Paxton

The Net2 plus can be connected to the PC via a RS485 data line or a TCP/IP connection.
This unit requires the controlling PC to be running Net2 v4.14 or later software.

Wiring
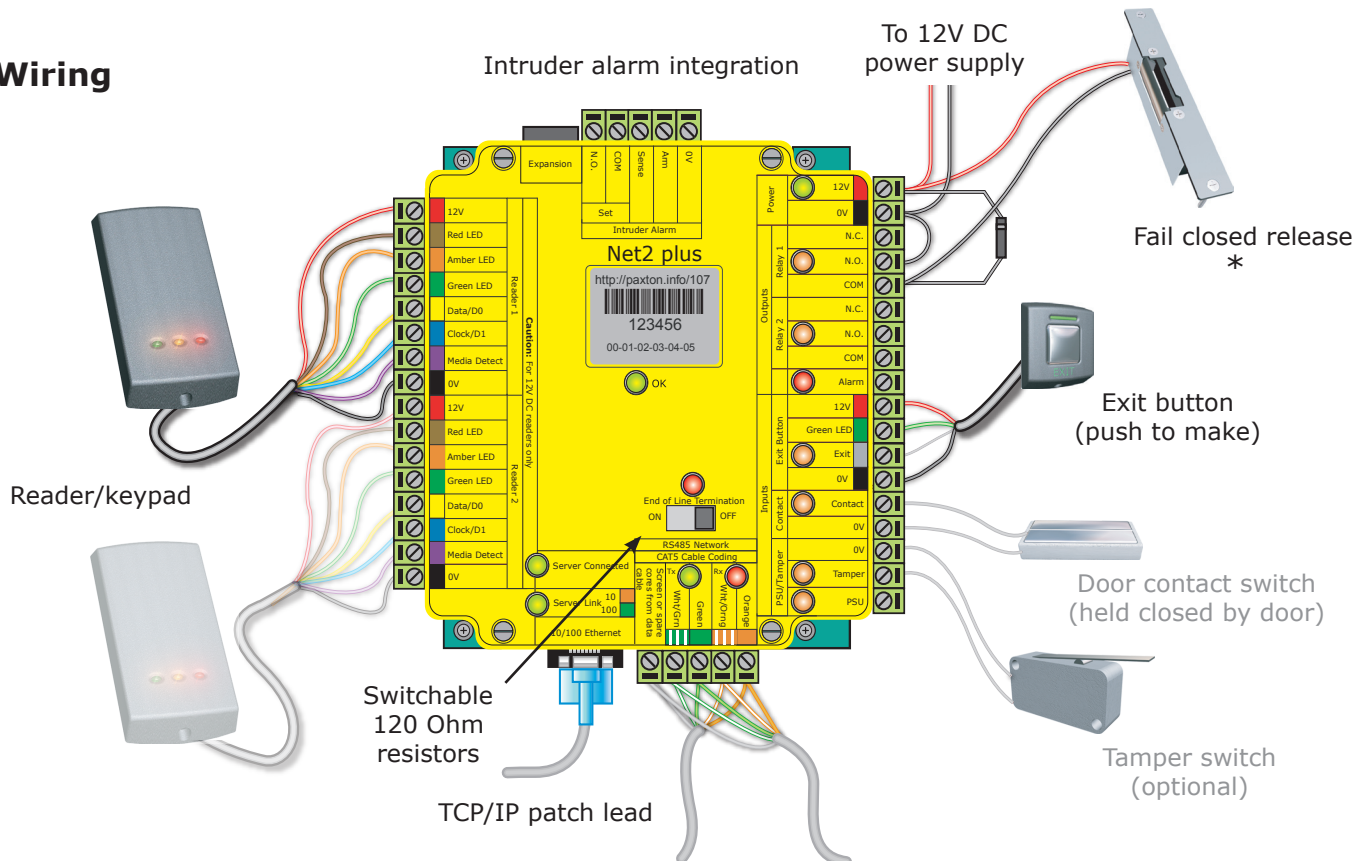
The Net2 plus ACU has 2 reader ports and 3 output relays, but can control just one door. The configuration of one control unit per door greatly simplifies installation and is ultimately highly cost effective.

* For a fail open lock (Maglock), the 0V loop wire is connected to the "N.C." terminal. (not the "N.O.")

LED indications

12V	(Green)	- Power LED.
Relay 1	(Orange)	- The relay is energised - (N.O./COM contacts are closed).
Relay 2	(Orange)	- The relay is energised - (N.O./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.
OK	(Green flash)	- The internal software is running.
Termination	(Red)	- The on-board resistors are in place across the RS485 data pairs.
Rx	(Red)	- The ACU is receiving data (TCP/IP or RS485) - See also FAQ section.
Tx	(Green)	- The ACU is responding to data - (TCP/IP or RS485).
Server Connected	(Green)	- The TCP/IP interface is communicating with the PC Net2 server.
Server Link		- Green = 100 Mbit/s : Orange = 10 Mbit/s (TCP/IP speed).

Overview

A Net2 plus can connect to the Net2 PC using either an un-shielded RJ45 patch cable or an RS485 data line. This greatly increases the number of installation options available to the installer.
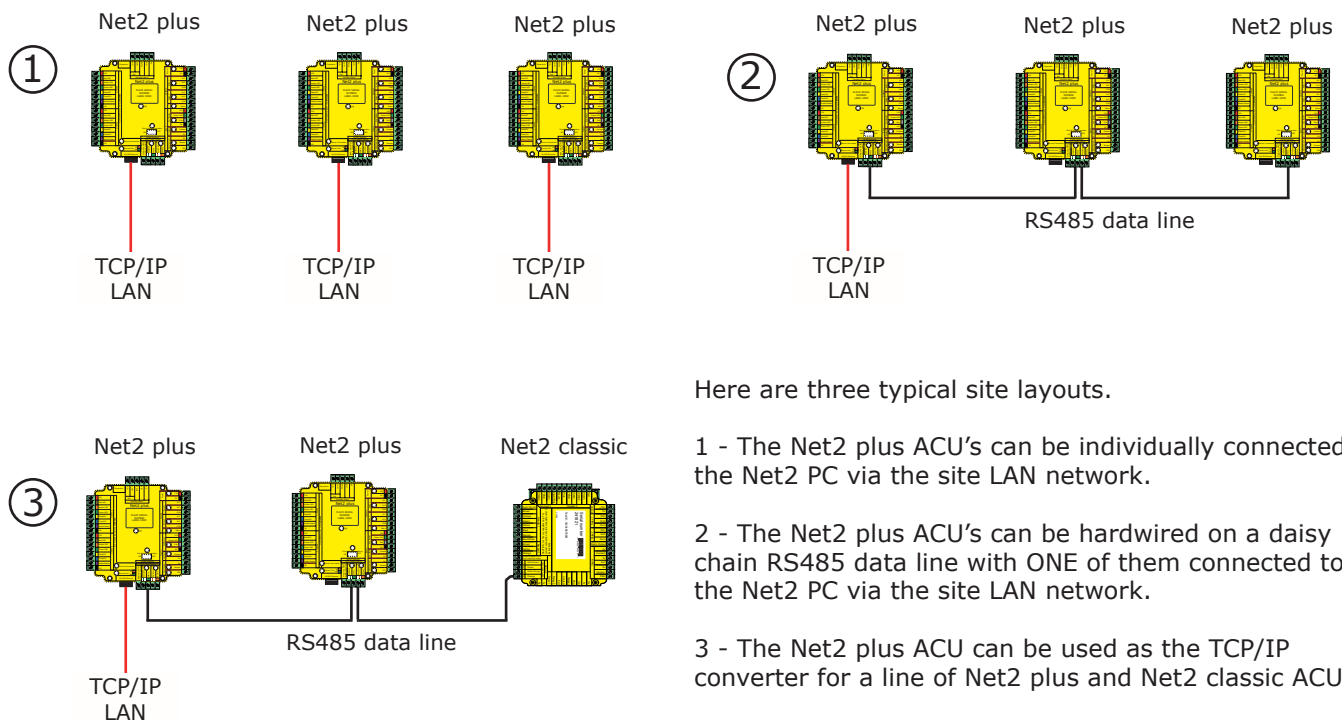
One Net2 plus can also be used as the TCP/IP interface for an RS485 daisy chain of Net2 plus and Net2 classic units.

When used with a TCP/IP connection, it must first be detected using the Net2 Server Configuration Utility. See later section of this instruction and *AN1006 - Installing remote sites using TCP/IP* < http://paxton.info/51 >

When used with an RS485 data line, on-board termination resistors can be put in circuit with a simple slide switch. Ensure that units installed in the middle of the data line have this switch turned OFF.

A dedicated Intruder Alarm connection is provided.

Site Layout Examples

① Net2 plus   Net2 plus   Net2 plus

TCP/IP LAN   TCP/IP LAN   TCP/IP LAN

② Net2 plus   Net2 plus   Net2 plus

RS485 data line

TCP/IP LAN

③ Net2 plus   Net2 plus   Net2 classic

RS485 data line

TCP/IP LAN

Here are three typical site layouts.

1 - The Net2 plus ACU's can be individually connected to the Net2 PC via the site LAN network.

2 - The Net2 plus ACU's can be hardwired on a daisy chain RS485 data line with ONE of them connected to the Net2 PC via the site LAN network.

3 - The Net2 plus ACU can be used as the TCP/IP converter for a line of Net2 plus and Net2 classic ACU's.

The TCP/IP interface allows an RS485 data line to be controlled by the Net2 Server running across a LAN network.

An RS485 data line has a 1 km maximum length. This distance can be increased by using Paxton high speed repeaters or by using shorter independant data lines using multiple LAN connections controlled from the same PC.

Control unit installation

Wire the components to the Access Control Unit (ACU) as shown on the first page. Power up the unit and wait for the OK heartbeat.

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

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.

Remember, the Net2 plus is a combined TCP/IP interface and an Access Control unit. If the TCP/IP interface is being used, you will need to detect the interface first using the procedure on the following page.

This is important if you are replacing an existing Net2 plus. The Replace wizard in the Doors screen does NOT reconfigure the IP address so it must be done manually. The wizard will then copy across the user data.

Each time the unit is powered on, it will run an internal health check. During this phase (about 5 secs) the OK LED will flash quickly before changing to a slower heartbeat.

Connecting to the PC via the Ethernet port

The IP address should be assigned a fixed value, or should be given a DHCP reservation. Unreserved IP addresses issued by DHCP servers are not guaranteed to be constant, leading to potential failure of communication between Net2 software and the device.

Run the Net2 Server Configuration Utility (Start/Programs/Net2) and Click on TCP/IP nodes.
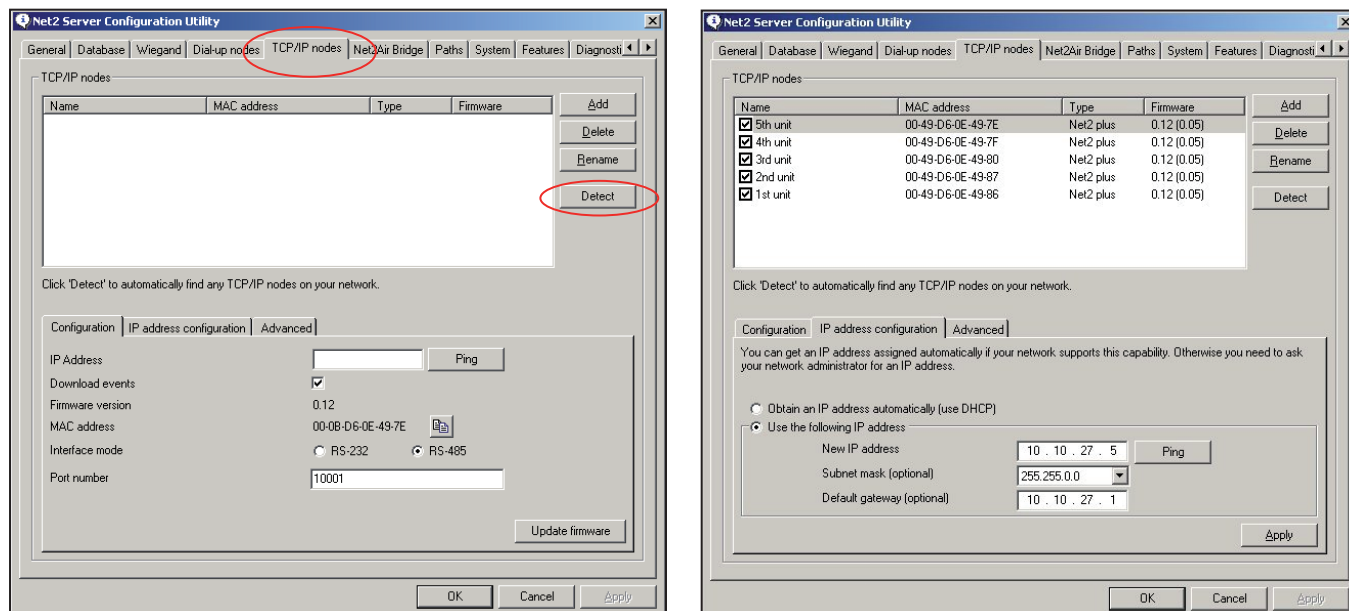
Click on **Detect** and the MAC address of the device(s) will appear in the table. You must then use the "IP address configuration" tab to manually assign the IP address, subnet mask and gateway.

Be aware that if the IP address that you give the device is not in the same IP range as the PC, the device will no longer respond until you connect to it with a PC that is in the same IP range.

Some firewall/virus protection software and other wireless hardware can block the IP detection process. Disable these and try to detect the device again. Please contact Technical Support if you require further advice.

If you detect the MAC address but the device now shows 'Not Responding', you must check the IP address, to make sure it is still in range with the PC or network. If it is not, you should either change the IP address of the PC or the IP address of the device so they are both again in the same range. Our Technical team can talk you through this if you need help.

If the MAC address does not appear when you click **Detect,** ensure that the following ports are open on all devices between this unit and the Net2 PC:-

69	UDP
10001	TCP
30718	UDP

TCP/IP Reset - The unit can be returned to DHCP settings by powering down the unit and linking the Brown and Mauve terminals on reader port 2. Power up the unit again and the unit will beep to acknowledge the link. You may now remove the link and the OK LED will flash fast for a few seconds. When the OK LED returns to a steady heartbeat, the IP settings will be reset to DHCP.

If you still cannot detect the MAC address of the device, call our Technical Support Help line.

The device will 'beep' when detected by the Net2 Server Configuration Utility or when new IP settings are applied. The sounder will also respond to a direct 'Ping' over the network. This is a feature to assist with finding devices hidden from view.

Connecting to a WAN or different subnet mask

If you are connecting this device to a remote subnet which is different from the Net2 software PC, the standard detect mechanism cannot work across the network routers between them. The IP address, along with the correct subnet mask and gateway for the remote subnet have to be set. Either do this on the local subnet with the existing Net2 PC, or use a PC on the remote subnet once the device is installed.

The PC that has the Net2 server installed must be able to access the IP address range on the WAN/remote site.

This may require the routers and gateways to be configured between the networks. Again, this would be done by the Network administrator of that site. Make sure the ports listed above are open on all intermediate routers.

Once installed, create a record with the **Add** button (if none was created during initial set up) and you should then be able to detect its MAC by entering the IP address in the Configuration screen Ping box.

TCP/IP Loopback test

The following test should be run if there are problems setting up the IP configuration of the interface. This test sends data to the device and checks this against the data it receives back. This confirms that the network is working correctly.

The Net2 server program must be shut down during this test.

Remove any wires from the RS485 data line connector and create a hardwired data loop as follows. Connect the Orange to White/Green and Green to White/Orange. To run the test, go to Net2 Server Config Utility/TCP/IP Nodes/Advanced and click on Loopback test. If the test fails, connect the unit directly to the PC with an RJ45 patch cable and test it again. Should this still fail, please call Technical Support for further advice.

Connecting to the PC or other ACU's via the RS485 data connection

90% of installation faults are caused by wiring errors on the RS485 data line. Special attention to getting this right first time saves a lot of time and effort.
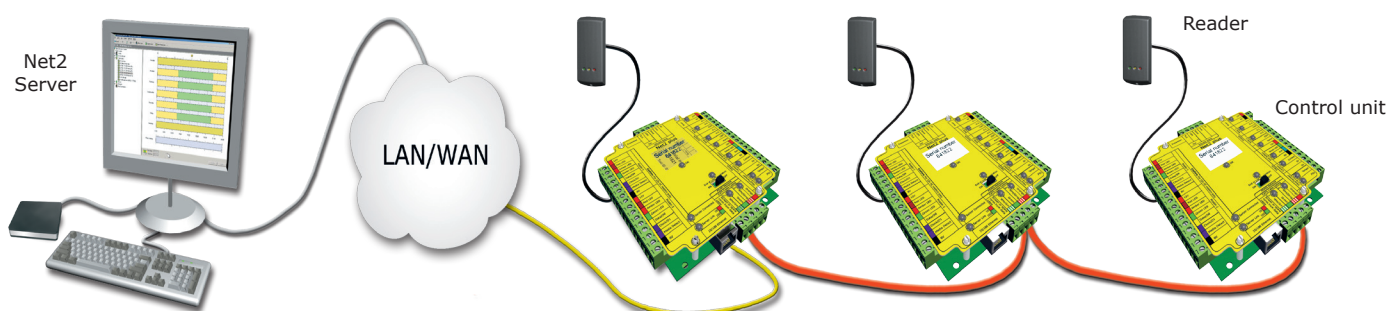
END OF LINE TERMINATION SWITCHES.
- These should all be OFF except for those at both ends of the data line.

READER & DATA CABLE SCREENS.
- Data cable screens and spare cores MUST be connected throughout.

- Reader and keypad screens where provided should be connected to the Black (0V) terminal.

The data line must be wired in a single daisy chain. The data converter may be located anywhere along the data line. 120 ohm terminating resistors must be linked across each data pair at the beginning AND end of the line. This can be done on many units with a switch or jumpers. If not, free resistors are provided with the converter.

RS485 data line checks

Power down all TCP/IP, USB and RS232 converters (individual and Net2 plus).

✓ Check the resistance across each data pair is 60-80 ohms.

✓ Check that there are no data line to screen shorts.

✓ Check the screen of the data cable is continuous - this provides the 0V DC system reference.

Software Configuration

Door name: Name the ACU.
Door open time: Set the door open time.
Unlock the Door during: Permanently unlocks the door while this timezone is active. - Should be set to 'At No Time' for normal user operation.

Reader 1: Settings for Reader 1 and Keypad 1 on the ACU.
Reader 2: Settings for Reader 2 and Keypad 2 on the ACU.
Alarm: Contains settings for the different types of alarm.
Codes: Valid codes can be viewed, added and removed. (Can only be viewed when a keypad is active).
Events: Shows the events for the control unit selected.

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.
Token data format: Select the data type being used on the system. (New formats can be created).

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

**Reader action**: Set the action required when access is granted.

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

Intruder alarm integration

A dedicated port for input and output signals is provided when integrating a Net2 plus ACU with an alarm system.

Please see *AN1035 - Integrating Net2 with an intruder alarm system* < http://paxton.info/91 > or call Technical Support for further information.
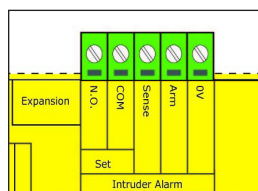
Arm   - Confirmation Push Button - Wire across 0V and Arm.
Sense   - Requires a voltage free loop across 0V and Sense to confirm when alarm is active.
Set   - Relay provides contacts across COM and N.O. for a voltage free loop to set the alarm.

Technical Help

1 - RS485 Data line resistance check - ACU not responding or fails to be detected.
First power down any data line converters and disconnect any ACU's that do not have a flashing OK LED. Using a Multimeter, measure the resistance across the White/Green and Green pair at one end of the network.
A resistance of between 60 and 80 ohms is required. Repeat the test for the White/Orange and Orange pair.
This is vital for a stable and trouble free installation.

2 - ACU Reset - No OK LED flashing.
The ACU has no factory reset condition as it does not contain any fixed settings. The unit does have an operating program (firmware) that controls its functions and can be confirmed as running by means of the flashing OK LED.
- If the OK LED is flashing steadily, then there should be no reason to reset the unit.
- If the OK LED is not flashing, you need to clear the unit so that it can receive a firmware download from the PC.
  Any other ACU's without OK LED's must be taken off the line or powered down.

1. Stop Net2 Server (Net2 server icon - Bottom right of screen - Right mouse click, Select Stop the Net2 Server).
2. Power down the Net2 ACU.
3. Insert a link wire between the Orange and Mauve terminals on reader 2 port.
4. Power up the ACU. - The OK LED flashes very quickly.
5. With the unit still powered, remove the link.
6. Go to the PC and Start the Net2 Server and go into the Doors screen. Click on the Detect button.   This should look for the ACU and then download its firmware (This may take up to 5 minutes). - The OK LED should now be flashing with a steady heartbeat. This procedure must only be done for one ACU at a time.

  NOTE: If this unit is using the TCP/IP interface, any fixed IP settings will be retained.
  If the unit is in DHCP mode it will need to be detected at each stage using the Net2 Server Config Utility
  as a new address may be issued by the IP server, each time the PCB resets.

3 - Can we use a DHCP IP address?
The Ethernet interface does support DHCP, but for more reliable communication, a static IP address must be reserved for the unit. This is because some servers issue different DHCP addresses each time they are restarted and this requires the Net2 interface to be manually set up again - a time consuming process.

4 - TCP/IP - Direct PC connection.
Connect the network interface directly to the LAN port of the PC. Without the presence of a DHCP server the unit will default to an IP address in the range 169.254.X.X.

Check the IP address of the network card of your PC by typing IPCONFIG at the command prompt. Detect the TCP/IP interface with the Net2 Server Configuration Utility and change the IP address to an address similar to that of your machine. For example, if the IP address of the PC is 192.168.10.7, change the IP address of the TCP/IP interface to 192.168.10.8. Once the IP address of the interface has been changed into the range of the PC then Net2 will be able to communicate with it.

NOTE: Do not change the IP address of your PC to 169.254.x.x, this will not allow the IP address of the TCP/IP interface to be fixed correctly.

5 - Cannot detect ACU via a TCP/IP interface.
1. The TCP/IP interface must be listed in the Net2 Server Configuration Utility, and responds when PINGed from the utility. A static IP address must be used for the interface.
2. If the interface is responding, try a loopback test. (see Loopback section)
3. The Net2 data line should be checked for resistance readings.

6 - Readers/Keypads not working.
- Software settings - Confirm that the settings of the reader or keypad are correct.
- Connections - Check the wiring and integrity of the connectors. - If possible, test this reader on the other port.
- Cable - Belden 9540 should be used to extend the reader cable (100 m maximum). Twisted pair alarm cable should not be used. To confirm that a cable extension is not at fault, wire the reader direct into the reader port.
- Supply voltage - Confirm that the voltage is within specification. (see table)
- User token - Confirm that the user token used for testing is OK by presenting it to a known working reader.
- Interference - Confirm whether the reader works when tested 'in hand' and not mounted on the wall. Ensure that readers are not mounted back to back or there is no interference from other local RF devices.

Here is the list of topics about this product that receive the most technical support enquiries.
We list them here to help you speed up the installation and trouble shooting process.

7 - Fire alarm integration - Net2 Professional software must be used.

A voltage free normally closed contact from the fire alarm system should be wired across an ACU input (Contact/PSU/Tamper/Exit). The doors that are required to open from that trigger are set up in the software for that ACU under the Fire Alarm Tab.

NOTE: The doors are relocked from the PC software - resetting the Fire panel will have no effect on the system. The Net2 Server MUST be running at all times for this method to work.

Fail open locks are required on fire doors. Break glasses should be installed to drop power to the lock manually.

8 - RS485 data line cable layout. (Net2 classic and Net2 plus)

The data line must be wired in a daisy chain. End of Line (120ohm) resistors must be fitted/switched across both pairs at each end of the line.
Repeaters must be used over 1000 metres and can be used to create a branch from the daisy chain. CAT5 or Belden 8723 (4 Core Twisted pair) must be used for the data line. The cable screen must be connected throughout for reliable communication. CAT5 must have spare cores terminated in lieu of screen cable.

9 - Timesheet - Why Time & Attendance must have dedicated readers for logging in/out.

In the vast majority of applications using the same reader for access and T&A is not practical. Traffic through the access points causes long, unmanageable T&A reports. It is therefore NOT possible to set this up in the software. Proximity or Cardlock readers set up as Clocking in or Clocking out readers have no effect on Relay 1 and will not appear in Access levels. Relay 2 will switch for half a second to allow confirmation by fitting an LED or sounder.

10 - TCP/IP communication over a WAN.

We need to establish two-way communications between a PC on site A and the TCP/IP interface on Site B.

The paths that the PC and the TCP/IP interface will use are different, but they each need to know the IP address they are trying to locate on the other site as well as the gateway IP address that will route their requests from their own LAN to the other LAN.

- TCP/IP Interface set up (Site B).

You need to set the IP address for the TCP/IP interface that will define it within it's own LAN. (e.g. 10.10.0.25).

You need to set the gateway IP address of the local 'router', in the TCP/IP interface. This is so that the router will know that any reply from this interface needs to be sent back to the other LAN.

NOTE: All the information required to get back to the sending PC on site A is done automatically by the network hardware; the 'site A' PC includes its own IP address in the outgoing message.

- PC Set up (Site A).

Most LAN addressing is set up such that different groups are reserved for specific remote sites. It is then just a case of setting up the IP address of the TCP/IP interface on site B (10.10.0.25) in the PCs' Net2 Server Configuration Utility; all the outward routing is done automatically by their network hardware.

Port '9999' must be allowed through any firewall software.

TCP/IP and RS485 LED indication

The Net2 plus performs two functions. It is an access control unit and also a TCP/IP RS485 converter. Information can pass across the PCB between the TCP/IP connection and the RS485 data port that is not relevant to this ACU.

- Server Connected LED. (Steady Green)
This LED shows that the TCP/IP interface is active and receiving data from the Net2 PC server. This includes all data for other ACU's that may be linked via the RS485 data port.

- Rx and Tx LED's.
These LED's show the activity for this ACU only. This is same indication as seen on a Net2 classic ACU.
 It is not dependant on the source (TCP/IP or RS485). The Rx LED will flash for all data being received and the Tx LED will only flash when this unit responds to its own address.

Specifications

Features	Min	Max	
Number of Cards		50,000	Net2 v4.16
Number of PIN's		50,000	Net2 v4.16
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		2	
Readers per port		2	
Keypads per port		2	
ACU per data line		200	
Data lines per PC		100	Net2 v4.14
Data retention after total power loss	28 days		
Events stored in ACU with no server connection		2,454	
Communication	Min	Max	
Ethernet network speed	10 Mbit/s	100 Mbit/s	
Ethernet bandwidth requirement		200 kbit/s	
DHCP support (fixed IP recommended)			Yes
RS485 network speed		115.2 kbit/s	
Electrical	Min	Max	
Voltage	11V DC	15V DC	
PCB Current (depending on activity)		200 mA	
Relay switchable voltage		24V DC	
Relay switchable current		4 A	
Alarm output current		1 A	
Combined reader port output current		500 mA	
Environment	Min	Max	
Operating temperature - Battery limits	0 °C	+ 55 °C	
Waterproof	NO - If used externally, it must be protected in a plastic weatherproof housing		
Dimensions	Width	Height	Depth
Control Unit	116 mm	126 mm	25 mm

CE

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