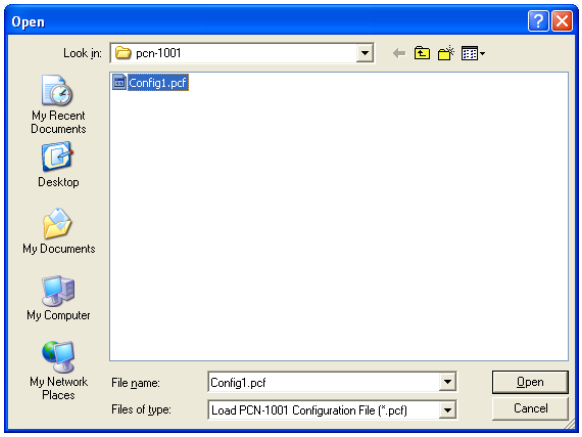
3. A dialog box like the following will appear:



4. Save the current configuration with a file name (i.e. Config1)

How to load a PCF

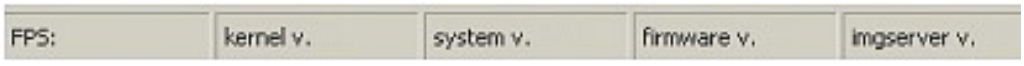
1. Make sure that the PCN-1001 is not running (click the "■" button)
2. Click the "Load PCF" button
3. A dialog box like the following will appear:



4. Select the proper file name (i.e. Config1) and click "Open"

NOTE:
The "Scene Background" must be retaken for each new PCN-1001, even if the background is theoretically the same

The status bar



When the PCN-1001 is working, the status bar displays the following information:

Value	Description
FPS:	Frames Per Second. The number of images displayed by *WinClient* every each second.
Kernel v.	The Linux kernel version
System v.	The Operating system version.
Firmware v.	The FPGA firmware version.
***Imgserver* v.**	The *Imgserver* program version.

Notes about images acquisition and FPS

During normal operations (default mode), the PCN-1001 acquires the images at a constant rate of approximately 60 Frames Per Second (FPS).

During configuration, the acquired images are transmitted to the Host PC for visualization. Depending on the Host PCs characteristics and the USB connection, the FPS rate may differ. The value displayed in the bottom left corner of the *WinClient* GUI is the current FPS rate detected by the Host PC. However the real FPS of the PCN-1001 is not affected by these external factors and remains at 60 FPS.

The tabs

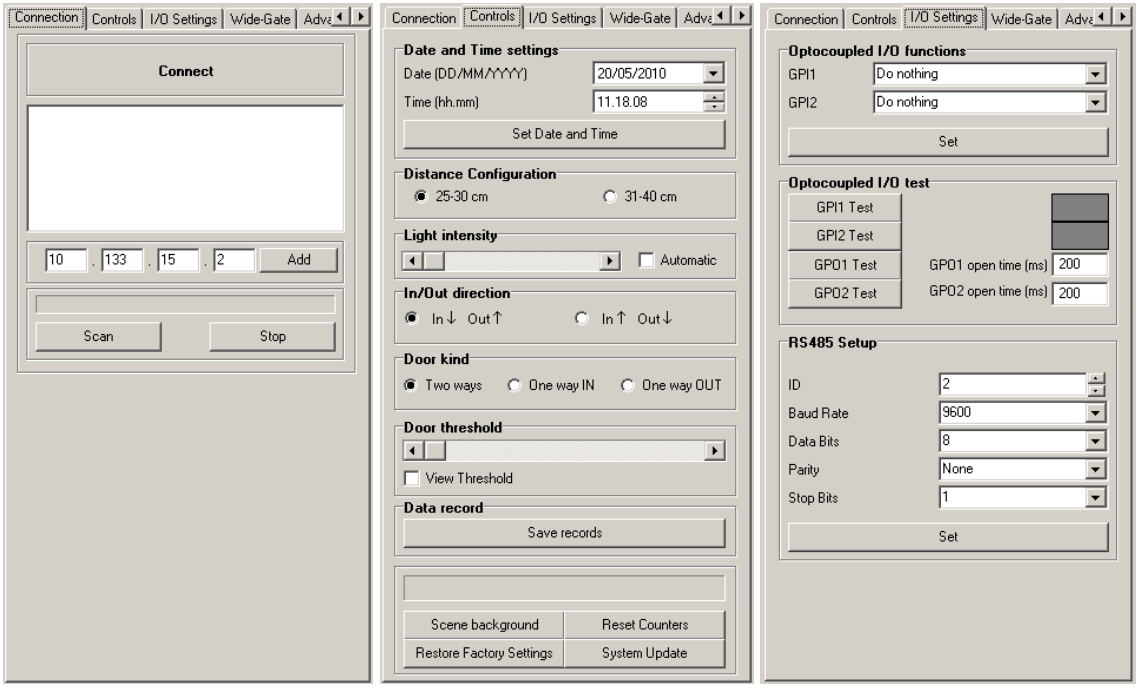


Figure 3. Connection, Controls and I/O Settings tabs

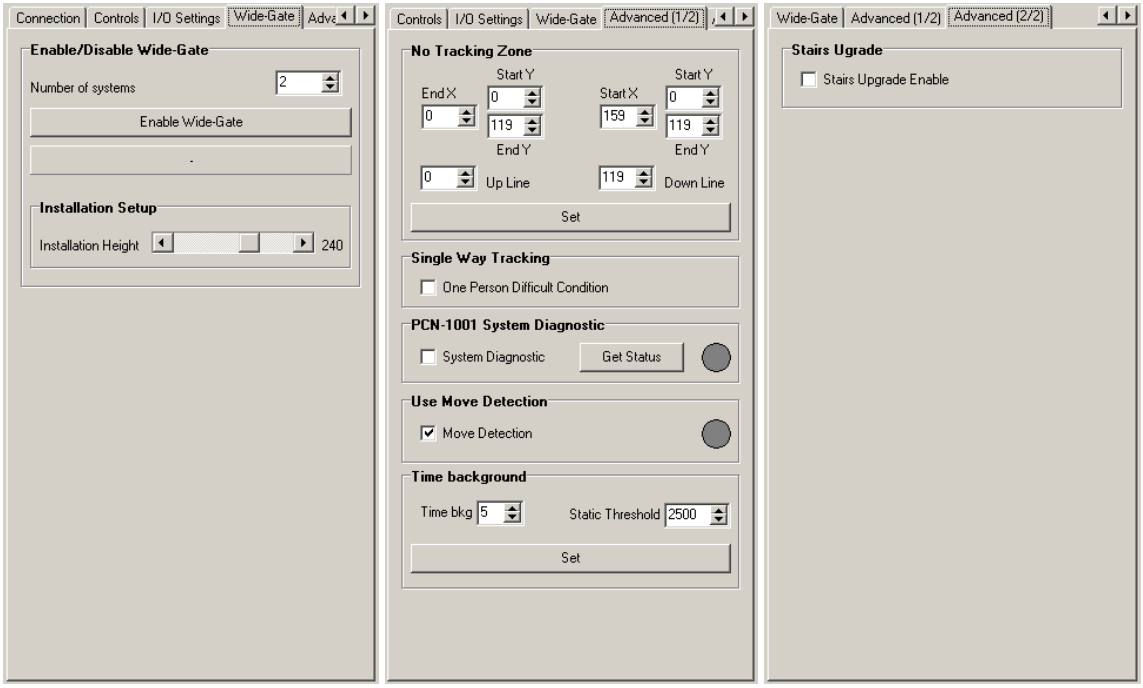


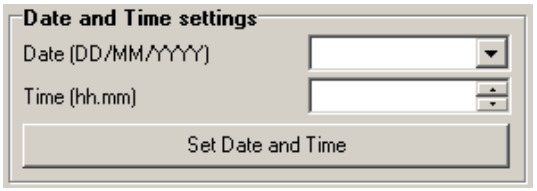
Figure 4. Wide-Gate and Advanced tabs

The “Controls” tab

The “Controls” tab allows you to change the main settings of the PCN-1001 in order to obtain a good resolution on windows 1, 2 & 3.

Any modifications to the settings will be automatically saved to the internal flash memory of the PCN-1001 and takes immediately effect (a reset is not needed).

The “Date and Time settings” panel



Displays and allows you to set the system time and date.

Set date and time correctly!

This is extremely important especially in stand-alone installations where the user download periodically data via USB using the “Save Records” feature.

The values displayed are updated when the system is connected. If after a successful connection the time and/or date are not displayed correctly, enter the Regional Options within the Windows Control panel and set the time separator to “.” And the date separator to “/”; after doing so reconnect to the PCN-1001 and verify that the time and date are correctly displayed.

If the PCN-1001 remains without power for more than seven days, the current time and date information will be lost, and therefore will need to be corrected.

The “Distance Configuration” panel

Allows you to set the distance between the PCN-1001 and the upper border of the detection area.

> **Example:**
> If the installation height is 230 cm above the floor and you want to count people high between one and two meters, you have to select the radio-button “25-30 cm”.

The “Light intensity” panel

The light intensity of LED indicators can be adjusted automatically or manually by the using this slider and Checkbox.

Flagging the checkbox will make the PCN-1001 automatically adjust the LED intensity according to the environmental lighting conditions.

For installations within buildings:

In these kinds of installation, it is assumed that the environment has a constant illumination.

The right light intensity has to be found experimentally.

For on-board installations:

Slide the bar completely to the right, and put the light intensity to the maximum.

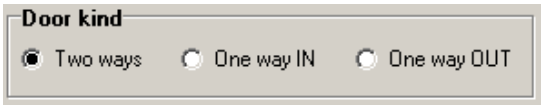
This will increase the counting accuracy even in installations where the environmental lighting conditions are always changing and can vary suddenly.

The "In/Out direction" panel

Be careful to set the direction for incoming and outgoing people in the right way, paying attention that the arrows refer to the motion of people as displayed on the *WinClient* interface.

Changing the direction will reset the in/out counters.

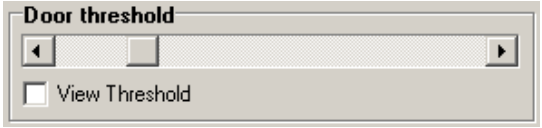
The "Door kind" panel



When, on-board a transportation vehicle, a door is dedicated to the entering only or the exiting only of passengers, this option allows the explicit declaration of the kind of door.

This declaration does not disable the income counting in a door declared as "one-way out" but decrease the erroneous counting of incoming people due to reflections or due to atypical behaviour of passengers (a passenger that was intended to go out, invert his direction and returns back) in the proximity of the open door.

The "Door threshold" panel

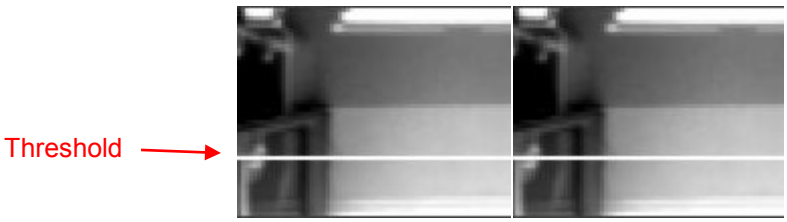


This is an important parameter that has to be properly set to obtain a reliable counting process.

During the tracking process, the two counters are incremented only if a person enters the detection area, crosses the door threshold and then exits from the detection area on the opposite side.

By default, the threshold is placed at row 60 (the image height is 120 rows). The position of the threshold line can be set between row 30 and row 89.

In each visualization mode, except for "Tracking", flagging the "View Threshold" checkbox will display the current threshold (a white horizontal line) in Windows 1 and 2.



Guidelines to find the best threshold position:

- Place it in a way that any person entering or exiting have to cross it.
- Place it away from high reflective surfaces (i.e. the steps on a bus/train). If the detection area includes also a portion outside the transportation vehicle, the door threshold should not be set outside.
- Place it away from door-opening mechanisms
- It should be placed in the middle of the detection area, which if the PCN-1001 has been installed correctly above the door, should correspond to a central position of the "Door threshold" slide bar

If a door is intended to be used in a single direction, for example "in only" or "out only", it may be useful to move the threshold towards the exit edge of the detection area.

The "Data records" panel

The Incoming & Outgoing counters along with Time & Date information is saved immediately by the PCN-1001; every sixty seconds these values are appended to a text log file within the flash memory of PCN-1001. Depending on the Optocoupled I/O functions selected (see the 'Optocoupled I/O functions panel' paragraph on page 67) the information written to the log file will be different.

The following paragraphs describe the available log file formats.

The log file

The log file is a series of text lines. There are four different types of line:

Boot: The following line is added each time the PCN-1001 completes a boot cycle:

Boot	*date*[1]	*time*[2]	*Counter In*[3]	*Counter Out*[4]

Count: The following line is added each time the counter registers a person as entering or leaving

Count	*date*	*time*	*Counter In*	*Counter Out*

Start: The following line is added when the Digital I/O has been enabled or the RS485 command "enable_pc 1" is used

Start	*date*	*time*	*Counter In*	*Counter Out*

Stop: The following line is added when the Digital I/O has been disabled or the RS485 command "enable_pc 0" is used

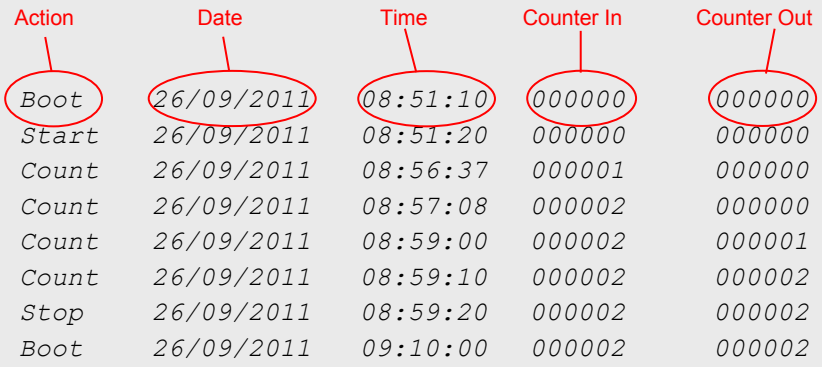
Stop	*date*	*time*	*Result In*[5]	*Result Out*[6]

[1] The date in dd/mm/yyyy format
[2] The time in hh/mm/ss
[3] Quantity of incoming people
[4] Quantity of outgoing people
[5] Quantity of people added to the Counter In since the last Start command
[6] Quantity of people added to the Counter Status Out since the last Start command

All the values in a text line are separated by a tab. This makes easy to export data into any spread-sheet application (e.g.: Microsoft Excel, OpenOffice, etc.).

Example

The following is an example of log file from a bus with a single door:



Action	Date	Time	Counter In	Counter Out
Boot	26/09/2011	08:51:10	000000	000000
Start	26/09/2011	08:51:20	000000	000000
Count	26/09/2011	08:56:37	000001	000000
Count	26/09/2011	08:57:08	000002	000000
Count	26/09/2011	08:59:00	000002	000001
Count	26/09/2011	08:59:10	000002	000002
Stop	26/09/2011	08:59:20	000002	000002
Boot	26/09/2011	09:10:00	000002	000002

In this example:

At 08:51:10	the PCN-1001 was powered on, the current counter values were: 0 In, and 0 Out
At 08:51:20	the door was opened
At 08:56:37	1 person entered
At 08:57:08	1 person entered
At 08:59:00	1 person exited
At 08:59:10	1 person exited
At 08:59:20	the door was closed, the values showed that 2 people had entered and 2 people had exited
At 09:10:00	the PCN-1001 was powered on (for example a reboot occurred)

Saving the records of the log file

By clicking the "Save records" button you will be able to download the log file as text. You will be given the option to "Save As" – "*filename.txt*".

NOTE:
The PCN-1001 can record a maximum of 300,000 log lines.
When the PCN-1001 exceed the amount of 299,999 log lines the internal software will overwrite the oldest block of 30,000 lines with the new data, leaving the remaining 30,000 x 9 lines already recorded.
In this case the system will continue to cancel and rewrite each successive block of 30,000 lines

It is possible to use the Mini USB 1.1 client connector located on the front side of the PCN-1001 in order to transfer data (i.e. to a Host PC).

The "Scene background" button

This is an important parameter that has to be properly set to obtain a reliable counting process.
The acquisition and storage of the background is a fundamental and sensitive issue.
A bad background acquisition can affect seriously the counting process.

IMPORTANT NOTE:
Acquire the background in the following circumstances:

- **Once the PCN-1001 has been installed**
- **When the PCN-1001 has been relocated**
- **If the background has altered**

Pay attention to the following issues:

- The background has to be taken with no foreign removable objects in the detection area
- The background has to be taken with doors open, especially if the doors would block the PCN-1001s' field of view as frequently occurs within buses or trains
- Lighting of the detection area should be diffused as much as possible. No spot lighting (e.g. solar reflections or strong lighting) should be present in the detection area during background acquisition
- Highly reflective, geometric structures situated on or near the floor, such as the metallic parts for door mechanisms, which cause extreme patterns of light and darkness when illuminated by strong light (e.g. direct sunlight or directional halogen lighting) could lead to flawed distance measurements. To avoid performance degradation due to these effects the structures and any high reflective surface should be avoided as much as possible in the detection area
- Metallic or shiny objects (such as handles, bars, glass, etc.) should not cover a significant part of the detection area. If this is not avoidable, the reflectivity of these items should be reduced by means of non-reflective materials or modifying the "No Tracking Zone".

Follow these steps to save the background:

1. Connect the PCN-1001 by pressing the "Connect" button
2. Select "8bit Disp. + median + FPN + ODC" in the drop-down list. In this way Windows 1 and 2 will display the separated images as seen by the two cameras, subtracting the Fixed Pattern Noise (FPN) and the Optical Distortion Correction (ODC). Window 3 will display the disparity map and a median filter will be applied for reducing noise
3. **Ensure the doors of the gate are open!**

4. **Check that the PCN-1001 is correctly set up!**
   This means that in windows 1 and 2 you must see the scene as captured by the two cameras while in window 3 the image has to be completely black or dark grey-scaled.
   If for any reason it does not appear dark or any white spot appears, this will be recognised as one or more objects present in the detection area. A background stored in these conditions will cause a wrong count during the tracking process. Refer to the "Pay attention to the following issues:" paragraph above for possible solutions
5. Press the "►" button. Press the "■" button
6. Select the "Controls" tab and click the "Scene Background" button. Ensure that window 3 remains completely dark or dark grey-scaled until the process has completed. If not restart from step "5"
7. Wait for the progress bar to complete. When completed, the "Scene background Saved!" dialog box is displayed. The PCN-1001 is now ready to operate

NOTE:
If the PCN-1001 is correctly connected via USB to the Host PC and the drivers is correctly installed but you still cannot see the images in windows 1 and 2, try to set the Host PC colour depth to 16 bit (or less) by going to the Start Menu > Settings > Control Panels > Display > Settings.

The "Reset counters" button

Zero's the Incoming and Outgoing counters.

The "Restore Factory Settings" button

Resets the system to its original factory configuration.

The "System update" button

Use this button to upgrade the PCN-1001 software when a new version becomes available.
You will find copies of the software on the CD-ROM provided with your PCN-1001.
You should also check the Download area on the Eurotech website for the latest updates.

The “I/O Settings” tab

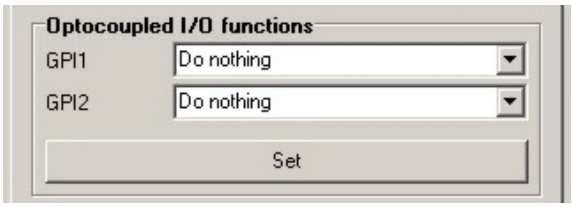
The PCN-1001 can be interfaced and triggered by means of 2 independent optocoupled inputs and 2 independent optocoupled outputs.

The RS485 port is the main communications interface used when the PCN-1001 is installed on-board a transportation vehicle.

Each modification to these settings will be automatically saved in the internal flash memory of the PCN-1001 and takes immediate effect (a reset is not needed).

The “Optocoupled I/O functions” panel

The two inputs, GPI1 and GPI2 (GPI means General Purpose Input), can be used in four different modes. These can be selected using the two drop-down menus.



Press the “Set” button to confirm the drop-down menu selection

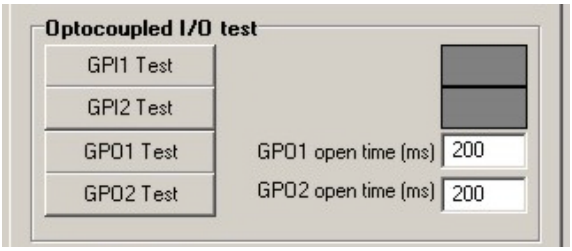
- **Do nothing:** The system ignores any signals received on the input lines
- **Test:** Allows the operator to test the two input lines (See ‘Optocoupled I/O test panel’ on next page for more details)
- **Reset counters:** Sets the incoming and outgoing counters to zero when a rising edge is detected. In the Wide-Gate configuration only the GPI2 can be set as reset. It has to be set connecting the first PCN-1001 and the signal will be available on the last PCN-1001
- **Enable/Disable counting** When the GPI1 / GPI2 inputs receive a rising edge (they are enabled) the PCN-1001 will start the counting process.
  When the GPI1 / GPI2 inputs receive a falling edge (they are disabled) the PCN-1001 will stop the counting process.
  In the Wide-Gate configuration only the GPI1 can be set as Enable/Disable.

  The default mode for the PCN-1001 when powered-up is “Counting Enabled”.
  The counting will be Disabled / Enabled only when the GPI changes state.

  Example 1:
  a) The PCN-1001 is powered up: the counting will be enabled by default
  b) The GPI is enabled: the counting was already enabled at power up and nothing change
  c) The GPI is disabled: the counting will be disabled

  Example 2:
  a) The PCN-1001 is powered up: the counting will be enabled by default
  b) The GPI is disabled: the counting will be disabled
  c) The GPI is enabled: the counting will be enabled

The "Optocoupled I/O test" panel



The two outputs, GPO1 and GPO2, (GPO means General Purpose Output) have the purpose to react when a person is counted:

- GPO1: By default is associated to incoming people
- GPO2: By default is associated to outgoing people

The optocoupled output electronics behave as low-side switches normally closed.
When the PCN-1001 detects a person, one of the two outputs (depending on the direction of the person) turns its status to open for a period of "GPO-Open-Time" milliseconds.

The GPO-Open-Time (GPOOT) can be configured inserting a value (from 8 to 1020 milliseconds) in the two GPO1 and GPO2 open time fields on the "Optocoupled I/O test" panels.

If two people walk in the same direction under the PCN-1001, the first signal will be immediately sent to the appropriate output, the second will be queued for (2 x GPOOT) milliseconds.

In the Wide-Gate configuration the GPO1 used will be the one of the first PCN-1001.
The GPO2 will be the one of the last PCN-1001. In any case, both the GPO-Open-Times have to be set connecting the first PCN-1001.

GPI1 Test / GPI2 Test

Follow these steps to test the inputs:

1. In the drop-down lists of the "Optocoupled I/O functions" panel select the option "Test" for either GPI1 or GPI2
2. Press the "Set" button
3. Press either "GPI1 Test" or "GPI2 Test" button. If a rising edge is received on GPI1 or GPI2, the corresponding grey rectangle will turn to white. If a falling edge is received it will turn to grey

NOTE:
The "Test" functions are only available via Socket API, not via RS485.

GPO1 Test / GPO2 Test

In order to test the outputs press the "GPO1 Test" or "GPO2 Test" button. The GPOOT value will be set to the nearest multiple of four lower than or equal to the inserted value.

NOTE:
The "Test" functions are only available via Socket API, not via RS485.

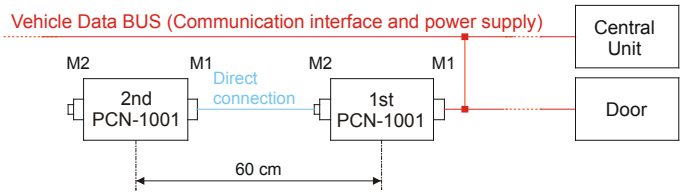
Notes about the Digital I/O interface

The PCN-1001 can be interfaced and triggered by means of two general-purpose inputs and two general-purpose outputs. For example, the general-purpose digital I/O interface can be used to detect a doors status (open or closed).

In this case the logic to follow is:

0 Door closed

1 Door open



The counters will be activated when the door status becomes 1 (Open).

The general-purpose I/Os are 1 kV isolated and are available on the M1 connector.

They allow for a direct connection to industrial equipment with an isolation of 3750 V_{RMS}.

In the Wide-gate configuration the door status input has to be connected to the M1 connector of the first PCN-1001, using GPI1. For further information refer to the 'Optocoupled I/O functions panel' paragraph on page 67 and to the Note: 'How the threshold works when using digital inputs' on page 47.

The Output Block

The figure below shows the electrical schematics of the output block. The labels on the right side refer to the M1 and M2 connectors, while the left side of the picture refers to the internal processing part of the system.

The Output Block behaves as a low-side switch. The load connected to the low-side switch can draw current either from an external power source or from the Digital OUT V+ referred to the Digital OUT GND.

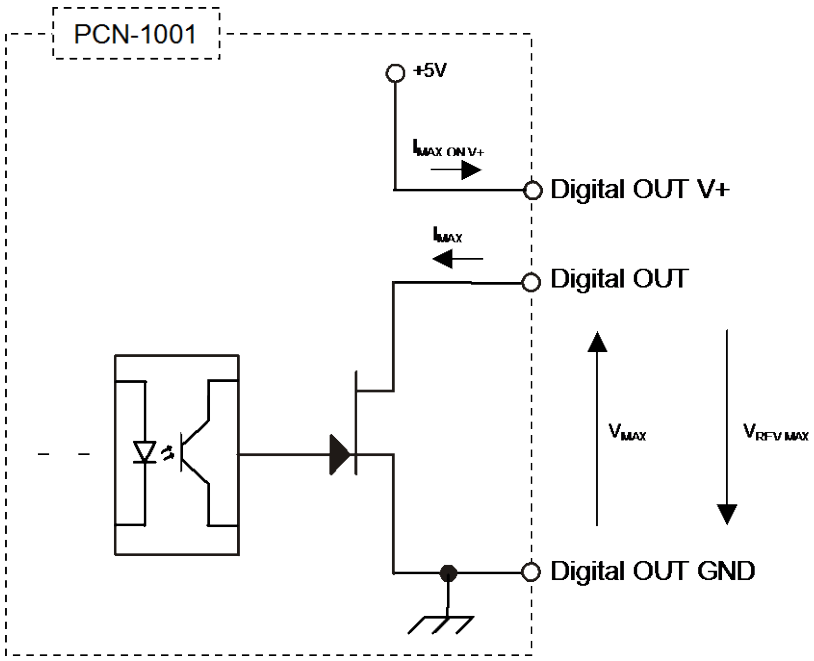


Figure 5. Schematics of the output differential optocoupled block

Recommended output operating conditions

PARAMETERS	SYMBOL	VALUE	UNIT
Maximum Voltage	V_{MAX}	32	V
Maximum Reverse Voltage	$V_{REV\ MAX}$	32	V
Maximum Current	I_{MAX}	300	mA
Maximum Current on Digital OUT V+	$I_{MAX\ ON\ V+}$	20	mA

The Input Block

The figure below shows the electrical schematics of the input differential optocoupled block. The “Digital IN” labels on the left side refer to the digital IN signals on the M1 and M2 connectors, while the right side of the figure refer to the internal processing part of the system. This input block can be connected to a standard TTL port. The Input Block draws a constant current when driven above the threshold.

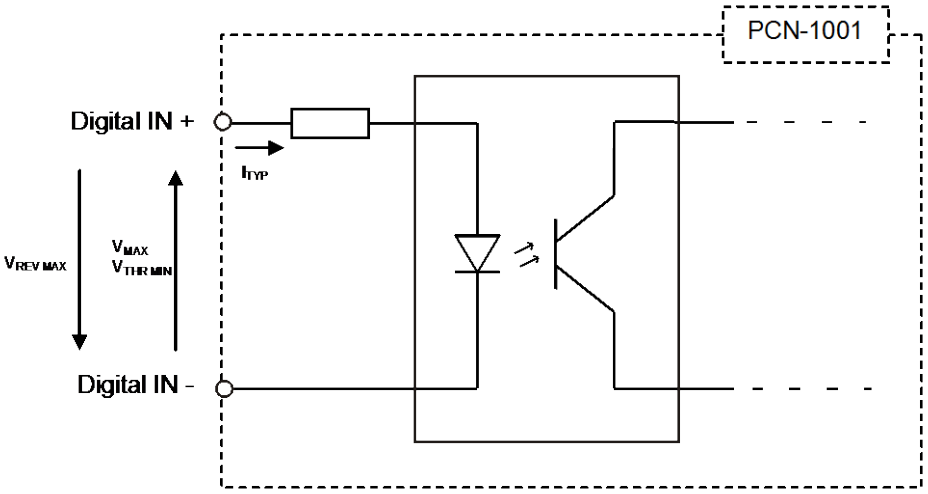


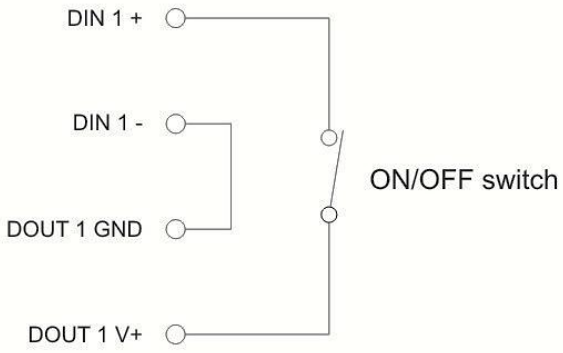
Figure 6. Electrical schematics of the input differential optocoupled block

Recommended input operating conditions:

PARAMETERS	SYMBOL	VALUE	UNIT
Minimum Threshold Voltage	$V_{THR\ MIN}$	2.4	V
Maximum Voltage	V_{MAX}	32	V
Maximum Reverse Voltage	$V_{REV\ MAX}$	32	V
Typical Current	I_{TYP}	3.6	mA

Note: How to simulate a digital input

Make the connections displayed in the following figure. The switch simulates the digital input.



For development purposes a digital input can be simulated using Cn5 of the CBL-1001-00 cable kit (see page 100) and an ON/OFF switch.

The “RS485 Setup” panel

See ‘Configure the RS485 port of the PCN-1001’ paragraph on page 82 for further information.

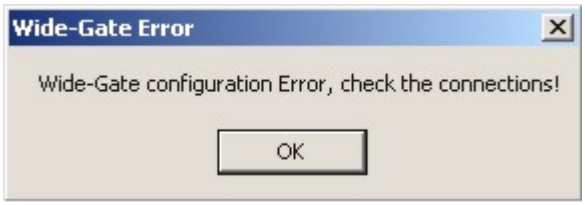
The “Wide-Gate” tab

When you need to monitor gates wider than 120 cm the “Wide-Gate” is an algorithm that has been developed in order to properly configure the necessary PCN-1001 devices.

Setting up the PCN-1001 devices for the Wide-Gate configuration

1. Connect properly all the PCN-1001 devices as described in the paragraph Number of PCN-1001 devices required on page 27

2. Connect your Host PC via the USB port (located under the service plate) to the Master PCN-1001 (the one directly connected to the Control Unit)
    a. Launch the WinClient utility and Click “Scan”
    b. Select the IP address of the PCN-1001. Click “Connect”
    c. Select the “Controls” Tab. Click “Restore Factory Settings”
    d. Click “Yes” when the “Warning” message will appear.
    If you do not perform a restore before configuring the “Wide-gate” mode you may receive the following error:



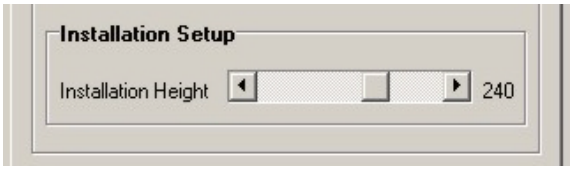
    e. Select the “Connection” Tab and click “Disconnect”

3. Connect your Host PC via the USB port to the 1st Slave PCN-1001
    a. Click “Scan”
    b. Select the IP address of the PCN-1001 and click “Connect”
    c. Select the “Controls” Tab
    d. Click “Restore Factory Settings”
    e. Click “Yes” when the “Warning” message will appear
    f. Select the “Connection” Tab and click “Disconnect”

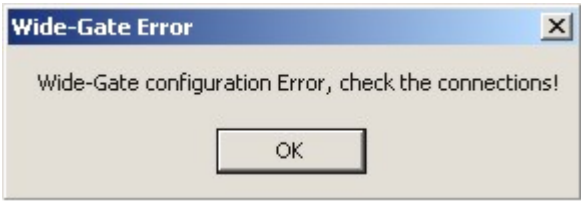
4. Move to next Slave PCN-1001 and repeat the above step 3 for all Slaves

5. Connect your Host PC via the USB port to the Master PCN-1001
    a. Click “Scan”
    b. Select the IP address of the PCN-1001 and click “Connect”
    c. Select the “Wide-Gate” Tab
    d. Insert the quantity of counters connected (i.e.: 2)

e. Set the installation height (from the floor) of the counters



f. Click “Enable Wide-Gate”:
   - If problems occur you will obtain a Wide-Gate Error. Check for the cable connections (you may have selected a higher system number than actually connected/available)



   - If all is ok a confirmation message will appear. Click “OK”

g. Select the “Controls” Tab
h. Click “Scene Background”
i. Click “OK” when a confirmation message will appear
j. Select the “Connection” Tab and click “Disconnect”

6. Cycle the power on all the PCN-1001 devices

7. Wait for the PCN-1001 devices to boot

8. The PCN-1001-00 is now ready for normal “Wide-Gate” counting operations

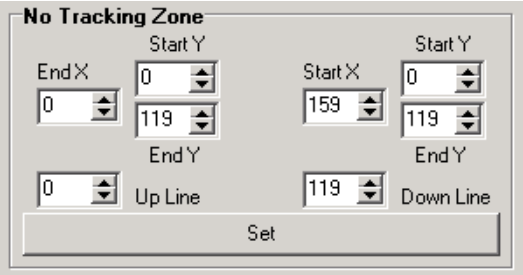
Note:
Remember to set the configuration parameters (direction, door threshold, light intensity, etc.). The configuration parameters have to be set only after the Wide-Gate mode has been enabled and you are connected to the Master PCN-1001. This will redirect the configuration parameters to the slave counters.

The “Advanced (1/2)” tab

“No Tracking Zone” panel

NOTE: The no tracking zone feature is NOT available in Wide-Gate mode

The “No Tracking Zone” feature allows you to define rectangular zones in the detection area where tracking will not be performed. This feature can be used to mask surfaces that are very reflective or with spot lighting.

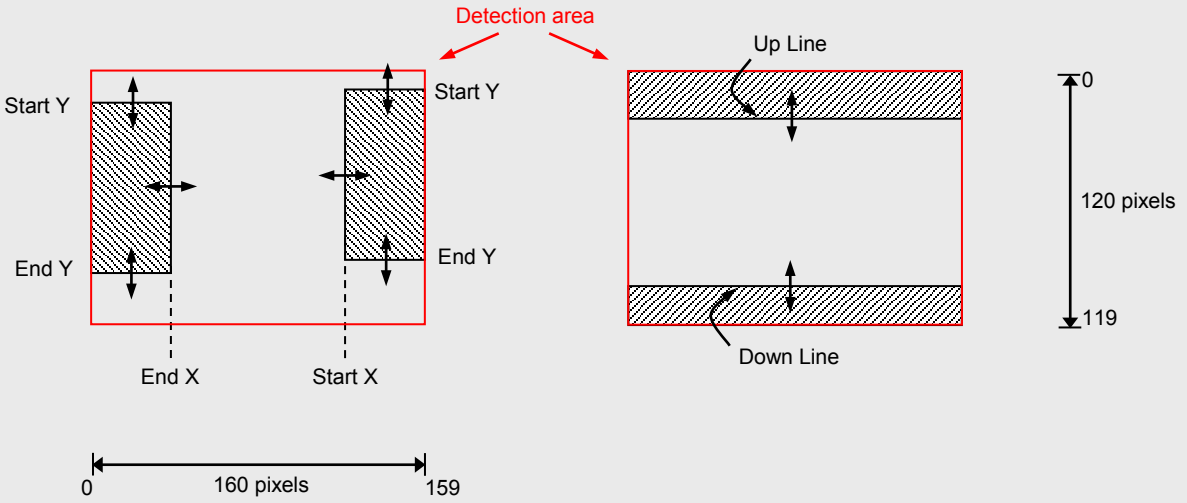


RANGES:

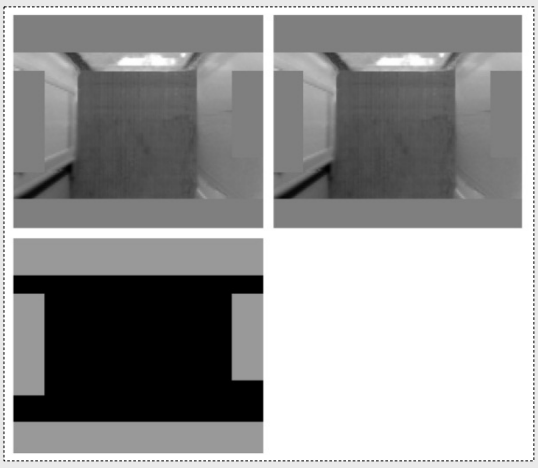
End X =	pixel 0 to 70
Start X =	pixel 159 to 91
Start Y =	pixel 0 to119
End Y =	pixel 119 to 0
Up Line =	pixel 0 to 59
Down Line =	pixel 119 to 60

Example:

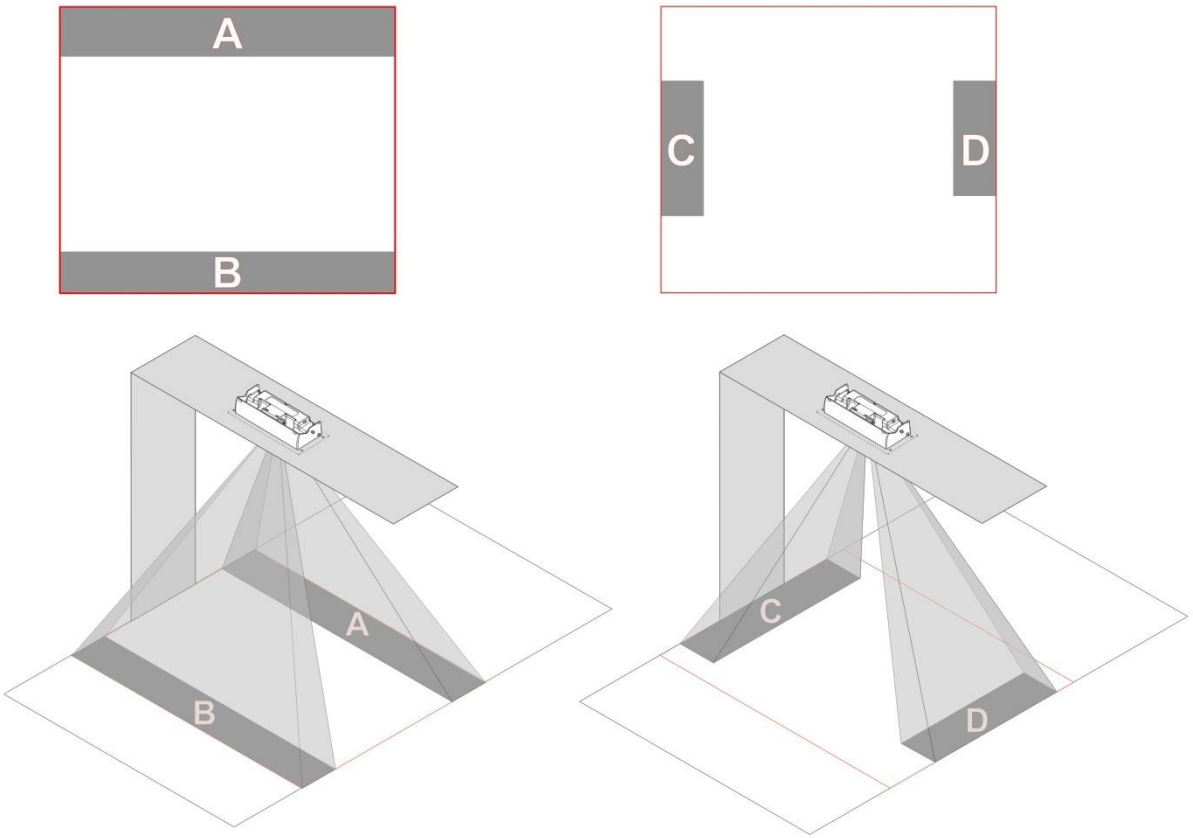
The picture below shows the Detection area with the no tracking zones represented as dashed areas:



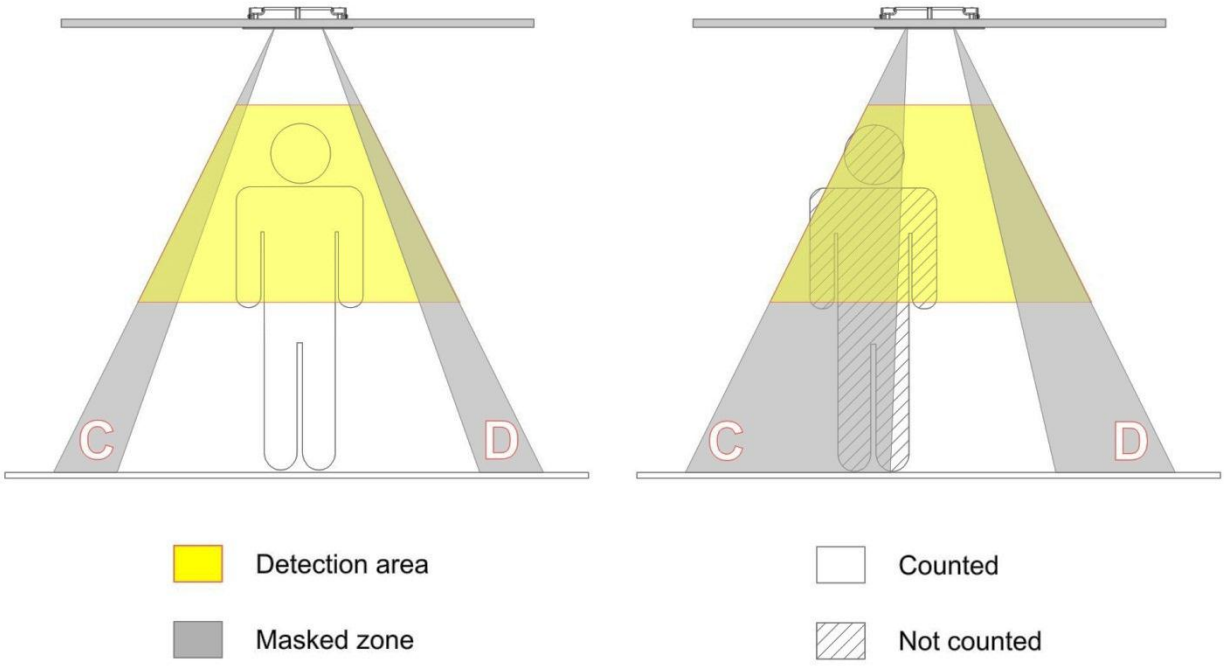
The picture below shows how the Detection area will appear in the WinClient windows.
The no tracking zones are represented as dark grey rectangles:



The picture below shows how the no tracking zones will affect the cameras' field of view and the Detection area.

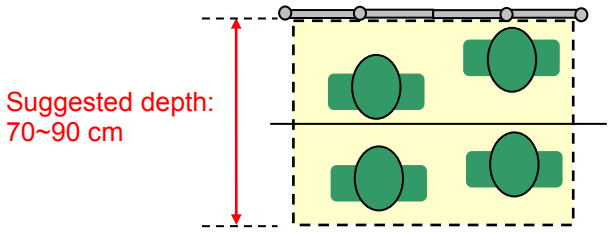


A person crossing the Detection area in a non-masked zone will be counted.
A person crossing the Detection area in a masked zone will not be counted.

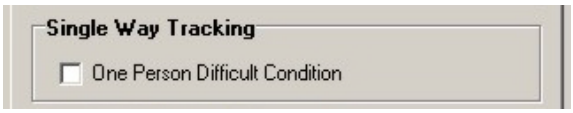


Pay attention to the following issues:

- Exclude as much as possible the area outside the transportation vehicle
- Verify that all the entrance area is detected properly. Make a person move under the PCN-1001s and verify the correct detection
- The PCN-1001 can't track more than 10 people at a time. In particularly crowded conditions, i.e. on-board buses, 10 people can be compressed in less than 1 m^2, so the detection area should be smaller. In these conditions a depth of 70~90 cm at floor level is fine to guarantee a good tracking of people.



"Single Way Tracking" panel



If this option is flagged, tracking will only work when people passing under the Counter are moving in one direction. Tracking will not work when people are moving in two directions at the same time.

"PCN-1001 System diagnostic" panel

Note:
With the WinClient software revision 2.2 the "PCN-1001 System diagnostic" works only if the PCN-1001 is set in single configuration.

This is a diagnostic algorithm that detects and signals any problem that may occur to the optical section of the PCN-1001 (i.e.: blind cameras, cameras malfunction, luminosity too low, etc.).

Pressing the "Get Status" button will change the colour of the grey circle:

- If the circle is red the diagnose is negative (there is a problem)
- If the circle is green the diagnose is positive (no problems occurred)

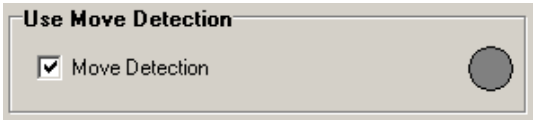
Every time the diagnostic status changes, it will be written on the log file

The following commands can be used to manage the system diagnostic:

COMMAND	DESCRIPTION
diagnostic_en 1 (unsigned char)	Diagnostic enabled (default configuration)
diagnostic_en 0	Diagnostic disabled
pcn1001_status	Returns the diagnostic status displaying two values (unsigned char) The first value will indicate the diagnose status: • If it is 1 the diagnose is positive (no problems occurred) • If it is 0 the diagnose is negative (there is a problem) The second value indicates the error code (it is 0 if the diagnostic is positive)

Note:
All the commands listed in the table above are also available for the RS485_GUI except for the "pcn1001_status" command that returns the diagnose status without the error code.

"Use Move detection" panel



"Use Move detection" is an algorithm that when enabled enhances the detection sensitivity.

Note:
It is suggested that this feature is kept as enabled.

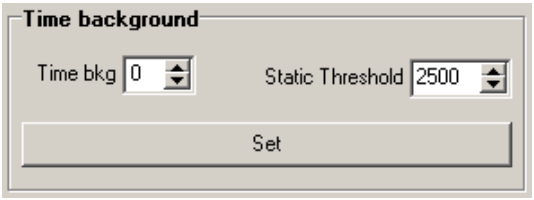
The colour of the grey circle will change in the following way:

- The circle should appear green when somebody is crossing the detection area
- The circle should appear red in other cases.

The following commands can be used to manage the Move Detection:

COMMAND	DESCRIPTION
move_det_en 1 (unsigned char)	Move detection enabled
move_det_en 0 (unsigned char)	Move detection disabled
move_det_val	Returns the current value of the "Move detection" parameter. Two values (int) will be returned, one for the right sensor and one for the left sensor. The final value should be the average between the right and left sensors
move_det_thr	Used to set the threshold value. Use the "Move_det_thr" followed by the value of the new threshold (int)
move_det_status	Returns the current move detection status displaying a value (unsigned char) that can be: 0 if the counting is disabled 1 if the counting is enabled because the "move detection" algorithm is disabled or because there is a cross through the gate

"Time Background" panel



The "Time Background" is an algorithm that can be used after the "Scene background" procedure. It allows you to dynamically acquire the background in order to manage intense light variations of the detection area or manage static objects that may be introduced in the detection area after its first acquisition during the installation, all conditions that may affect the scene background.

WARNING!
The "Time Background" feature has been specifically developed for building installations.
If the PCN-1001 is installed on-board a transportation vehicle it is strongly recommended to disable the Time background by setting to "0" the value of the "Time bkg" parameter.
This because the time when the door will be open is not predictable. If the acquisition of the background starts while the door is opening there would be a discrete number of false negatives. This will happen because the count is disabled during the background acquisition.

The value of the "Time bkg" parameter indicates how many minutes should pass before automatically executing a new background acquisition; this happens only if during this period of time the image changed a number of pixels higher than the valued indicated by the "Static Threshold" parameter. The maximum "Static Threshold" value is 19200 pixels.

NOTE:
The "Time Background" algorithm foresees that any person stands in the detection area for less than the amount of time (in minutes) set by "Time bkg"

Typical values are:

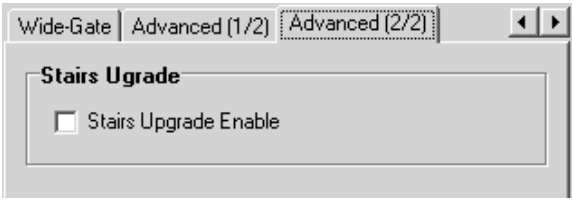
- "Time bkg" = 2-5 minutes (Default set is 0 and means disabled)
- "Static Threshold" = 1500-3500 pixels (Default set is 2500)

The "Time Background" algorithm is enabled giving to "Time bkg" a value higher than 0.
Use the command "timebkg" followed by the number of minutes (unsigned char) in order to set "Time bkg"
Use the command "staticth" followed by the threshold value (number of pixels (int)) in order to set "Static Threshold".

The “Advanced (2/2)” tab

“Stairs Upgrade” panel

Flag the “Stairs Upgrade Enable” feature if stairs are present inside the detection area.
This will improve the accuracy of counting.



Note:
It is suggested to keep this feature enabled.

Test an RS485 connection and use the *RS485_GUI*

Introduction

Thanks to its RS485 ports, the PCN-1001 allows you to take advantage of all the benefits of an RS485 network, including the possibility of connecting multiple devices – up to 32 at the same time – and perform communications over long distances even in electrically noisy environments.

RS485 communications are based on a master/slave configuration:

- The master (a Host PC such as a laptop or, in a real situation, the main on-board computer that acts as the Control Unit, for example a Eurotech DuraCOR system) begins communications by sending a message to the slave devices
- The slave devices (the PCN-1001 devices) analyse the message, execute a command (if required) and transmit the answer to the master.

The "***RS485_GUI***" is a program that, once installed on the Host PC, can be used to simulate a real RS485 connection.

Warning:
The parameters of the serial port on the Host PC and PCN-1001 must be equal (see 'Configuring the RS485 port of the PCN-1001' on page 82)

Warning:
The PCN-1001 system does not include any line termination resistor, nor any fail safe bias resistors.
The two ends of the RS485 bus should include a termination resistor connected across the Data + and Data – wires. Furthermore, one end of the RS485 bus should include pull-up or pull-down resistors to ensure a fail-safe bias for each data line/wire when the lines are not being driven by any device.

Notes about the RS485 serial bus for development purposes

- The same “Multifunction cable” (found in the CBL-1001-00 Cable Kit) you are using to supply power to the PCN-1001, also allows you to connect the PCN-1001 to the RS485 port of the Host PC by using Cn4.
- Personal Computers generally do not have a RS485 port. You can use the “703704001SL Adapter” (an element of the CBL-1001-00 Cable Kit) to connect Cn4 of the Multifunction Cable with the USB port of the Host PC. The 703704001SL Adapter also integrates one termination resistors (120 Ohm) and two fail safe resistors (560 Ohm). Refer to “CBL-1001-00 cable kit” on page 100 before attempting to use the 703704001SL Adapter.

Figure 7. The “Multifunction Cable”

Figure 8. The “703704001SL Adapter”

Notes:

- The 703704001SL Adapter includes the 120 Ohm termination resistors and the 560 Ohm fail safe resistors
- The “CDM 2.06.00 WHQL Certified” software (available on the CD-ROM) has to be installed on the Host PC before connecting the 703704001SL Adapter. Visit the following websites for further software information and updates:
  - http://www.ftdichip.com/Documents/InstallGuides.htm
  - http://www.ftdichip.com/Drivers/VCP.htm

Example of RS485 network

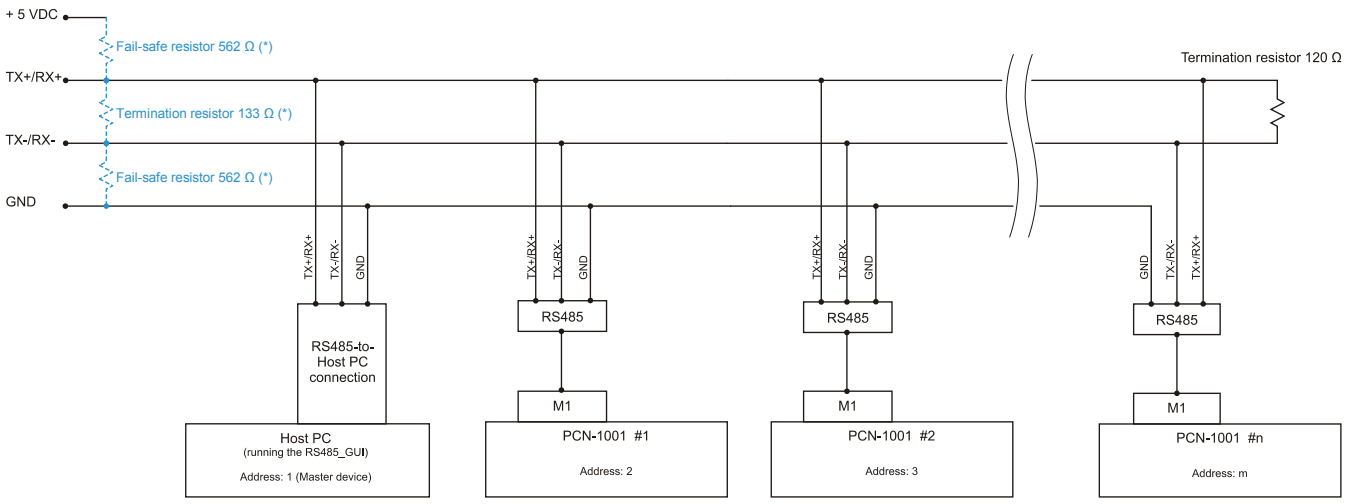
Several PCN-1001 devices can be connected in a Multi-drop RS485 two-wire half-duplex setup, see the diagram below. In this configuration:

- You need a Host PC that acts as Master device, manages the RS485 network, and has ID number = 1
- Each one of the PCN-1001 devices must have same values for Baud Rate, Data Bits, Parity and Stop Bits, but different ID number, starting form 2.

The Host PC starts the communication and includes the address of the target PCN-1001 within the SNP (Small Network Protocol, see the paragraph 'The communication protocol' on page 87).

All the PCN-1001 devices receive the command but only the target PCN-1001 will respond.

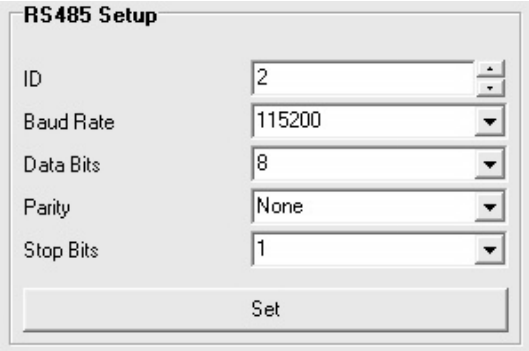
Note:
In Wide-Gate Configuration the Host PC sees only the first PCN-1001 of each group of counters in and the address has to be assigned only to this one.



(*) These resistors are required within the RS485 line if not already present in the RS485-to-Host PC connection

Configure the RS485 port of the PCN-1001

Use *WinClient* to configure the RS485 ports of the PCN-1001. Select the “I/O Settings” tab and refer to the “RS485 Setup” panel as shown below:

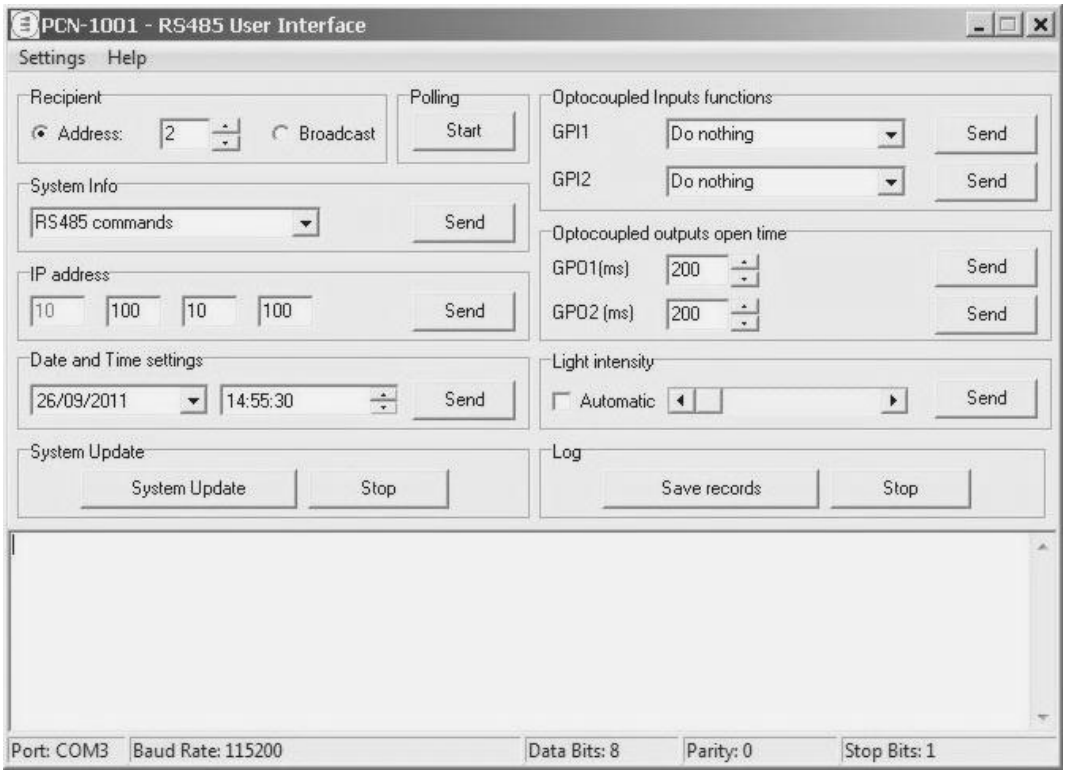


Insert there the parameters of the PCN-1001 serial port and then click “Set” to save them.

Each modification to these settings will be automatically saved in the internal flash memory of the PCN-1001 and takes immediate effect (a reset is not needed).

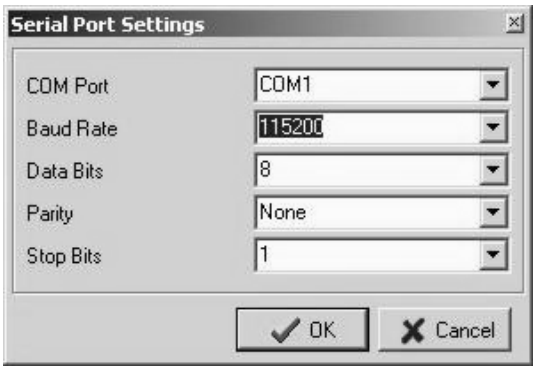
Start the *RS485_GUI*. Configure the RS485 port of the Host PC

Double click on the *RS485_GUI* link on the Host PC desktop. The following interface will appear:



It allows you to test all the commands available to the RS485 port.
Before starting communications, it is important to verify that the RS485 port configuration is correct.
These values are shown in the status bar of the GUI.
They can be modified selecting in the main menu: **Settings** > **COM Settings**.

The screenshot like the following will appear:



Warning:
It is important that the Baud Rate, Data Bits, Parity and Stop Bits values have to be the same for the master and for the slaves connected.

"Recipient" and "Polling" panels

The first operation to do is polling; this will verify the connection status of the intended target PCN-1001.

To do this, Insert the appropriate address in the Recipient box and then click the Start button.

If the appropriate PCN-1001 is found, the address is correct and the port is configured correctly, the software will display a message like: "Got reply from [Slave #2]".

Otherwise the following message will be displayed: "Timeout expired!!!" In this case, you must verify the settings and try again.

For each command that has been sent to a PCN-1001, the *RS485_GUI* waits for an answer.
Three kinds of answer are available:

RESPONSE	DESCRIPTION
[Slave #2] sled	The PCN-1001 has received the "sled" command followed by the LED level (see "RS485 Protocol") and replied with the string: "sled".
Got corrupted reply!!!	The *RS485_GUI* could not understand the answer.
Timeout expired!!!	The signal has been lost and the *RS485_GUI* did not receive any answer.

Flag "Broadcast" for sending a message to all the PCN-1001 devices connected (i.e.: for setting the same time and date to all the PCN-1001)

When a message is sent in broadcast mode, the PCN-1001 devices will not reply.

"System Info" panel

The "System Info" combo box shows the software versions installed on the PCN-1001.

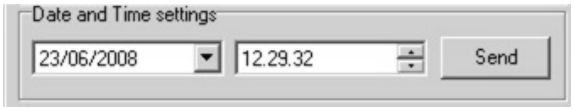
It also allows you to read and modify the counters status and disable the counter algorithm.
Select the value and press "Send".

VALUE	DESCRIPTION
Kernel version	PCN-1001 Linux kernel version.
System version	PCN-1001 operating system version.
Firmware version	PCN-1001 FPGA firmware version.
***Imgserver* version**	The *Imgserver* program version.
Enable person counting	Enables the person counting process.
Disable person counting	Disables the person counting process.
Get counters	Requests the Incoming and Outgoing counter values.
Reset counters	Resets the Incoming and Outgoing counters.
Get Date Time	Resets the Date and the Time
Enable Diagnostic Control	Enables the Diagnostic Control
Disable Diagnostic Control	Disables the Diagnostic Control
Get Diagnostic status	Returns the diagnostic status displaying: 1 if the diagnose is positive (no problems occurred) 0 if the diagnose is negative (there is a problem)
Test Digital Input 0 & 1	Allows displaying in the log view a message about the state of the digital input 0 or 1.

"IP Address" panel

This allows you to insert the PCN-1001 IP address.
The default IP address is 10.100.10.100; the first octet if fixed to avoid network configuration mismatch.
In Wide-Gate configuration all the PCN-1001 of same group will obtain the same IP address

"Date and Time settings" panel



This allows you to set the Time and Date on your PCN-1001.

"System Update" panel

The "System Update" button, like the equivalent button in "*WinClient*", allows you to choose an *Imgserver* to be sent to the PCN-1001 via RS485.

The file transfer progressing is displayed in the log view as shown as follows:

No other operation is allowed during file transfer.
When transfer finishes a proper message will be shown in the log view and the user will be allowed to perform other operations.

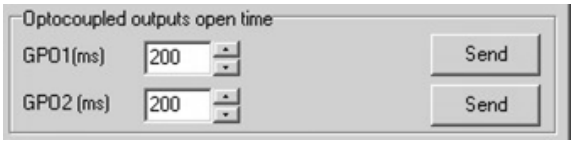
The “Stop” button stops the transfer and interrupts the update.

Notice that even if during the file transfer some packets are lost the protocol guarantees a successful transmission by sending again the lost packets. If more than 10 consecutive packets are lost the application will stop the file transfer and an error message will be displayed in the log view.

“Optocoupled Inputs functions” panel

See the section ‘The I/O settings tab – Optocoupled I/O’ on page 67.

“Optocoupled outputs open time” panel

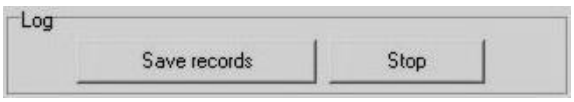


See the section ‘The I/O settings tab – Optocoupled I/O’ on page 67.

Light intensity

This allows you to set the LED intensity. See the section ‘The “Light intensity” panel’ on page 61.

“Log” panel



The “Save records” button allows you to download the log file as a text. This option works as ‘Save the records of the log file’ on page 65.
The “Stop” button allows you to stop and cancel the saving process.

The communication protocol

SNP (Small Network Protocol) is the communication protocol used in the RS485 connection.

The packet format contains the addresses of both the sender and recipient and the number of packets to be sent along with the current packet number.

Bit stuffing is not used because, when the length of data field is stated, all values can be sent in the data field. The maximum length of the data field is MAX_DATA_LENGTH = 1024 bytes.

FIELD	LENGTH (BYTES)	CONTENTS
PreAmble	5	5 times 0xFF, to be sent prior to the initial character in order to give time for change of transmission direction
StartCharacter	1	SOH = 0x01
Source	1	Address of sender
Destination	1	Address of recipient
TotalPacketNumber	1	Total number of packets
PacketNumber	1	Number of this packet First packet has number 1
DataLength	2	States the length of the data field LSB (Least Significant Byte) is to be sent first
Data	0 to MAX_DATA_LENGTH	Each byte can contain 0 to 0xFF
CRC16	2	CRC16 (x16 x15 x2 x0) check sum calculated from Source to Data (both fields included) with an initial value of -1. LSB is to be sent first
Postamble	1	0xFF.

Remember that there is only one master on the bus, while all others are slaves. When the master has sent a message to a slave, an answer from the slave is expected. A slave cannot send anything to a master without being asked. It is possible to send to all slaves at a time (broadcast), which means that slaves do not return an answer and that messages are not retransmitted.

Polling

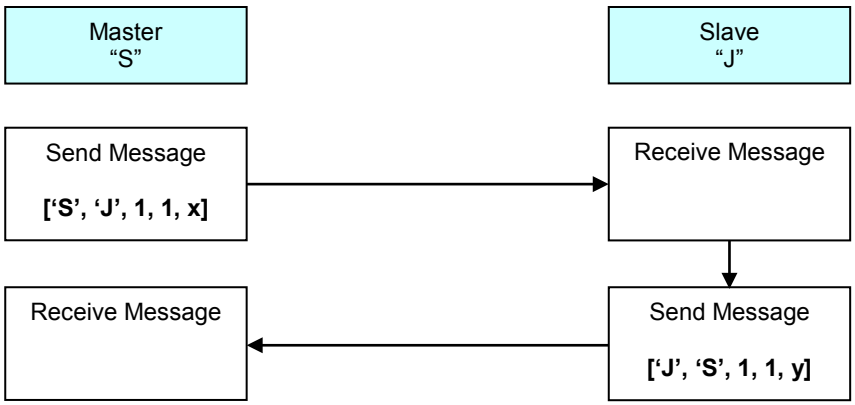
The master can poll a slave who answers with a message to the master. A poll is defined as a packet with:

TotalPacketNumber = 0
PacketNumber = 0
DataLength = 0

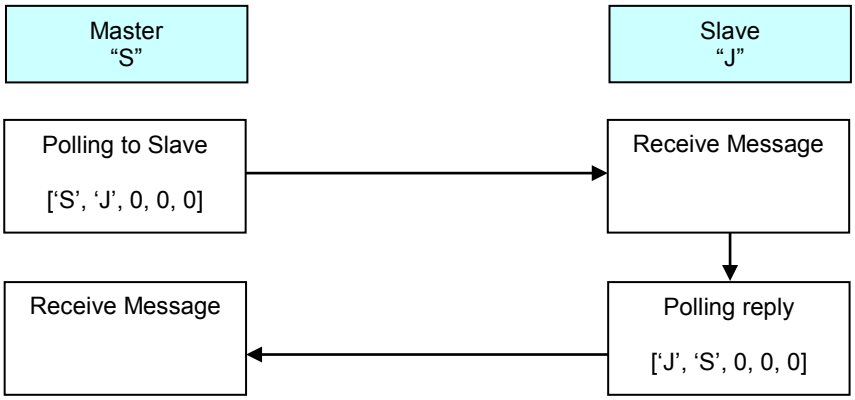
Scenarios

The following charts are intended to give an idea of how the sequences are sent/received by the master and slave devices:

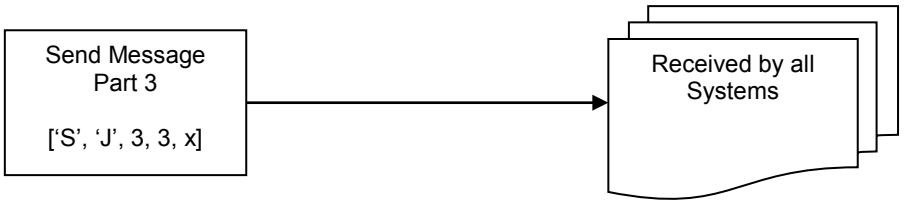
Short Message to Slave



Polling



Broadcast Message



Each message between Master and Slave is made in the following format:

Source	Destination	TotalPacketNumber	PacketNumber	DataLength

Source: Address of the device transmitting the message
Destination: Address of the target device
TotalPacketNumber: Quantity of Packets to be sent
PacketNumber: The number of the current packet being sent
DataLength: Length of the data in this Packet [0x01 to 0xFE or MAX]

Therefore, as we can see from the examples on the previous pages, a message may take this form:

[0x01, 0x02, 3, 2, MAX]

In this case Node "0x01" is sending a message to Node "0x02"; this is package 2 of 3, and is MAX (255) characters long. Whereas:

[0x02, 0x01, 1, 1, 2]

would be Node "0x02" is sending a message to Node "0x01"; this is package 1 of 1, and is 2 characters long.

The following message would be a Broadcast message:

[0xFF, 1, 1, 1, 2]

This is indicated by the 0xFF, which means all Slave devices will act upon the message, however, no reply will be sent by any of the Slave devices.

The DATA field

All the messages exchanged between the Master and the Slave units have to be encapsulated in the SNP transmission.
The command to send is contained in the Data field of the SNP protocol.

All the commands are formed by: the Command string, the String terminator, and some values (Value 1, Value 2, …). Each value can be a number (1, 2 or 4 bytes long) or a string.

The Data field maximum length is contained in the MAX_DATA_LENGTH
The Data field is formed by:

NAME	LENGTH (BYTES)	CONTENTS
Command string	0-256 bytes	Command
String terminator	1	0
Value 1	1,2,4	First parameter
Value 2	1,2,4	Second parameter
….	1,2,4	….

Example 1: setting the LED intensity to 100

In this case the Data is composed by the SLED command, the string terminator, and an argument (an unsigned char parameter, 8 bits long):

COMMAND	STRING TERMINATOR	ARGUMENT
Sled	0	100

The complete message is:

SNP PACKAGE	VALUE	
Preamble	0xFF	
Preamble	0xFF	
Preamble	0xFF	
Preamble	0xFF	
Preamble	0xFF	
SOH	0x01	
Source	0x01	
Destination	0x02	
TotalPacketNumber	0x01	
PacketNumber	0x01	
DataLength	0x06	
	0x00	
Data	Command “sled”	0x73(s)
		0x6C(l)
		0x65l
		0x64(d)
	String terminator	0x00
	Argument (value = 100)	0x64
CRC16	CRC value = -27888	0x10
		0x93
Postamble	0xFF	

The slave will reply to this command with:

COMMAND	STRING TERMINATOR
“sled”	0

Example 2: requesting the kernel version installed in the PCN-1001

Example of request

COMMAND	STRING TERMINATOR
“ker_version”	0

This command does not need any parameter.
The Slave will answer with:

COMMAND	STRING TERMINATOR	ARGUMENTS
“ker_version”	0	“2.1”

In this case, the parameter in the answer of the slave will be a string containing the kernel version.

Commands availability

These commands are incorporated in the SNP (Small Network Protocol) protocol.

COMMAND	DESCRIPTION
address	Sets the PCN-1001 IP address
autoled	Enable the automatic regulation of the LED indicators
diagnostic_en	Enables or disables the diagnostic
enable_pc	Enables or disables the counting process
fw_version	Reads the version number of PCN-1001 FPGA firmware
gcounters	Returns the values of the Incoming and Outgoing counters
gdatetime	Reads the date and the time
input0 / input1	Sets the functions of the two input lines
ker_version	Reads the version number of PCN-1001 kernel
output0/output1	Sets the optocoupled outputs open time
pcn1001_status	Returns the PCN-1001 diagnostic status
reset	Resets the Incoming and Outgoing counters
sdatetime	Sets Date and Time information
sled	Sets the LED intensity
sys_version	Reads the version number of PCN-1001 operating system
version	Reads the version number of PCN-1001 core software

address

Command	address
Command Description	Sets the IP address of the PCN-1001
Parameters	String
Parameters Description	String containing the IP address (e.g.: “10.100.10.100)
Returns	

autoled

Command	autoled
Command Description	Enable the automatic regulation of the LEDs. This regulation is based on the luminosity of acquired images If the automatic regulation is activated the manual control (sled command) will be ignored.
Parameters	Unsigned char (1 byte)
Parameters Description	0: Disabled 1: Enabled
Returns	

diagnostic_en

Command	diagnostic_en
Command Description	Enables or disables the diagnostic
Parameters	Unsigned char (1 byte)
Parameters Description	0: Disabled 1: Enabled
Returns	

enable_pc

Command	enable_pc
Command Description	Enables or disables the counting program
Parameters	Un unsigned char (1 byte)
Parameters Description	0: Disable 1: Enabled
Returns	

fw_version

Command	fw_version
Command Description	Returns the PCN-1001 firmware revision.
Parameters	
Parameters Description	
Returns	String containing the firmware revision number (e.g.: “1.8”)

gcounters

Command	gcounters
Command Description	Returns the current counter values (In & Out)
Parameters	
Parameters Description	
Returns	Two unsigned values (4 bytes long). 1st is incoming counter value 2nd is outgoing counter value

gdatetime

Command	gdatetime
Command Description	Gets date and time in the PCN-1001
Parameters	
Parameters Description	
Returns	String containing the date and the time in PCN-1001

input0 / input1

Command	input0 / input1
Command Description	Enable the functions for the two Optoisolated inputs. The available functions are: • Reset Counters • Enable / Disable person counting. For further information see the chapter: “The I/O settings tab- Optocoupled I/O”.
Parameters	Un unsigned short (2 bytes)
Parameters Description	0: Input disabled 1: Enable the function “reset counters” 2: Enable the function “Enable/Disable person counting”
Returns	

ker_version

Command	ker_version
Command Description	Returns the PCN-1001 Kernel version
Parameters	
Parameters Description	
Returns	String containing the Kernel version number (e.g.: “2.1”)

output0 / output1

Command	output0 / output1
Command Description	Sets the optocoupled outputs open time. For further information see the chapter: “The I/O settings tab-Optocoupled I/O).
Parameters	Un unsigned short (2 bytes)
Parameters Description	Value indicating output open time (in milliseconds). This value must be a multiple of 4 and included in the range between a 8 and 1020
Returns	

pcn1001_status

Command	pcn1001_status
Command Description	Returns the PCN-1001 diagnostic status
Parameters	
Parameters Description	
Returns	Returns one unsigned char (1byte) that indicates the diagnose status: • If it is 1 the diagnose is positive (no problems occurred) • If it is 0 the diagnose is negative (there is a problem)

reset

Command	reset
Command Description	Resets the values of the incoming and outgoing counters
Parameters	
Parameters Description	
Returns	

sdatetime

Command	sdatetime
Command Description	Sets date and time in the PCN-1001
Parameters	String
Parameters Description	String containing the date and time. Example: 21 May 2006 at 15:39 = “052115392006”
Returns	

sled

Command	sled
Command Description	Sets the light intensity of LEDs
Parameters	Un unsigned char (1 byte)
Parameters Description	0 ~ 255 0: Off 255: Maximum intensity
Returns	

sys_version

Command	sys_version
Command Description	Returns the PCN-1001 operating system version.
Parameters	
Parameters Description	
Returns	String containing the OS version number (e.g.: “1.6”)

version

Command	version
Command Description	Returns the PCN-1001 counting software version.
Parameters	
Parameters Description	
Returns	String containing the counter software version number (e.g.: “2.0”)

CRC16 Algorithm

Table based algorithm in C for calculation of CRC16.

```
#include <string.h>
#define MAX_DATA_LEN   4096
#define MAX_PACKET_LEN 5+1+1+1+1+1+2+MAX_DATA_LEN+2+1
#define MAX_CRC_DIGITS 256
#define BYTE_WIDTH     8
#define CRC_WIDTH      16
#define CRC_MASK 0xFF

static const unsigned short CrcTable[MAX_CRC_DIGITS] =
{
     0,32773,32783, 10,32795, 30, 20,32785,32819, 54,
     60,32825, 40,32813,32807, 34,32867, 102, 108,32873,
     120,32893,32887, 114, 80,32853,32863, 90,32843, 78,
     68,32833,32963, 198, 204,32969, 216,32989,32983, 210,
     240,33013,33023, 250,33003, 238, 228,32993, 160,32933,
     32943, 170,32955, 190, 180,32945,32915, 150, 156,32921,
     136,32909,32903, 130,33155, 390, 396,33161, 408,33181,
     33175, 402, 432,33205,33215, 442,33195, 430, 420,33185,
     480,33253,33263, 490,33275, 510, 500,33265,33235, 470,
     476,33241, 456,33229,33223, 450, 320,33093,33103, 330,
     33115, 350, 340,33105,33139, 374, 380,33145, 360,33133,
     33127, 354,33059, 294, 300,33065, 312,33085,33079, 306,
     272,33045,33055, 282,33035, 270, 260,33025,33539, 774,
     780,33545, 792,33565,33559, 786, 816,33589,33599, 826,
     33579, 814, 804,33569, 864,33637,33647, 874,33659, 894,
     884,33649,33619, 854, 860,33625, 840,33613,33607, 834,
     960,33733,33743, 970,33755, 990, 980,33745,33779, 1014,
     1020,33785, 1000,33773,33767, 994,33699, 934, 940,33705,
     952,33725,33719, 946, 912,33685,33695, 922,33675, 910,
     900,33665, 640,33413,33423, 650,33435, 670, 660,33425,
     33459, 694, 700,33465, 680,33453,33447, 674,33507, 742,
     748,33513, 760,33533,33527, 754, 720,33493,33503, 730,
     33483, 718, 708,33473,33347, 582, 588,33353, 600,33373,
     33367, 594, 624,33397,33407, 634,33387, 622, 612,33377,
     544,33317,33327, 554,33339, 574, 564,33329,33299, 534,
     540,33305, 520,33293,33287, 514
};


void CalcCrc16Block(char *pBlock,  // Pointer to start of block
          unsigned short Number,   // Number of bytes i block
          short *pCrc)             // Will be updated with CRC16
{
    *pCrc = -1;
    while (Number)
    {
        *pCrc = CrcTable[((*pCrc >> (CRC_WIDTH - BYTE_WIDTH)) ^ *pBlock++) &
           CRC_MASK] ^ (*pCrc << BYTE_WIDTH);
        Number--;
    }
}
```

(continued on the next page)

```
int
main (int argc, char *argv[])
{
     char buf[MAX_PACKET_LEN];
     char data[6] = {0x73, 0x6c, 0x65, 0x64, 0x00, 0x64};
     unsigned char src = 0x01;
     unsigned char dest = 0x02;
     char tpn = 0x01;
     char pn = 0x01;
     short datalen = 6;

     short crc;
     int index = 0;
     int data_start;

     buf[index++] = 0xFF;     //Preamble
     buf[index++] = 0xFF;     //Preamble
     buf[index++] = 0xFF;     //Preamble
     buf[index++] = 0xFF;     //Preamble
     buf[index++] = 0xFF;     //Preamble

     buf[index++] = 0x01;     //SOH
     data_start = index;

     buf[index++] = src;      //source address
     buf[index++] = dest;     //destination address
     buf[index++] = tpn;      //Total Packet Number
     buf[index++] = pn;       //Number of this packet
     buf[index++] = datalen & 0x00FF;    //Data Length LSB
     buf[index++] = datalen >> 8;             //Data Length MSB

     if(data) memcpy(&buf[index],data,datalen); //Data copied in buf

     index += datalen;
     CalcCrc16Block(&buf[data_start],6+datalen,&crc);

     buf[index++] = crc & 0x00FF;        //CRC LSB
     buf[index++] = crc >> 8;                //CRC MSB
     buf[index++] = 0xFF;                     //Postamble

     return 0;
}
```

APPENDIX

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Note for mounting the front panel with angles from 20° up to 45°

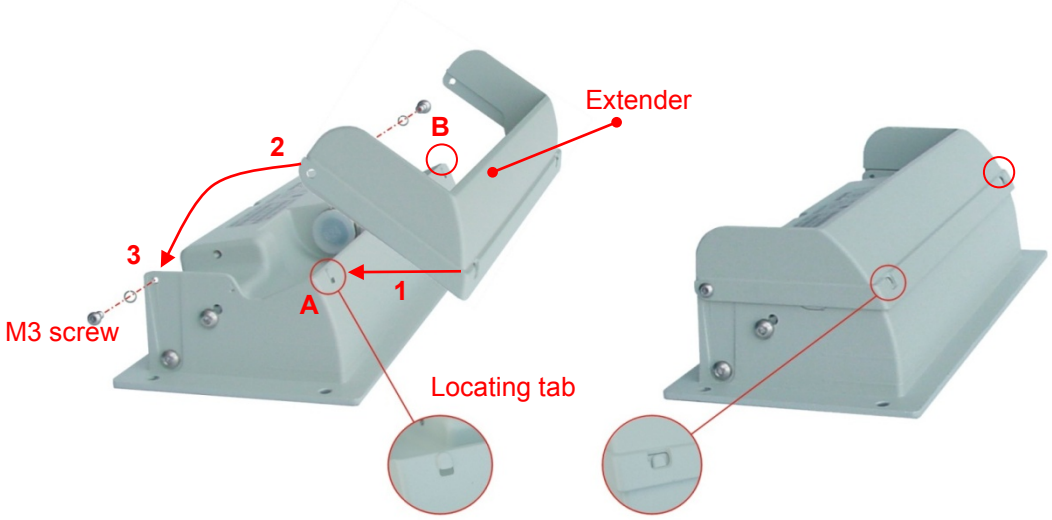
Please contact Eurotech to use this configuration in order to properly configure the software parameters of the PCN-1001.

To use front panel angles between 20° and 45°, it is recommended to mount the PCN-1001 Extender to better protect the rear connections. It is also recommended to install any cabling before mounting the extender, this will give easier access to M1 and M2.

Use the two M3 x 6 hexagonal head screws (and the two split washers) provided to fix it to the PCN-1001. A hexagonal 2 mm (3/32") key/driver is required.

This is the procedure for mounting the PCN-1001 Extender:

1. Place the Extender onto the rear of the PCN-1001; ensure that the two locating tabs (**A** and **B**) are correctly aligned
2. Ensure that the holes on the Extender and on the PCN-1001 are correctly aligned
3. Insert the two washers and the two M3 screws into the holes and firmly tighten them.



IMPORTANT NOTE!
Once the PCN-1001 is installed, the angle of the front panel cannot be modified and the rear connectors cannot be accessed without removing the entire device from the ceiling.

PCN-1001 Cable kits

The PCN-1001 Cable kits simplify connections and allow you to rapidly develop demonstrative applications or software setup.

CABLE KIT	DESCRIPTION
CBL-1001-00	Development Kit for the PCN-1001
CBL-1001-01	Link Cable for double PCN-1001 configurations (Wide—Gate) To monitor gates wide from 120 to 180 cm
CBL-1001-02	Link Cable for multiple PCN-1001 configurations

CBL-1001-00 cable kit

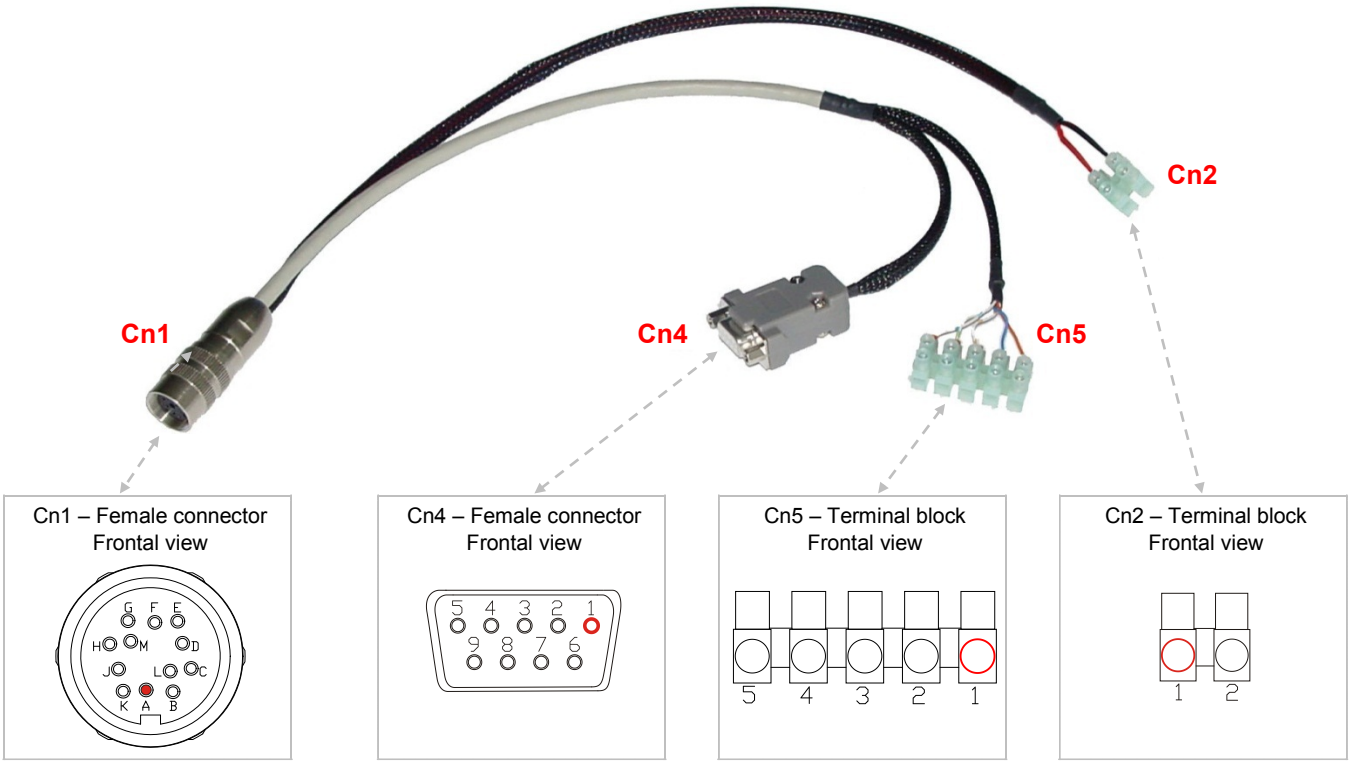
The CBL-1001-00 Cable Kit allows you to quickly power supply and interface the PCN-1001 to the external world.
The cable kit has the following components:

- 1x 7030000330L Multifunction Cable
- 1x Male USB Mini-B to Male USB Type “A” Cable
- 1x Male USB Type “A” to Female USB Type “A” Extension Lead
- 1x 703704001SL Adapter (Male USB Type “A” to Male DB9 for RS485 Cable)

7030000330L Multifunction Cable

Cable length:

- Data cable (grey): 40 cm +/- 10%
- Power cable (black): 40 cm +/- 10%



Connector Details

NAME	USE	TYPE
Cn1	To PCN-1001 M1	12-Pin Female Circular Connector; Lumberg part number 032212
Cn2	Power Supply +/-	2-Way nylon terminal block
Cn4	Serial 1, RS485	Female 9-pin D-Sub
Cn5	Digital IO & Aux Power Supply	5-Way nylon terminal block

Connector Pinouts

FROM Cn1 PIN #	TO	PIN #	USE	COLOUR
A	Cn2	1	Power supply +	Red
B		2	Power supply -	Black
J	Cn4	2	RS485_1 +	Brown
K		1	RS485_1 -	White / Brown
H		5	RS485_1 GND	Green
C	Cn5	1	Digital IN1 +	Orange
F		2	Digital OUT 1	Blue
D		3	Digital IN1 -	White / Orange
G		4	Digital OUT 1 GND	White / Green
E		5	Digital OUT 1 V+	White / Blue
L	Cn2	1	Power supply + (*)	Red
M		2	Power supply - (*)	Black

(*) For secondary PCN-1001

Male USB Mini-B to Male USB Type "A" Cable

Cable length: 180 cm +/- 10%

Connector Details

NAME	USE	TYPE
Cn1	To PCN-1001	Male USB Mini-B
Cn2	To Host Computer	Male USB Type "A"

Male USB Type "A" to Female USB Type "A" Extension Lead

Cable length: 300 cm +/- 10%

Connector Details

NAME	TYPE
Cn1	Male USB Type "A"
Cn2	Female USB Type "A"

703704001SL Adapter (Male USB Type "A" to Male DB9 for RS485 Cable)

Cable length: 180 cm +/- 10%

Connector Details

NAME	USE	TYPE
Cn1	To Multifunction Cable, Cn4	Male DB9 (for RS485)
Cn2	To Host Computer	Male USB Type "A"

Cn1 Connector Pinout

PIN #	SIGNAL
1	Data -
2	Data +
5	Ground

NOTE:
The 703704001SL Adapter includes the 120 Ohm termination resistors and the 560 Ohm fail safe resistors

NOTE:
Install the "CDM 2.06.00 WHQL Certified" software (available on the CD-ROM) on the Host PC before connecting the 703704001SL Adapter.
Visit the following websites for further software information and updates:

- http://www.ftdichip.com/Documents/InstallGuides.htm
- http://www.ftdichip.com/Drivers/VCP.htm

CBL-1001-01 cable kit

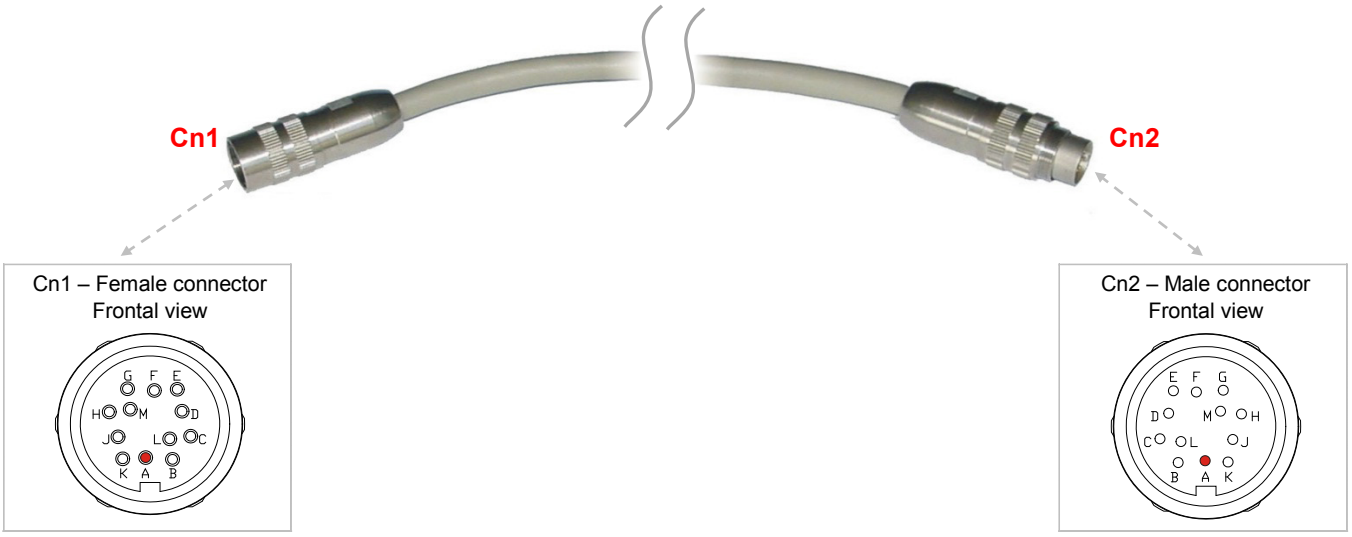
The CBL-1001-01 allows you to directly connect two PCN-1001 devices together in Wide-Gate configuration (for gates wide between (120 and 180 cm).

The cable kit has the following components:

- 1x 7010000108L Cable for direct connection

7010000108L Cable for direct connection

Cable length: 80 cm +/- 10%



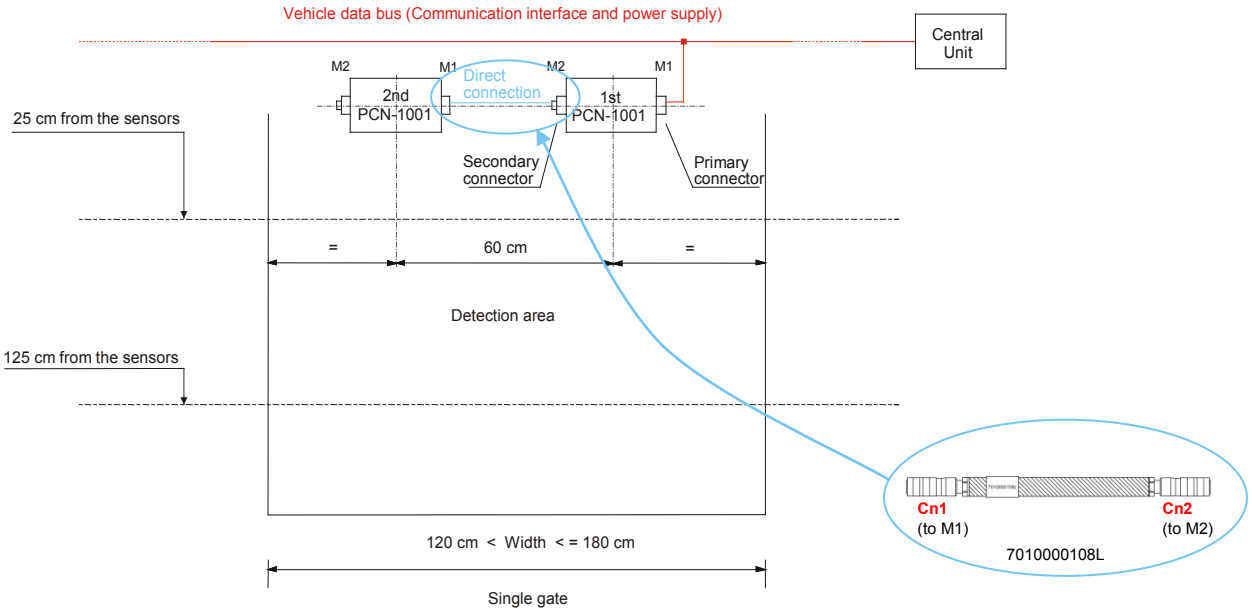
Connector Details

NAME	USE	TYPE
Cn1	To M1 of 2nd PCN-1001	12-Pin Female Circular Connector; Lumberg part number 032212
Cn2	To M2 of 1st PCN-1001	12-Pin Male Circular Connector; Lumberg part number 033212

Connector Pinouts

Cn1 PIN #	SIGNAL	Cn2 Pin #	SIGNAL
A	Power supply +	**A**	Power supply +
B	Power supply -	**B**	Power supply -
J	RS485_1 +	**J**	RS485_2 +
H	RS485_1 GND	**H**	RS485_2 GND
K	RS485_1 -	**K**	RS485_2 -
C	Digital IN 1 +	**C**	Digital OUT 2 V +
F	Digital OUT 1	**F**	Digital IN 2 -
D	Digital IN 1 -	**D**	Digital OUT 2
G	Digital OUT 1 GND	**G**	Digital OUT 2 GND
E	Digital OUT 1 V+	**E**	Digital IN 2+
L	Not connected	**L**	Not connected
M	Not connected	**M**	Not connected

Example of direct connection using the CBL-1001-01



CBL-1001-02 cable kit

The CBL-1001-02 Cable Kit allows you to install three or more PCN-1001 devices in Wide-Gate configuration to monitor gates wider than 180 cm.

Remember that in this configuration it is necessary to supply additional power to the third PCN-1001, and the same connection has to be done for each PCN-1001 thereafter.

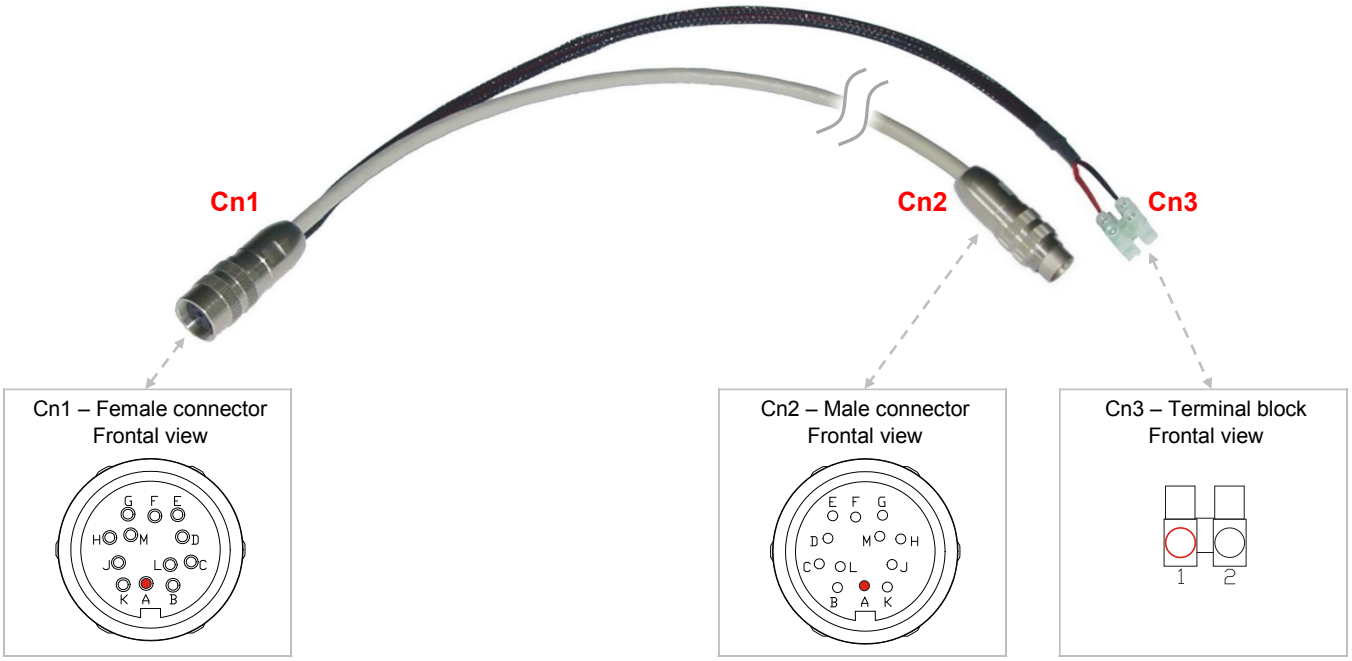
The kit has the following components:

- 1x 7030000331L Cable for Multiple Connection

7030000331L Cable for Multiple Connection

Cable length:

- Data cable (grey): 80 cm +/- 10%
- Power cable (black): 40 cm +/- 10%



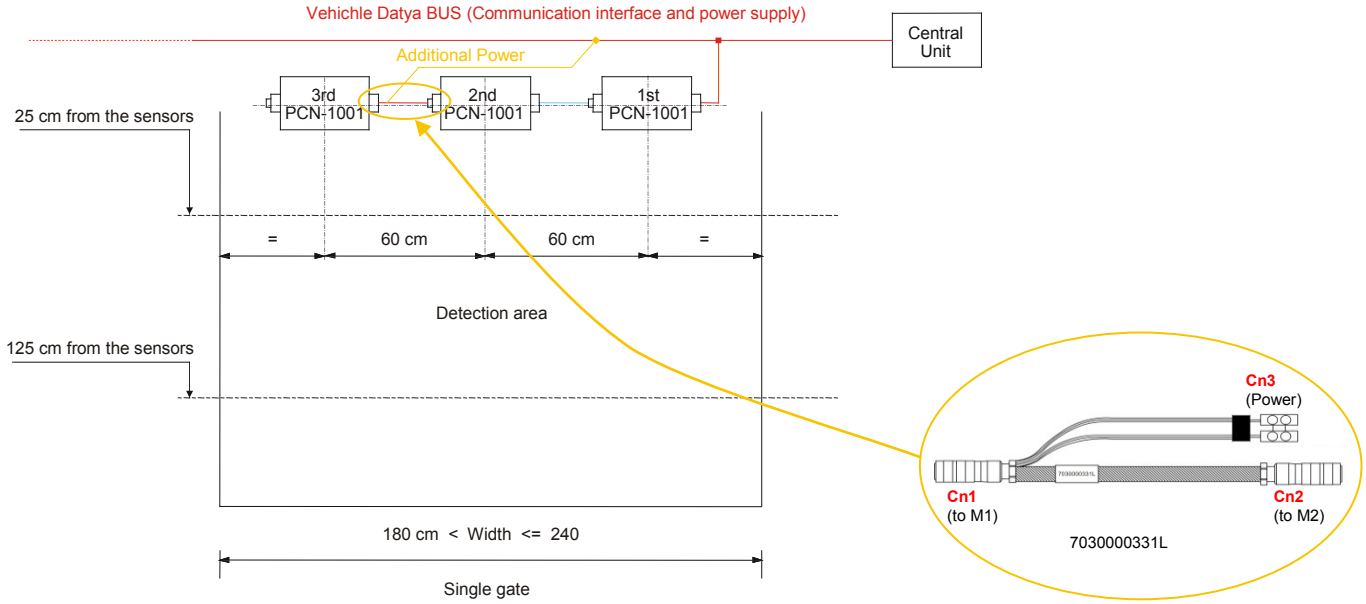
Connector Details

NAME	USE	TYPE
Cn1	To M1 of 3rd PCN-1001	12-Pin Female Circular Connector Lumberg part number 032212
Cn2	To M2 of 2nd PCN-1001	12-Pin Male Circular Connector Lumberg part number 033212
Cn3	Power supply (Typical 12 or 24V dc)	2-way Nylon Terminal Block (screw terminals)

Connector Pinouts

Cn1 PIN #	SIGNAL	Cn2 Pin #	SIGNAL	Cn3 Pin #	SIGNAL	SIGNAL
C	Digital IN1 +	**C**	Digital OUT 2 V +			
D	Digital IN1 -	**D**	Digital OUT 2			
E	Digital OUT 1 V+	**E**	Digital IN 2+			
F	Digital OUT 1	**F**	Digital IN 2 -			
G	Digital OUT 1 GND	**G**	Digital OUT 2 GND			
H	RS485_1 GND	**H**	RS485_2 GND			
J	RS485_1 +	**J**	RS485_2 +			
K	RS485_1 -	**K**	RS485_2 -			
A	Power supply +			**1**	VIN+	Red
B	Power supply -			**2**	VIN-	Black
L	Power supply +			**1**	VIN+	Red
M	Power supply -			**2**	VIN-	Black

Example of direct connection using the CBL-1001-02

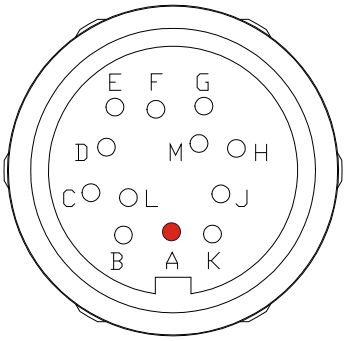


Rear interfaces

CONNECTOR	DESCRIPTION
M1	12-pin male circular connector **Lumberg 031512**
M1 counterpart	12-pin female circular connector **Lumberg 032212**
M2	12-pin female circular connector **Lumberg 030512**
M2 counterpart	12-pin male circular connector **Lumberg 033212**

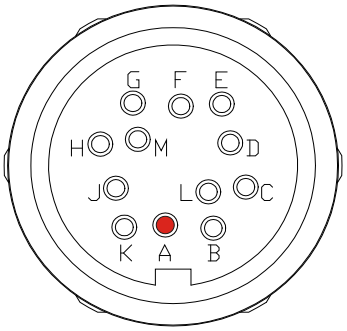
M1 pinout

PIN	SIGNAL	DIRECTION
A	Power supply +	IN
B	Power supply -	IN
C	Digital IN 1 +	IN
D	Digital IN 1 -	IN
E	Digital OUT 1 V+	OUT
F	Digital OUT 1	OUT
G	Digital OUT 1 GND	OUT
H	RS485_1 GND	IN/OUT
J	RS485_1 +	IN/OUT
K	RS485_1 -	IN/OUT
L	Power supply + (For the secondary PCN-1001)	IN
M	Power supply – (For the secondary PCN-1001)	IN



M2 pinout

PIN	SIGNAL	DIRECTION
A	Power supply + (To the secondary PCN-1001)	OUT
B	Power supply – (To the secondary PCN-1001)	OUT
C	Digital OUT 2 V+	OUT
D	Digital OUT 2	OUT
E	Digital IN 2+	IN
F	Digital IN 2-	IN
G	Digital OUT 2 GND	OUT
H	RS485_2 GND	IN/OUT
J	RS485_2 +	IN/OUT
K	RS485_2 -	IN/OUT
L, M	Not Connected	-



Power Supply Specifications

CHARACTERISTIC	MINIMUM	NOMINAL	MAXIMUM
Power input	9 V dc	12 / 24 V dc	32 V dc
Power consumption	--	--	15 Watts

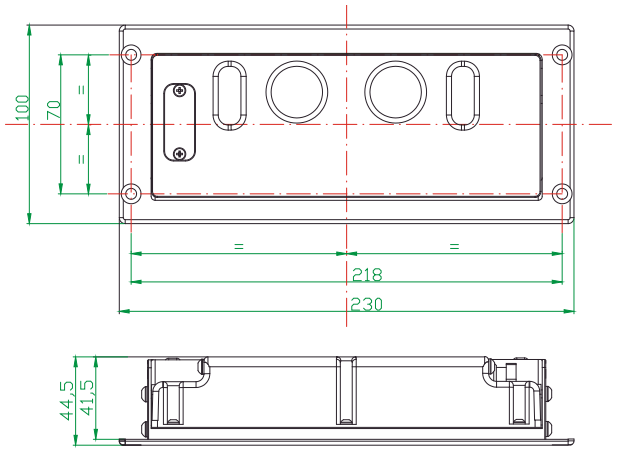
Mechanical Characteristics

PCN-1001	
Weight:	515 grams

PCN-1001 FRAME	
Height:	100 mm
Width:	230 mm
Thickness:	3 mm

REQUIRED CUT OUT DIMENSIONS	
Height:	82.0 mm
Width:	208.5 mm
Depth:	41.5 to 70.0 mm (with optical panel at 45°)

PCN-1001 dimensions



Required cut-out dimensions for mounting

Dimensions are in millimetres

WARNING!
WHEN MOUNTING THE PCN-1001, USERS SHOULD PROVIDE SUFFICIENT ANCHORAGE, THIS SHOULD BE DONE TO ENSURE THAT THE PCN-1001 DOES NOT BECOME DETACHED DURING TRANSIT AND CAUSE A SAFETY HAZARD.

PCN-1001 Logon

The PCN-1001 runs using an embedded Linux Operating System.
Use the ssh protocol (IP: 10.100.10.100) if for any reason it is necessary to log-on the Operating System .

Example:

```
ssh root@10.100.10.100
```

These are the default passwords:

LOGIN	PASSWORD
root	root
ftpuser	ftpuser

Passwords can be changed when you are logged on using “root” using the following command:

COMMAND	SYNTAX	EXAMPLE
passwd	passwd <user name>	# passwd ftpuser # conf-save

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Troubleshooting

WARNING!
Before going further with this troubleshooting make sure you have ALWAYS installed the SAME REVISION of "pcn-1001-*Imgserver*" and "pcn-1001-demo-win32" (the software package that contains "*WinClient*" and "*RS485_GUI*").
Incompatibilities will happen and cause problems if older and newer versions of either the "pcn-1001-demo-win32" or "*Imgserver*" are used together.

	PROBLEM	POSSIBLE CAUSE	REMEDY
1	**The amber and green LED indicators flicker constantly or remain dark.**	PCN-1001 has wrong/no power supply.	Check the connections and the power requirements.
		PCN-1001 defective.	Contact your local Eurotech Technical Support Team. Refer to the back cover of this manual for full contact details
2	**WinClient does not identify the IP address of the PCN-1001 automatically**	Network issue	Use IPCONFIG / PING to check the network connection. Restart WinClient Type the address of the PCN-1001 manually
3	**In window 3 the image appears bright or with white spots while in windows 1 and 2 it is possible to see the regular scene as captured by the two cameras (the function "8bit Disp. + median + FPN + ODC" is selected).**	The floor is very reflective or has spot lighting. Highly reflective, geometric structures situated on or near the floor, such as the metallic parts for door mechanisms cause extreme patterns of light and darkness. These effects can be caused by solar reflections or strong lighting on metal surfaces.	Lighting of the detection area should be diffused as much as possible.
			Highly reflective structures and any high reflective surface situated on or near the floor should be avoided as much as possible in the detection area. Reduce the reflection by means of non-reflective materials or paints.
			Modify the "No Tracking Zone".
4	**PCN-1001 seems to function but counters are not incremented properly.**	Door is closed and the counting is activated / deactivated by the GPI1/GPI2 inputs so that counting only takes place when the door opens.	Open the door or check the configuration of the digital inputs.
		PCN-1001 incorrectly configured.	Adjust the PCN-1001 configuration. Pay particular attention to: • the background acquisition • the door threshold
		PCN-1001 defective.	Contact your local Eurotech Technical Support Team. Refer to the back cover of this manual for full contact details
5	**It is impossible to see the images in windows 1 and 2 even if the PCN-1001 is correctly connected via USB to the Host PC and the drivers are correctly installed**	Host PC colour depth too high	Set the Host PC colour depth to 16 bit (or less) by going to the Start Menu > Settings > Control Panels > Display > Settings
		Host PC firewall incorrectly configured	Refer to Step 3.5: Configure the Host PC firewall on page 39
6	**Counter results poor in one / both directions (i.e.: false positives due to shoulders or other body parts counted as people).**	Disturbing objects in the detection range block the PCN-1001.	Remove the objects and reacquire carefully the background (refer to problem # 2).
		PCN-1001 incorrectly set.	Rearrange the PCN-1001
		PCN-1001 installed too high/low.	Install the PCN-1001 at a maximum of 250 cm above the floor.
			Evaluate carefully the average population's high.
		The detection area is too little respect to the gate	Modify the "No Tracking Zone".

	PROBLEM	POSSIBLE CAUSE	REMEDY
7	**Too many false negatives**	There is a counting enable delay	The digital inputs should enable the PCN-1001 as soon as the door starts opening.
8	**Too many false positives**	There is a counting disable delay	The digital inputs should disable the PCN-1001 after the door is closed completely.
		The “Use Move detection” grey circle appears green even if nobody is crossing the detection area	Reacquire carefully the background (refer to problem # 2).It is strongly recommended to don’t acquire the background if the circle appears green but nobody is crossing the detection area.
		The door mechanisms are counted as people entering.	Shift the “threshold line” outside the mechanism motion range.

Standards Compliance

TEST	STANDARD FOLLOWED	RESTRICTION	TYPE	ROUTINE
Visual inspection	EN 50155 Section 10.2.1		*	*
Performance test	EN 50155 Section 10.2.2	Low limit: 9V High limit: 32V Interruption: Class 1 (no interruptions)	*	*
Cooling test	EN 50155 Section 10.2.3	Class T1: -20°C (§ 10.2.3)	*	-
Dry heat test	EN 50155 Section 10.2.4	Class T1: +55°C (§ 10.2.4)	*	-
Power supply over-voltages	EN 50155 Section 10.2.6.1	40V for 100ms (1ohm)	*	-
Surges	EN 50155 Section 10.2.6.2 (EN 50121-3-2)	On Battery: • Waveform A • 1,8 kV 5/10 us, Rs=100Ω • Performance criteria B	*	-
Transient burst susceptibility test	EN 50155 Section 10.2.7 (EN 50121-3-2 / EN 61000-4-4)	On I/O ports and Battery: • +/- 2 kV (peak) • 5/50 Tr/Th ns • 5 kHz Rep. Frequency	*	-
Conducted radio frequency susceptibility test	EN 50155 Section 10.2.8.1 (EN 50121-3-2 / EN 61000-4-6)	On I/O ports and Battery: • 10 Veff (carrier voltage) • 0,15 – 80 MHz, 1 KHz, 80 % AM • Source impedance: 150 Ω • Performance criteria: A	*	-
Radio frequency susceptibility test	EN 50155 Section 10.2.8.1 (EN 50121-3-2/ EN 61000-4-3)	On the enclosure port: • 20 V/m • 80 MHz 1 GHz, 1 KHz, 80 % AM • Source impedance: 150 Ω • Performance criteria: A	*	-
Radio frequency susceptibility test with pulse modulation	ENV50204	On the enclosure port: • 10 V/m • 900 MHz +-5 MHz • 1,89 GHz +-10 MHz • Performance criteria: A	*	-
Electrostatic discharge	EN 61000-4-2 /A1 /A2	On the enclosure port: • 6KV contact discharge • 8KV air discharge • Performance criteria: B	*	-
Conducted emission	EN 55022 / A1 EN 50155 Section 10.2.8.2 (EN 50121-3-2 / 55011)	On Battery: • 0,15 – 0,5 MHz: 66-56 dB µV • 0,5 – 5 MHz: 56 dB µV • 5 – 30 MHz: 60 dB µV • quasi-peak measured at 3m	*	-
Radiated emission	EN 55022 / A1 EN 50155 Section 10.2.8.2 (EN 50121-3-2 / 55011)	On the enclosure port: • 30 – 230 MHz: 40 dB µV/m • 230 MHz – 1 GHz: 47 dB µ V/m • quasi-peak measured at 3m	*	-
Insulation resistance	EN 50155 Section 10.2.9	500Vac@1min	*	-
Electrical transient conduction along supply lines.	ISO-7637-2 Pulses: 1, 2a 2b, 3a 3b, 4	Test level: III Functional status: Class D	*	-
Radiated emission	ECE ONU Regulation 10		*	-
Random vibrations	EN 50155 Section 10.2.11 EN61373 (ed. 2000) Section 8	Category 1 Class B	*	-
Simulated long life testing	EN 50155 Section 10.2.11 EN61373 (ed. 2000) Section 9	Category 1 Class B	*	-
Shocks	EN 50155 Section 10.2.11 EN61373 (ed. 2000) Section 10	Category 1 Class B	*	-
Safety	EN 60950	Essential constraints defined in the standard	*	-

* Performed
\- Not performed

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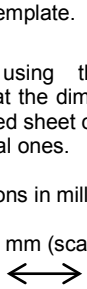
Cut-out template

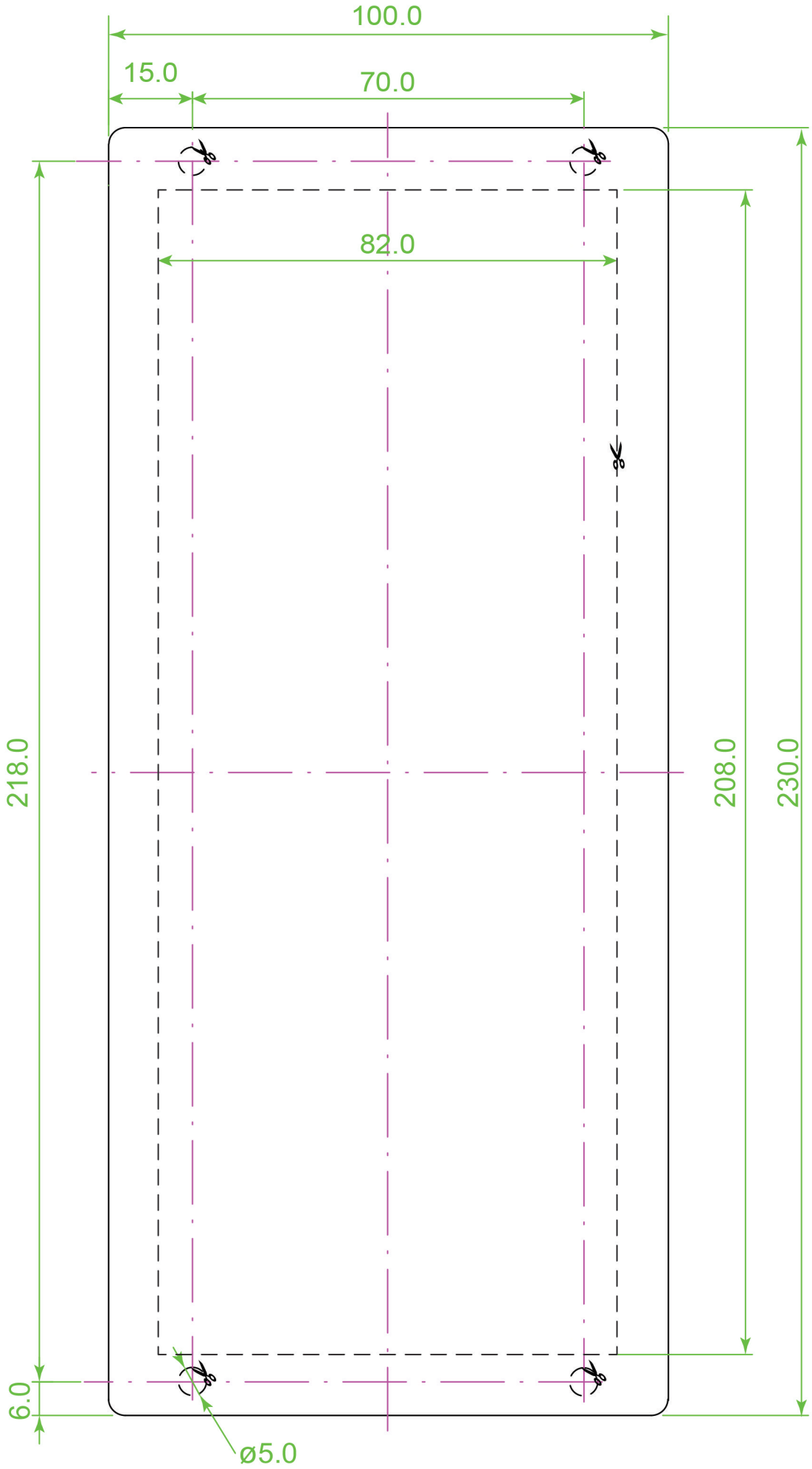
To simplify the PCN-1001 installation you can print this page in A4 format (e.g.: on card or plasticard) without any scaling and use it as a cut-out template.

Before using this page, verify that the dimensions in the printed sheet correspond to the real ones.

Dimensions in millimetres

10.0 mm (scale 1:1)





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Notes

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