

**Technical Support**

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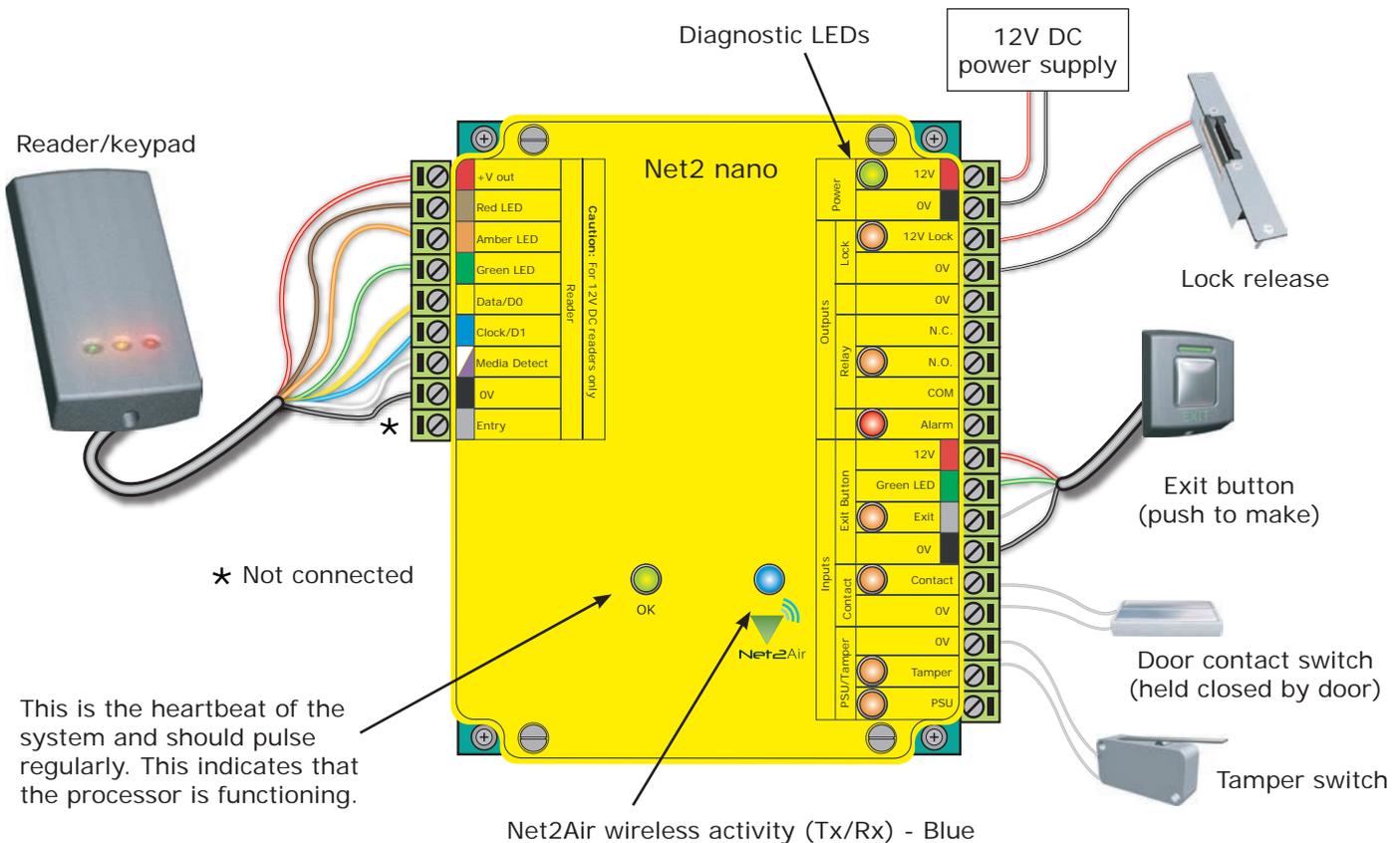
Technical help is available: Monday - Friday from 02:00 AM - 8:00 PM (EST)

Documentation on all Paxton products can be found on our web site - <http://www.paxton-access.com/>

For instructions in alternative languages - <http://paxton.info/1000>

This access control unit uses wireless communication. It is recommended that a Net2Air site surveyor is used to determine the best position for the bridge and control units.

This wireless unit requires a Net2Air bridge to communicate with the server PC.



A new unit requires approximately 30 seconds after initial power up to self configure.  
 During this time the OK LED will not be flashing.  
 The unit will not operate correctly until this function has completed.

**LED indications**

12V	(Green)	- Power LED.
Lock	(Orange)	- The 12V lock output is energised.
Relay	(Orange)	- The relay is energised - (NO/COM contacts are closed).
Alarm	(Red)	- 12V Alarm output is active.
Exit	(Orange)	- The exit button contacts are closed.
Contact	(Orange)	- The door contacts are closed.
Tamper	(Orange)	- The tamper contacts are closed.
PSU	(Orange)	- The PSU contacts are closed.
Net2Air	(Blue)	- Net2Air interface Tx/Rx activity.
OK	(Green flash)	- The internal software is running.

## Net2Air wireless communication

Net2Air wireless control units are fully compatible with the hard wired Net2 range but there are several important differences that need to be understood before installing wireless equipment. The most important of these is the location of the control units and their bridge components.

These principles are therefore explained first before we move on to the control unit itself.

The access control unit connects to the Net2 software running on the PC using Paxton Net2Air proprietary wireless technology. A Net2Air bridge enables communication from the Net2 software to the Paxton wireless products.

Radio signals do not always behave as you might expect. For example, a cell phone that displays a full signal on one part of the site will lose signal completely only a few feet away. These problems can be addressed by using the Net2 site surveyor kit (690-200-US)

See also: [AN1095 - Net2 nano - How does it work? < http://paxton.info/974 >](http://paxton.info/974)  
[AN1096 - How to plan a Net2 nano installation < http://paxton.info/975 >](http://paxton.info/975)  
[Ins-30096-US - Net2Air site surveyor < http://paxton.info/1193 >](http://paxton.info/1193)

## Radio frequency

This product should not be installed within 10 feet of other wireless equipment operating on a 2.4Ghz frequency. To ensure optimum performance other wireless networks should avoid WiFi channels 11, 12 and 13 to reduce the possibility of interference.

A Net2 nano ACU or a Hands free interface cannot be installed in a Metal cabinet as this would block the RF signal used for the Net2Air wireless technology.

Options	
Part number	Description
654-943-US	Net2 nano 1 door access control unit
654-549-US	Net2 nano 1 door ACU in plastic housing

## Net2 nano PC / server operation

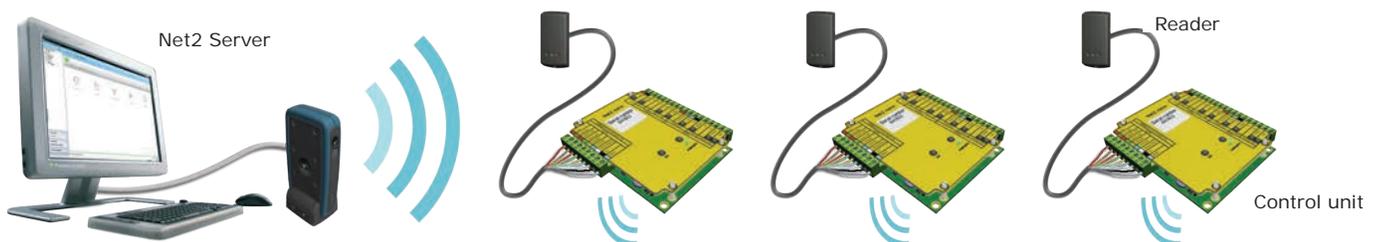
Data transfer with wireless technology requires far more control and error checking than with a hard wired data line connection. Net2 classic runs with a server that originates and controls all the communications on the data line. This would not be efficient in a wireless environment.

We therefore give the Nano controller the active role. Each Nano is always active and transmits data bursts (including a regular Heartbeat) every few seconds. The Net2 server then acts upon these requests for service.

The PC requires at least one Net2Air bridge to communicate with a Nano. This can be a local Net2Air USB bridge (only one per system) and/or multiple Net2Air Ethernet bridge units connected to the PC via a TCP/IP connection.

**There is NO Net2 nano detection function.** It is recognised that there could be security issues if the wireless units were detectable from outside the site. During installation, a Nano unit binds with a Net2Air bridge which will then only talk to registered units. The Server configuration utility also has an ' Enable commissioning' mode which can be turned off to inhibit Nano units being added.

An entry is then made on the Doors screen and a special icon is used to denote the wireless connection. 



The reader's default indication has all the LED's on. Access granted is denoted with a single flashing Green LED. Access Denied is a single flashing Red LED.

## Mounting

Parts kits		
Part number	Qty	Description
Fitting Kit fk1-095	3	35mm wall plugs
	3	8g x 1.5 pozi twin woodscrew
	1	M4 x 20 pozi pan machine screw
	5	Cable tie
	4	Cable clip
	1	Diode 1N4001
	1	M4 Rubber washer

This product is not suitable for retail sale. All warranties are invalid if this product is not installed by a trained technician.

## Cable type

Cable specification		
Use	Max length	Type
Reader / Keypad	500 feet	8 core, shielded - Belden 9538, Alpha 1298C (22AWG) General Cable C0744A / C0745A (22AWG)
Input / Output	100 yds	2 conductor - Alpha 1172C (22AWG) or equivalent

## Control unit installation

**This unit is for Indoor use only**

The ACU shall be installed within the protected premises as both the power and lock wiring is present at the PCB. A Tamper alarm input is provided on the PCB - See Input/Output Wiring

Where the ACU is being installed within a plastic enclosure, the hub must be connected to the conduit before it is connected to the plastic enclose. This is to eliminate the potential of any excessive torque loading being applied to the plastic enclosure during installation.

This housing should be fixed to the surface with suitable fasteners; screws and wall plugs are provided for this in the fitting kit. Also provided are cable ties to secure the cabling and a smaller securing screw for the lid.

Wire the components to the Access Control Unit (ACU) as shown on the first page.

Press the exit button or in the absence of an exit button, short the 0V and exit terminals together. The configured lock output LED will come on and the lock should release.

The unit will continue to operate in a 'standalone' mode if the PC is shut down. Any Events that occur during this period are stored in the unit and the PC is updated when it comes back on line.

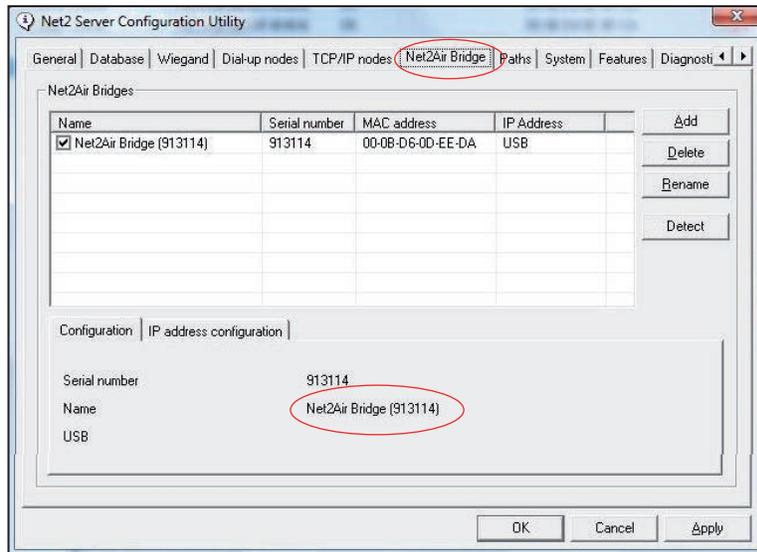
## PC installation

The current specification for compatible PC hardware, network and operating systems is available on our website at the following link: <http://paxton.info/720>

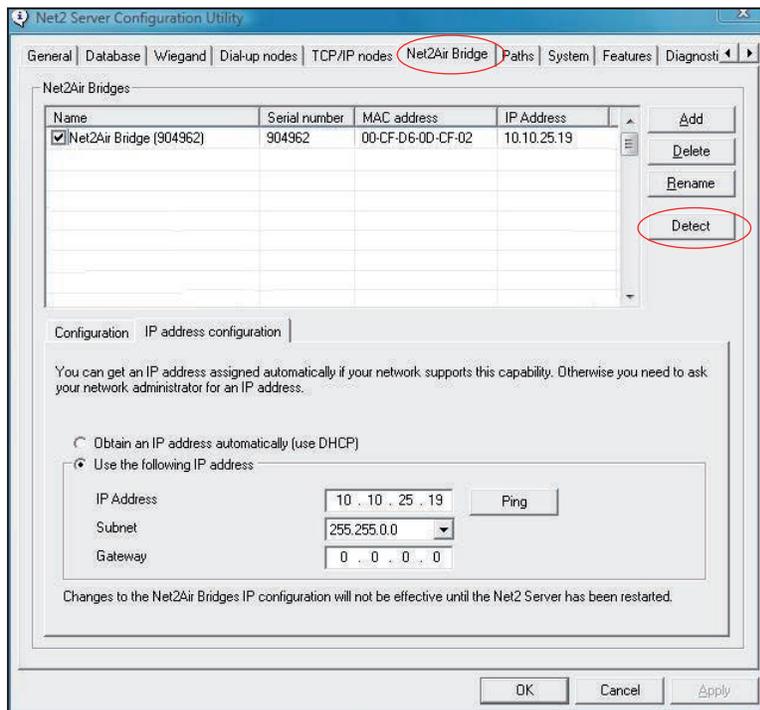
## Software installation

The Net2 software should be loaded on the controlling PC with at least one Net2Air bridge installed.

Full documentation is supplied with the Net2Air bridge unit and also from the website as follows:



Only ONE Net2Air USB bridge may be used per system. Multiple Net2Air Ethernet bridges may also be configured.



AN1051 - Installing Net2 software < <http://paxton.info/1520> >  
Ins-40084-US Net2Air USB bridge < <http://paxton.info/1453> >  
Ins-40085-US Net2Air Ethernet bridge < <http://paxton.info/1192> >

## Enrolling a Net2 nano

A Nano must first bind to a Net2Air bridge before it will enroll itself onto the Net2 system. The term 'bind' is used to denote the fixed relationship between a Nano and its bridge.

Create a user record in the database and assign a Net2 token to the user. If you are not using PROXIMITY tokens you should still create the user record and assign a token number (Not a PIN) of your choice. These records can be deleted after the installation is complete.

Connect a PROXIMITY reader to the Nano and then present the same user token previously assigned. (If you are enrolling a Keypad only unit, enter the token number on the keypad followed by \* ) The Nano will then transmit the token number and wait for a response from a bridge.

If more than one bridge replies, the Nano checks the signal strength and selects the strongest bridge to communicate with. The Net2 software confirms that the token number is in the database and if so registers this Net2 nano/bridge binding.

## System checks

Present a token at each reader. An event for each read should appear in the Events screen.

Change the default password for the System Engineer.

Set up other operators if required.

Set up time zones.

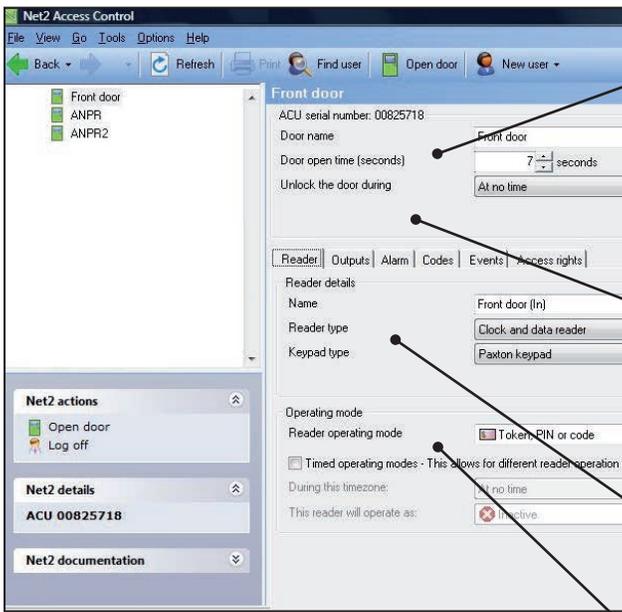
Set up access levels.

Users can be added & assigned to the required access level.

Departments can be created if required.

The Net2 CD can assist here with detailed application notes for setting up users and general system operation.

## Software configuration



The screenshot shows the 'Net2 Access Control' software interface. The main window is titled 'Front door' and displays configuration options for an ACU serial number (00825718). The 'Reader' tab is selected, showing fields for 'Door name' (set to 'Front door'), 'Door open time (seconds)' (set to 7), and 'Unlock the door during' (set to 'At no time'). Below these are sections for 'Reader details' (Name: 'Front door (In)', Reader type: 'Clock and data reader', Keypad type: 'Paxton keypad'), 'Operating mode' (set to 'Token, PIN or code'), and 'Timed operating modes' (set to 'At no time').

**Door name:** Name the Door.  
**Door open time:** Set the door open time.  
**Unlock the Door during:** Holds the door unlocked during this timezone. - Set to 'At No Time' for normal user operation.

**Reader:** Settings for the Reader and Keypad.  
**Outputs:** Lock, Relay, Alarm. - Selects these outputs to be used by the Lock, Bell or Alarm functions.  
**Alarm:** Configures the settings for the different alarm types.  
**Codes:** Valid keypad codes can be viewed, added and removed (This tab is only displayed when a keypad is fitted)  
**Events:** Shows the events for this control unit only.  
**Access Rights:** Lists users who have access through this door.

**Name:** Each reader can be named individually if required.  
**Reader type:** Set the reader type, if applicable.  
**Keypad type:** Set the keypad type, if applicable

**Reader operating mode:** Set the operating mode.  
**Timed operating modes:** A different operating mode can be configured within a time window.

## UL compatible readers

Part	Type
373-110-US	PROXIMITY P75 reader
373-120-US	PROXIMITY P75 reader, screw connector
353-110-US	PROXIMITY P50 reader
390-747-US	PROXIMITY metal reader
390-727-US	PROXIMITY metal reader, chrome
390-737-US	PROXIMITY metal reader, brass
390-135-US	PROXIMITY panel mount reader

Part	Type
371-110-US	TOUCHLOCK K75 keypad
371-120-US	TOUCHLOCK K75 keypad, screw connector
372-110-US	TOUCHLOCK K75 stainless steel keypad
372-120-US	TOUCHLOCK K75 stainless steel, screw connector
375-110-US	PROXIMITY KP75 keypad
375-120-US	PROXIMITY KP75 keypad, screw connector

## Maintenance

The Net2 nano is designed to take input from Clock and Data readers through its (In/Out) reader port. It can also be configured for 26bit Wiegand.

It has a Net2Air wireless interface that is used for uploading firmware and user information as well as providing Event information to the PC on demand.

Following the completed installation of this equipment, no further maintenance or testing is required.

It is advisable to ensure that any third party backup power supplies or recovery procedures are checked regularly to ensure that the operation of the Paxton system is not compromised.

1 - Short circuiting, mutilation or incineration of the cells must be avoided to prevent one or more of the following occurrences; Release of toxic materials, release of hydrogen and/or oxygen gas, rise in surface temperature.

2 - If a cell has leaked or vented the control unit must be replaced. The battery is not to be replaced.

## Net2 nano reset

The Nano controller holds the address information for the bridge that it has bound with. This will cause problems if the unit is to be used on another system.

To clear this address information, you need to perform a hardware reset. Link Orange/White on the reader port and then power cycle the unit.

Make sure that the power is not removed again until after the green OK LED is flashing again. Later versions of software also flash the reader LED's until the reset process has finished. Remove the Orange/White link.

## INPUT / OUTPUT WIRING

The Net2 nano has 3 outputs that can be configured in the Doors screen to perform different functions.

This flexibility means that a site that requires the Relay output (volt free contacts) for the door function can configure the Lock output to drive a door bell.

The screenshot shows the 'Parking' configuration window for the Net2 nano. The 'Outputs' tab is selected and circled in red. The 'Output configuration' section has three dropdown menus: 'Lock output' is set to 'Door lock', 'Relay output' is set to 'Door bell', and 'Alarm output' is set to 'Alarm'. To the right of these dropdowns are three radio buttons: 'Fail closed' (selected), 'Fail open', and 'Toggle'. Below the configuration area, there is a note: 'Please select the function of each of the Net2 nano outputs'.

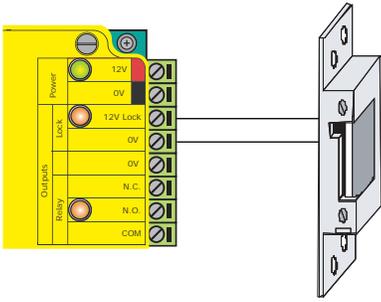
**Lock output** - This is a transistor 'open drain' output, (not a voltage free contact) that has been designed to simplify the wiring of the lock. It can be configured to operate in Fail lock, Fail unlock or toggle modes and removes the need for additional links or diodes normally required when using a relay for output switching.

**Relay output** - This provides a set of volt free contacts to switch external devices.

**Alarm output** - This is a transistor driven output that switches to 0V when activated.

The use of a Fail closed/Secure configuration shall be determined by the local building codes and the local AHJ.

## Lock wiring - Lock output (12V DC)



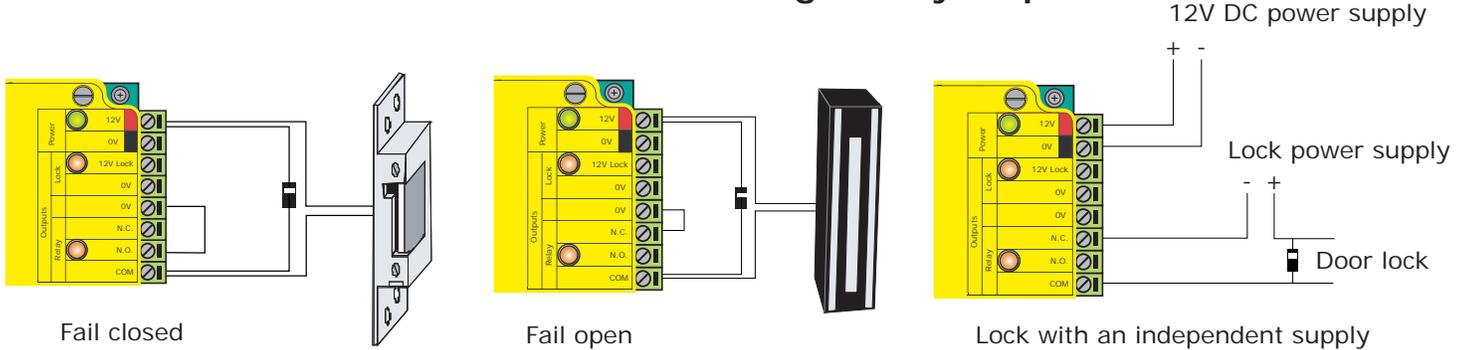
The lock is wired across the 12V Lock and 0V terminals. No diode or additional wiring is required.

Set the 'Lock output' to 'Door lock' and set the release type to fail locked, fail unlocked, or toggle.

This wiring illustration shows the Lock output configured for the Door lock function.

See Specification table for Output ratings.

## Lock Wiring - Relay output



This wiring illustration shows the Relay output configured for the Door lock function.

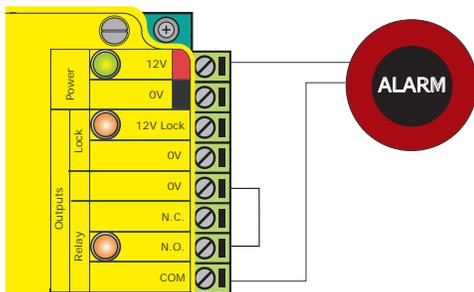
See Specification table for Output ratings.

The lock is wired across 12V and COM. A 0V link is then required to complete the circuit. This will be wired from 0v to NO or NC depending on lock type (Fail Open / Fail Closed)

A diode is supplied which should be fitted across 12V and COM (Silver end to 12V ) to protect the relay contacts.

The dry relay contacts can be used to switch the power from an independent lock power supply. Wire the 0V to NC or NO and the lock to COM; the +VCC supply is wired directly to the lock.

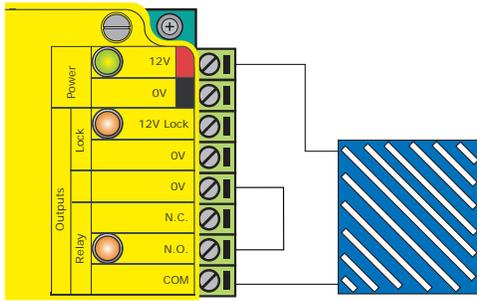
## Alarm sounder



The Net2 ACU has a local alarm output. This is a transistor 'open drain' output, (not a volt free contact) that is capable of switching 1A at 12V DC.

A Lock output, Relay output or Alarm output must be configured to function as the Alarm output.

This local output can be turned on or off for each type of alarm and can be configured to sound continuously or intermittently to distinguish between different alarm types.



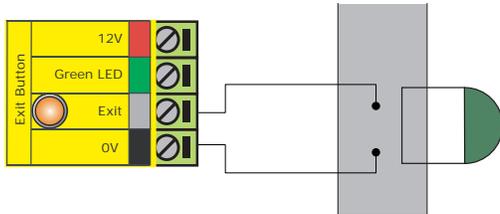
## Door Bell - Relay output

Pressing the bell button on the keypad will energise the Door bell output for 1 second.

The Lock output, Relay output or Alarm output must be configured to function as the Door Bell output.

This wiring illustration shows the Relay output configured for the Door Bell function.

See Specification table for Output ratings.



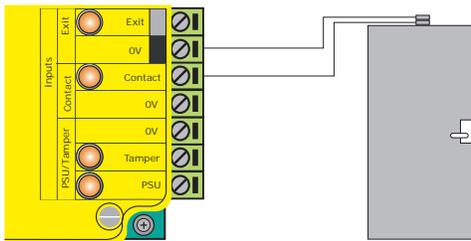
## Exit button

Where fitted, a 'push to make' button is required. (See Specification table for ratings)

The Exit LED will be ON when the switch is closed. - Button Pushed.

When the Exit terminal is shorted to 0V, the ACU will illuminate the Exit LED and activate the lock output for the set 'Door open time'. The lock output will remain active while the short to 0V remains and the reader/exit button Green LED will flash during this period. More than one exit button can be wired in parallel.

A Lock output, Relay output or Alarm output must be configured to function as the Door Lock output.

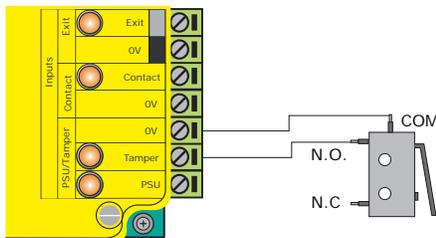


## Door Contact

A NO switch may be fitted so that it is held closed while the door is shut.

The Contact LED will be ON when the switch is closed. - Door Closed.

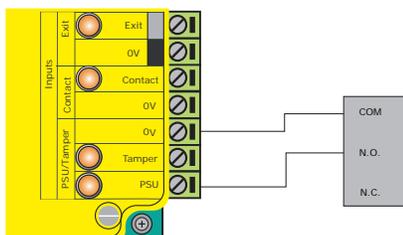
When connected, Net2 will check the door position during access activity and will raise an Alarm in the event of a 'Door Forced' or 'Door left open' condition.



## Tamper switch

The ACU supplied in a plastic housing has a 'NO' tamper switch fitted and pre-wired into the circuit board.

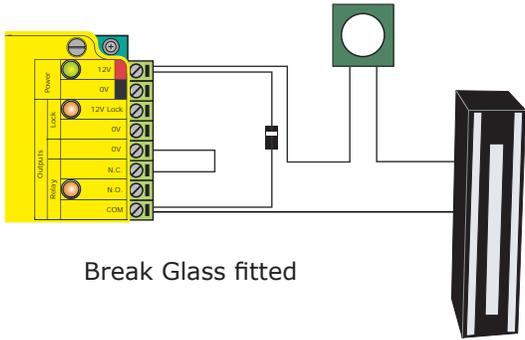
The Tamper LED will be ON when the switch is closed. Net2 will monitor the switch position and will raise an Alarm in the event of a 'Tamper' condition.



## PSU monitoring

The PSU LED will be ON when the NO Relay contacts are closed. - Power OK.

The Net2 software will monitor the relay contacts and will raise an Alarm in the event of a 'Power Fail' condition.



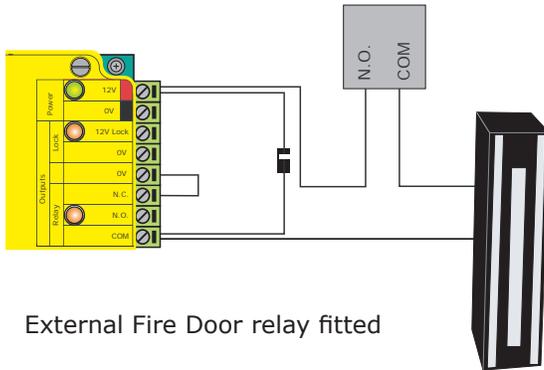
Break Glass fitted

## Panic hardware

A break glass should be fitted, in conjunction with a fail open release to ensure a reliable egress method in the event of an emergency. This is fitted on the 12V supply wire to the lock and drops the power ensuring that the lock opens.

The diagram shows how to include the break glass in the Net2 lock wiring circuit.

This wiring illustration shows the Relay output configured for the Door lock function.



External Fire Door relay fitted

## Fire Door Interface

A fire alarm system must be used to release all fire doors. External relay contacts are held closed by the fire alarm's interface and will be dropped during an alarm condition. The system is fail safe as the door will release even if the cable burns through.

This wiring illustration shows the Relay output configured for the Door lock function.

## Product compliance and limitations

To comply as a UL listed installation, the following conditions must apply: -

The power must be provided via a separate DC supply, a UL Listed Access Control (or Burglar Alarm) Class 2, Power-Limited, power source capable of 4 hours standby must be employed. This is wired into the 0V and 12/24V terminals and the cable secured with the cable ties provided.

Wiring methods shall be in accordance with the National Electrical Code (ANSI/NFPA70), local codes, and the authorities having jurisdiction.

Software features and functions have not been evaluated by UL.

Server based functions (Antipassback, Time and Attendance, etc) have not been evaluated by UL and cannot be used for UL 294 installations.

The use of Wiegand readers and the configuration software has not been evaluated by 'UL'

Wiring: - Where an equivalent cable / wire is used it must be ' UL Listed ' All interconnecting devices must be UL Listed.

Exit buttons - A UL listed 'push to make' button must be used.

Door contact - A UL listed 'Normaly Open' (N.O.) switch must be used.

Tamper alarm - Connect to a UL listed burglar alarm unit for supervision.

Alarm sounder - Connections to this alarm output have not been evaluated by UL for burglar alarm use.

Break glass- A UL listed break glass must be used.

For CAN/ULC-S319 installations, terminals, leads and wiring methods must comply with CSA, C22.1, Canadian electrical code, Part 1, safety standards for electrical installations.

The use of any add-on, expansion, memory or other module manufactured or supplied by the manufacturer's representative will invalidate the CAN/ULC-S319 certification.

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

<b>Specifications</b>			
<b>Features</b>	Min	Max	
Number of Cards		10,000	
Number of PIN's		10,000	
Access Levels		250	
Time Zones		64	
Maximum door open time	1 sec	99,999 sec	
Number of Codes		50	
Doors per ACU		1	
Reader ports per ACU		1	
Readers per port		2	
Keypads per port		2	
ACU's per Net2Air bridge - Recommended	1	10	
Net2Air bridge (data lines) per system	1	100	
Net2Air wireless range to ACU		30 yds	
Data retention after total power loss	60 days		
Events stored in ACU with no server connection		3,584	
<b>Electrical</b>	Min	Max	
Input Voltage			12V DC
Input Current	120 mA	3 A	
Relay switchable voltage		24V DC	
Relay switchable current		2 A	
Dedicated lock output voltage	11.2V DC	12V DC	
Dedicated lock output current		1.1 A	
Alarm output voltage	11.6V DC	12V DC	
Alarm output current		1 A	
Reader port voltage	10.8V DC	12V DC	
Reader port output current		500 mA	
Carrier frequency			2.405 GHz
Exit button voltage	11.3V DC	12V DC	
Exit button current		20 mA	
<b>Environment</b>	Min	Max	
Operating temperature - Battery limits	0°C (32°F)	55°C (131°F)	
Humidity		85% - Relative humidity	
Waterproof			No
<b>Dimensions</b>	Width	Height	Depth
Control Unit	4 1/8 in	3 1/4 in	7/8 in
Plastic Housing	7 in	7 in	1 5/8 in

## FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment must not be co-located with any other transmitter and must be used at a distance in excess of 20cm to the user.

The party that incorporates this equipment into another host device is responsible for verification of the emissions produced by the final product and must adhere to the limits specified in FCC Part 15.

Furthermore, a label must be applied to the exterior of the final product referring to this enclosed module, which states : "Contains Transmitter Module FCC ID: USE654943" or "Contains FCC ID: USE654943".