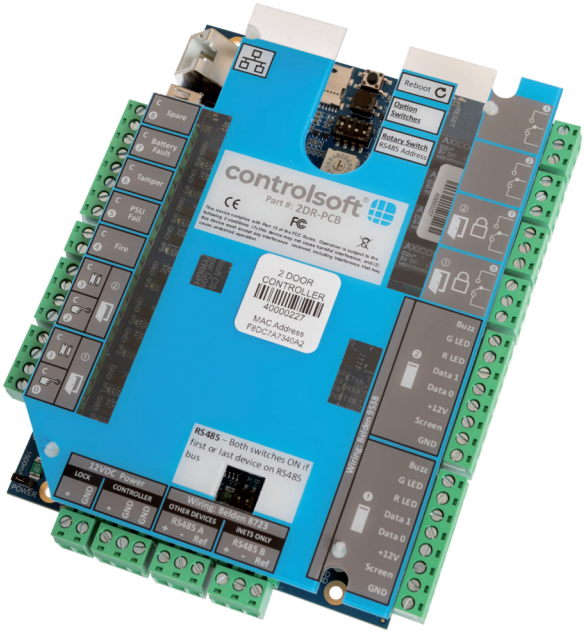
Installation Instructions

Scan for help getting started

iNet™ 2 Door Controller

Access Control Unit

Part Code: US-2DR-PCB



This device is configured for DHCP.

Use the iNet IP Utility to locate this device by its MAC address (e.g. F8DC7A7340A2) and set a fixed IP Address.

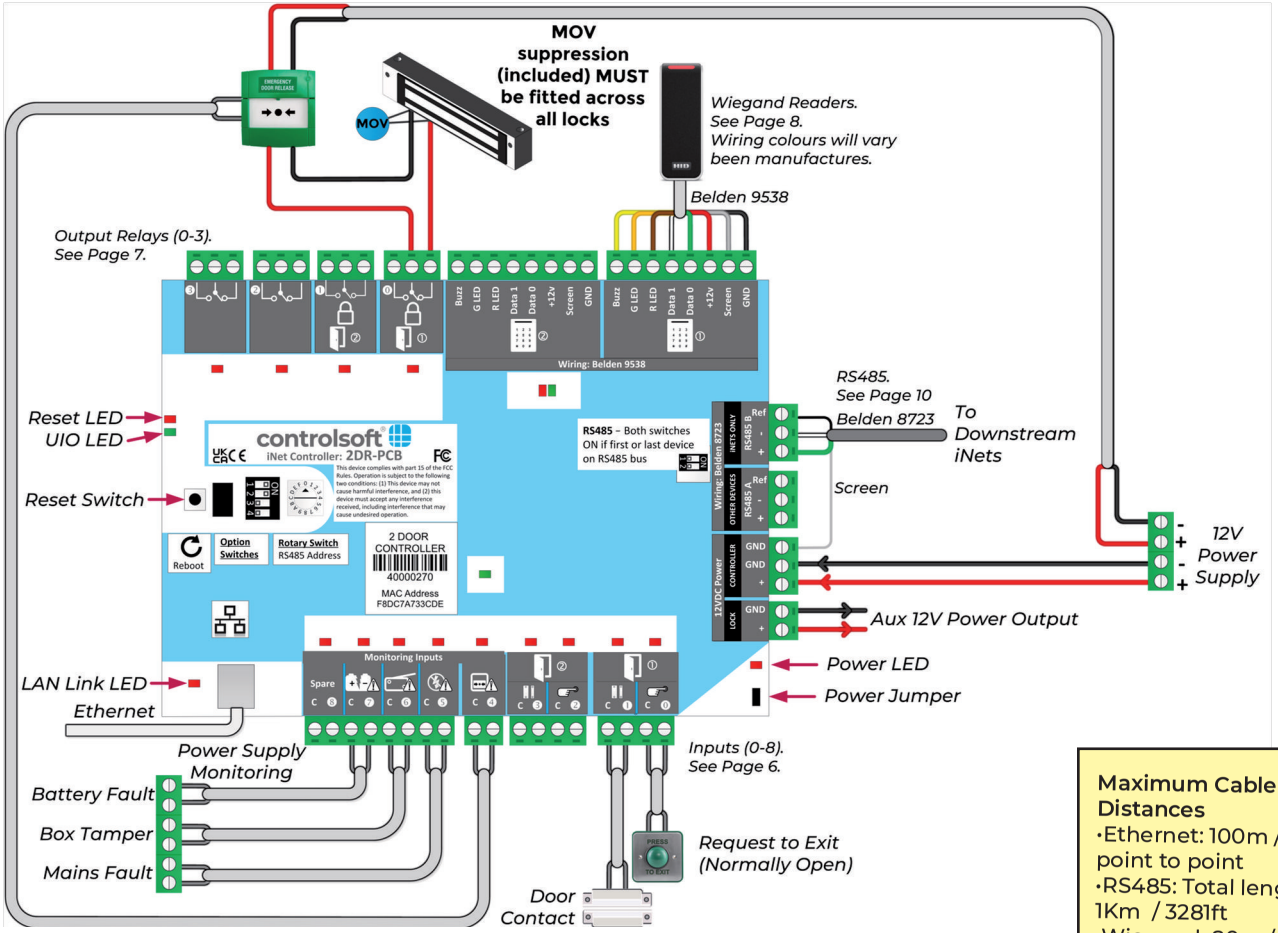
Further information can be found in the Identity Access Express Commissioning Guide, available at https://www.controlsoft.com/IAExpressGuide

Software Downloads available at www.controlsoft.com/login

9010-0078 Iss 1

controlsoft® access control

Important
To prevent back EMF damaging the iNet controller, ALWAYS install a MOV or diode across the coil of every lock



Maximum Cable Distances
- Ethernet: 100m / 328ft point to point
- RS485: Total length 1Km / 3281ft
- Wiegand: 80m / 262ft (25m / 82ft without local PSU)

Contents

Cable Specification....4
Example Configurations....5
Box Layout....6
Step 1: Connect the Inputs....6
Step 2: Connect the Outputs....7
Step 3: Install the Readers....8
Wiring for IDEMIA Biometric Readers....9
OSDP Readers....10
Aperio Wireless Locks....10
Step 4: Connect the RS485 Bus....10
Step 5: Select the Switch Settings....11
Controller Reset....12
Step 6: Connect Power....12
Step 7: Check LED/RS485 Indications....13
Identity Access Configuration....13
IOC Expander / Elevator Control....14
iNet Expansion....14
Upgrading iNet Firmware....15
Frequently Asked Questions....15
Spares Pack....15
Specifications....16
Product Compliance....17
iNet Cover Pictograms....18

Introduction

The iNet 2 Door Controller (2DR) from Controlsoft® provides a single board solution for one or two doors. The 2DR is expandable up to 32 doors through the use of additional 1 Door or 2 Door iNet Controllers.

All versions of iNet controllers are compatible with Controlsoft's Identity Access software which supports up to 12 doors or readers (IA-Lite), up to 64 doors or readers (with IA-PRO license) or unlimited (with IA-ENT license)

The iNet 2DR controller is available as the following variants:
US-2DR-PCB: UL294 Compliant iNet PCB only

Cable Specification

For RS485 connections between iNet controllers we recommend using **Belden 8723** (or equivalent). This is a 2 twisted pair cable (22AWG), with each pair screened. **NEVER** use twisted pair CAT5 or CAT6 cables for RS485 connections.
Note: the RS485 '+' and '–' connections must be run on either side of the same twisted pair (e.g. Green and White), with a separate core (e.g. Black) used for the REF connection.
The **total distance** of the RS485 bus must not exceed **1000m/3281ft**.

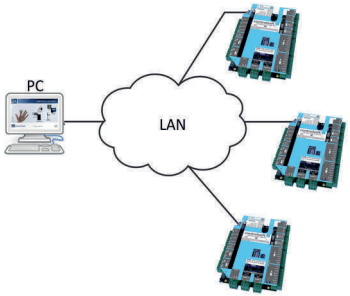
From the **iNet controller to Wiegand readers** we recommend using **Belden 9538** (or equivalent). This is an untwisted 8 core cable (24AWG) with an overall screen. **Do not use twisted pair CAT5 or CAT6 cables to connect readers to the iNet controller.**
The maximum length of the Wiegand reader cable is 80m/262ft but if this distance exceeds 25m/82ft we recommend using a local power supply for the reader.

Between the **iNet Controller and Exit Buttons** we recommend 24 AWG or thicker gauge i.e. alarm cable. We recommend cables with spare cores in case a core breaks. **Do not use CAT5 or CAT6 cables to connect exit buttons.**

Between the iNet Controller and Locks we recommend 18 AWG or thicker gauge cable. We recommend cables with spare cores in case a core breaks.
Do not use CAT5 or CAT6 cables to connect locks.

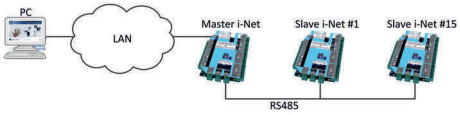
Example Configurations

Networked iNet Controllers
Each iNet 2DR Controller has its own IP connection/address, and controls 1 or 2 doors.
Communication to the PC is over the LAN.



NOTE: The iNet will continue to operate in "offline" mode if the PC is shut down or disconnected. Any non PC related events that subsequently occur are stored in the iNet and are automatically sent to the Identity Access software when the PC is back on-line.

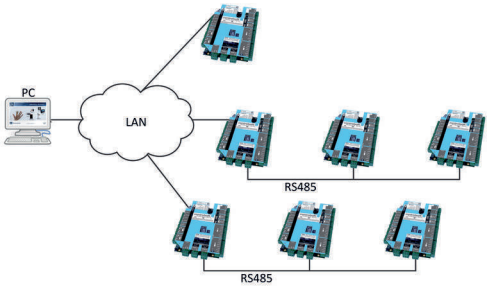
iNet to iNet
The Master iNet Controller is connected to the PC via TCP/IP. Additional downstream iNet Controllers are daisy-chained on the RS485 Port B data line, up to a maximum of 15.



Downstream iNets have fully distributed intelligence, so they continue to operate even if the RS485 data line is broken. When the RS485 data line is restored, the downstream iNets transfer events to the Master iNet which forwards them to the Identity Access software.

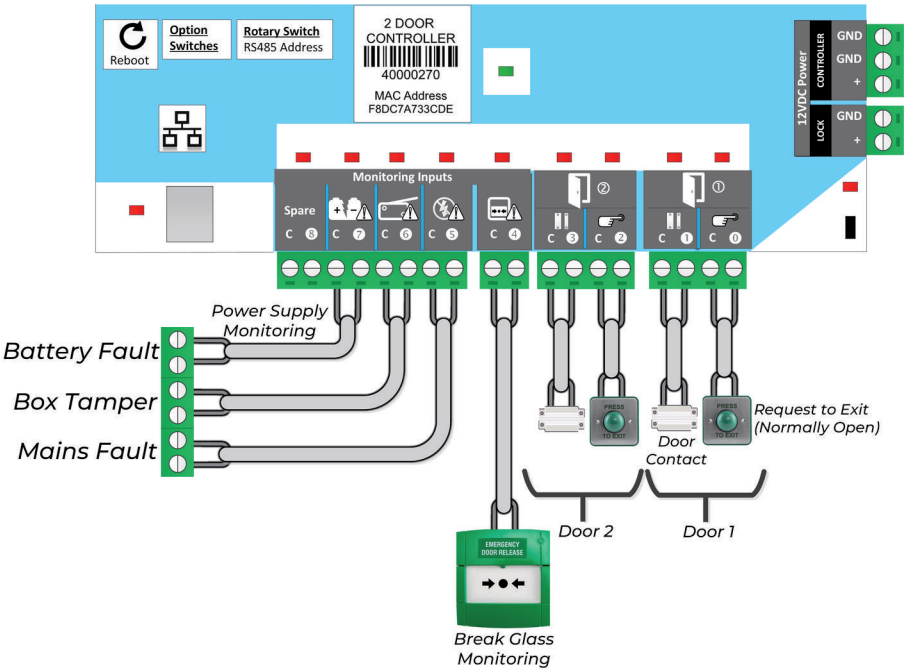
The RS485 bus must be wired in a daisy-chain topology as shown above and not a STAR topology. **NEVER** wire additional iNet Controllers on a 'spur' to create a third end.

For maximum flexibility, the system can be wired as a combination of the above techniques.



Step 1: Connect the Inputs

All inputs are fully programmable however the default function of each input is indicated on the iNet cover (for example, Input 0 = Request to Exit for Door 1). Using these defaults will make system configuration in the Identity Access software quicker by using the Door Wizard. Inputs must be voltage free clean contacts.



7 Connecting the Outputs

Step 2: Connect the Outputs

The default function of each output is indicated on the iNet cover (for example, Output 0 = Lock for door 1). Using these defaults will make system configuration quicker in Identity Access by using the Door Wizard.

All outputs are fully programmable so any maglock, strikelock etc. can be connected to any output.

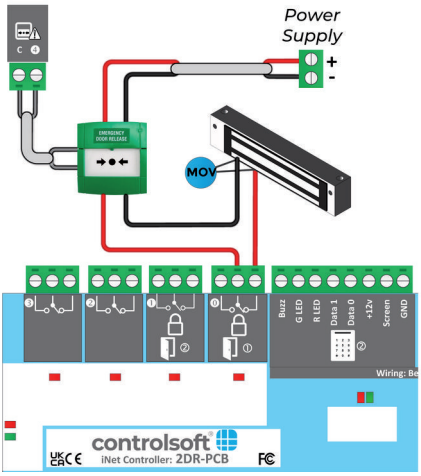
Important

To prevent back electromotive force (back EMF) damaging the iNet controller, **ALWAYS** install a MOV (supplied) across the coil of every lock.

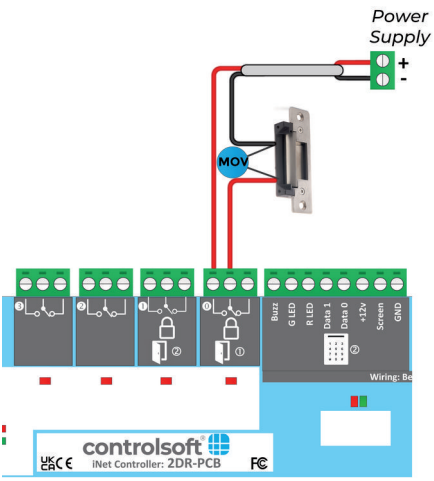
Breakglass

To ensure a reliable method of egress in the event of an emergency, a “breakglass” should be fitted in conjunction with a fail open lock. The breakglass disconnects the 12V supply to the lock to remove power when activated.

The diagram below shows how to wire a **triple pole breakglass**. If monitoring is not required a **double pole breakglass** may be used.

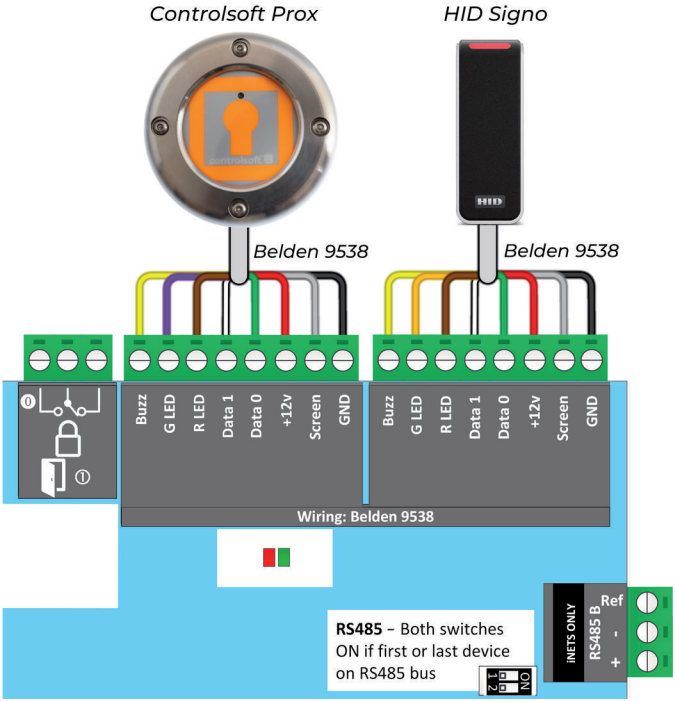


Fail Open (Maglock)



Fail Closed (Strikelock)

Step 3: Install the Readers



The iNet controller supports the industry standard Wiegand protocol. Wiegand readers should be wired in Belden 9538 or equivilant cabling.

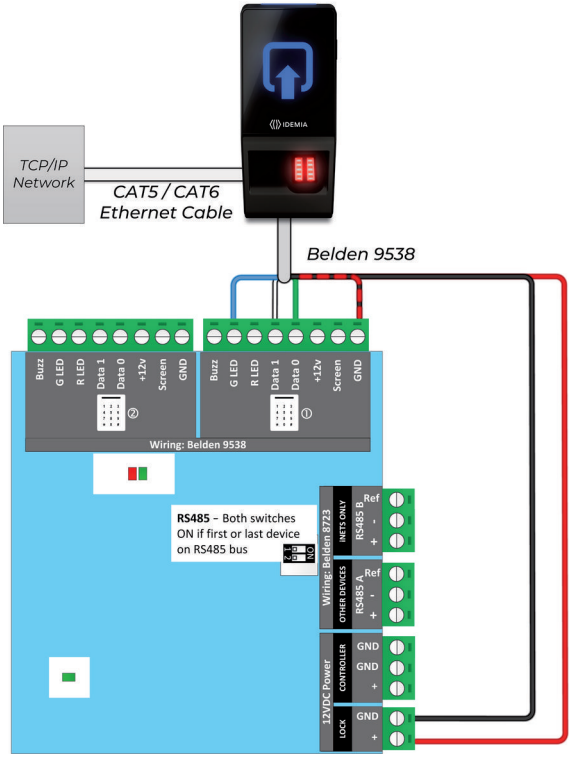
The maximum length of the Wiegand reader cable is 80m/262ft but if this distance exceeds 25m/82ft we recommend using a local power supply to the reader.

Compatible Wiegand Readers include:
HID readers (including Prox, iClass SE, Multiclass SE and Signo Range)
Idemia Biometric readers (Sigma Wide, Sigma Lite, Sigma Lite Plus, Sigma Extreme, MorphoWave Compact, VisionPass)
UL294 compliant readers must be used to maintain UL294 compliance

The iNet 2DR is also compatible with RS485 readers, these are connected via RS485 **Port A**:
HID Signo 20, 20K, 40 and 40K (OSDP V1)

9 Wiring for IDEMIA Biometric Readers

Wiring for IDEMIA Biometric Readers



SIGMA Lite, SIGMA Lite Plus, SIGMA, SIGMA Extreme Readers, MorphoWave Compact and VisionPass

iNet	IDEMIA	Colour
Wiegand GND	Wiegand_Gnd	RED/BLACK
Data 0	Wiegand_Out0	GREEN
Data 1	Wiegand_Out1	WHITE
Green LED	Wiegand_LEDOUT1	BLUE
GND	Power GND	BLACK (Optional*)
+12v	Power +12v	RED (Optional*)

* Sigma Series readers can be powered from a +12v source, the iNet's "LOCK/AUX" connector OR can be powered via PoE.
Never power Sigma readers from the iNet's reader port as it cannot supply the required current.

Always use BELDEN 9538 or equivalent cable between the Sigma Series reader and the controller. A network connection is required to the reader for biometric templates to be downloaded to the device.
For more information on Idemia readers within Identity Access see Knowledge Base Article 186.
https://controlsoft1.zohodesk.com/portal/en/kb/articles/ia-9-idemia-readers

OSDP Readers

OSDP (Open Supervised Device Protocol) Readers communicate with the iNet controller over RS485 Port A and are used to replace the on-board Wiegand readers for a more flexible connection. The iNet 2DR supports up to 8 OSDP readers. For further information on using OSDP readers, please refer to Knowledge Base Article 176, available at
https://controlsoft1.zohodesk.com/portal/en/kb/articles/ia9-osdp-guide
Note: If using OSDP readers with an iNet controller, downstream controllers cannot be connected.

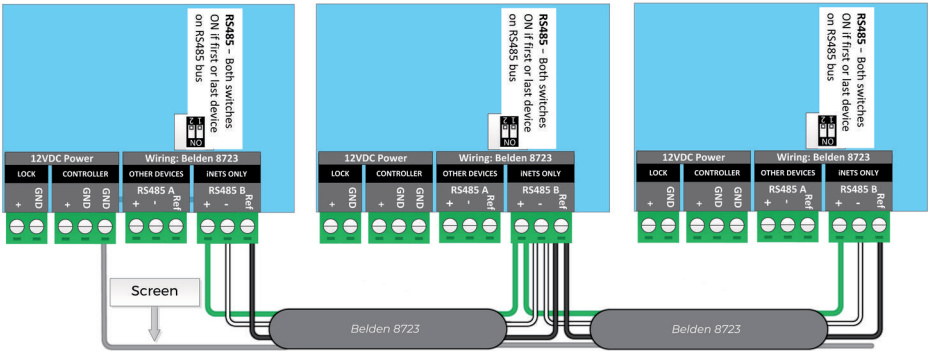
Aperio Wireless Locks

Aperio locks can be used to replace existing handles and cylinders to integrate them into the Access Control system. This can provide a quick and efficient way to upgrade door handles or cylinders with mechanical locks.
AH30 Wireless hubs are connected to the the iNet controller using the RS485 Port A. Each Hub can be paired with up to 8 wireless locks using the Assa Abloy Programming Application (PAP), up to a maximum of 32 locks per controller. For further information on using Aperio Locks, please refer to Knowledge Base Article 196, available at
https://controlsoft1.zohodesk.com/portal/en/kb/articles/ia-9-aperio
Note: If using Aperio AH30 RS485 Hub with an iNet controller, downstream controllers cannot be connected.

Step 4: Connect the RS485 Bus

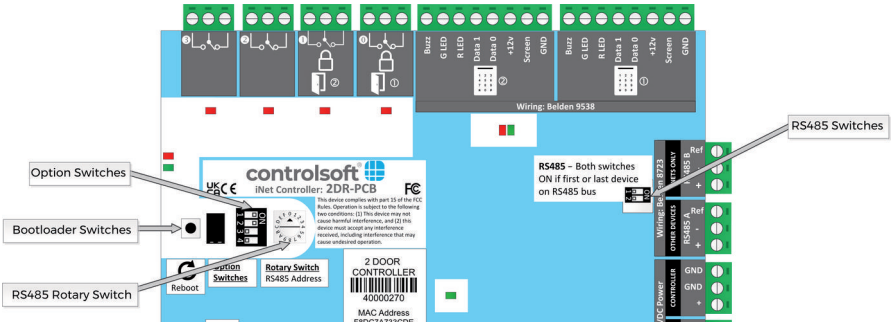
The RS485 bus **must** be wired with Belden 8723 or equivalent twisted pair screened cable.

The RS485 '+' and '–' must be on the same pair (example Green & White). The 'Ref' connection can use either of the other pair (usually Black). The cable screen **must** be connected to the GND terminal (0V) at the Master Controller ONLY, as shown.



11 Switch Settings

Step 5: Select the Switch Settings



Option Switches	
Switch 1 ON	**enables** wiegand readers
OFF	**disables** wiegand readers
Switch 2 ON	to use **Downstream iNets**
OFF	to use **Other Devices**
Switch 3	No Function
Switch 4	Selects the Reset Mode (see Controller Reset on Page 12)
	Wiegand Readers Enabled RS485 Downstream iNet (Port B) Enabled
	Wiegand Readers Enabled RS485 Other Devices (Port A) Enabled

Bootloader Switches
Switch 1 OFF Switch 2 ON  **DO NOT CHANGE** Changing these switches will prevent the iNet from working.

RS485 Switches	
	iNet controller **is NOT** at the end of the bus
	iNet controller **is** at the end of the bus
Only terminate the RS485 line if it exceeds 100m / 328 ft, to terminate ensure that DIP switches 1 & 2 on the first and last iNet are in the **ON** position. By default these are **OFF.**	

Continued on next page

RS485 Rotary Switch Settings

Each device on the RS485 bus must be assigned with an individual bus address. The table below shows how the rotary switch position relates to the RS485 address:

Rotary Value	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
485 Address	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Master		Downstream iNets														

Any iNet connected to the LAN is a Master iNet, and must be given address 0. Downstream iNets must be given addresses 1 to 15 (1 to F).

Controller Reset

RESET Button: Press and release to reboot controller



With Option Switch 4 in the off position. Press and hold until Reset LED lights once (approx 7 seconds) to change default IP Address to 10.0.1.230 and reset the controllers password.



With Option Switch 4 in the on position. Press and hold until Reset LED lights once (approx 7 seconds) to change default IP Address to DHCP and reset the controllers password.

Real Time Clock Backup Battery

The real time clock is backed up by a lithium battery when input power is removed. This battery should be replaced every 5 years.

Battery type: CR2032 UL1642 certified.

Step 6: Connect Power

Connect mains power to the PSU before connecting the controller terminal blocks. Connect the power supply to the +12V and GND terminals on the iNet Controller.

The power supply must provide a voltage greater than 10.5Vdc on full load and less than 15.0Vdc on no load.

It is strongly recommended that a standby battery is connected to the power supply capable of supporting the system when the mains supply is off.

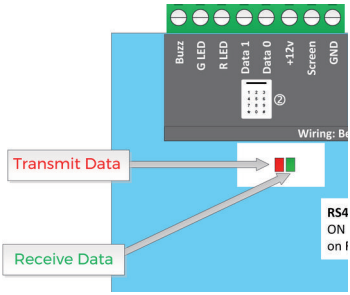
13 Check LED Indications / Identity Access Configuration

Step 7: Check LED/RS485 Indications

LED	Colour	Function
Power	Solid Red Off	The 12v supply is OK No 12v supply present
Relays	Solid Red Off	Relay is energised Relay is de-energised
Inputs	Solid Red Off	Contacts connected to input are shorted Contacts connected to input are open circuit
RS485	Flashing Red Flashing Green Off	The iNet controller is transmitting RS485 data The iNet controller is receiving RS485 data No data on the RS485 bus
LAN port	Solid Red Off	The iNet controller is connected to the LAN the iNet controller is not connected to the LAN
UIO	Flashing Green Off	The internal software is running The internal software has stopped
Module	Flashing Green Off	The processor board is running The processor board has stopped

When the iNet is transmitting data on the RS485 bus, the red LED below the reader connections flash.

When the iNet is receiving data, the green LED will flash.



Identity Access Configuration

For information on how to program your hardware within Controlsoft Identity Access, see the Identity Access Express Commissioning Guide available at:
https://www.controlsoft.com/IAExpressGuide

IOC Expander / Elevator Control

The IOC Input/Output Expander provides 8 inputs and 8 outputs to further enhance the flexibility of the system. This expander board is particularly useful for the Elevator Control function.

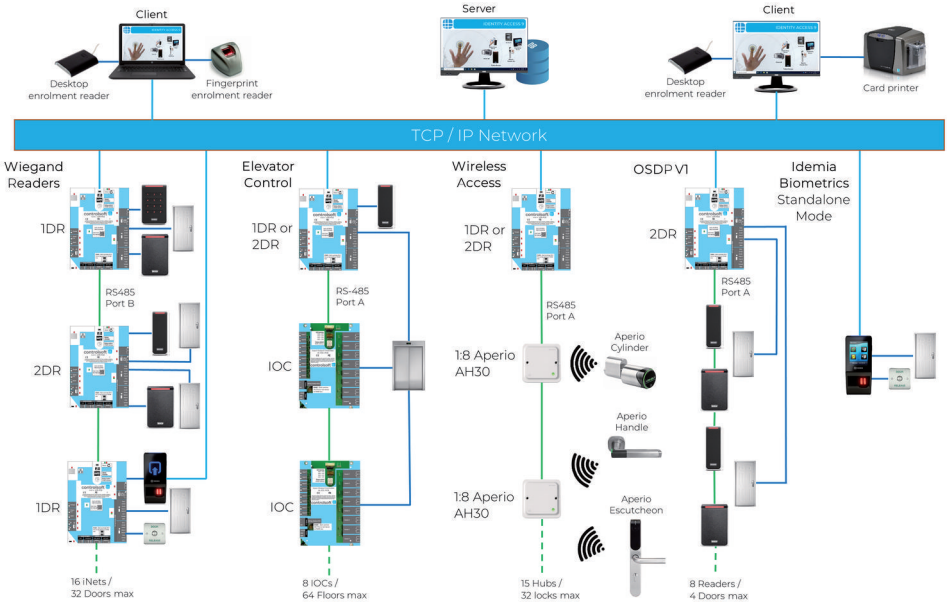
The IOC Expanders are connected to the iNet controller using the RS485 Port A and provide the outputs necessary to control the elevator buttons. Identity Access software supports elevator control for up to 64 floors.

For further information on elevator control, please refer to the Identity Access Knowledge Base Article 202, available at https://controlsoft1.zohodesk.com/portal/en/kb/articles/ia9-elevator-control

NOTE: When an IOC Expander is connected, it is not possible to use downstream iNets or OSDP/Aperio Devices on the same Master iNet Controller.

For further information on the IOC Expander, please refer to the IOC Expander Installation Instructions. supplied with the product.

iNet Expansion



15 Firmware Upgrade / Frequently Asked Questions

Firmware Upgrade

It is recommended to always use the latest version of firmware and to regularly update the controllers firmware.

NOTE: When connecting an iNet Controller to an RS485 bus, all controllers should have the same firmware version. Failure to achieve this may cause operational issues. RS485 Downstream devices can only be upgraded locally.

Details on how to locate the firmware version and how upgrade the iNet Firmware can be found on Knowledge Base Article 217:
https://controlsoft1.zohodesk.com/portal/en/kb/articles/updating-1dr-pcb-or-2dr-pcb-inet-controllers

Frequently Asked Questions

Why are my RS485 devices not polling?	• Ensure that the Master iNet Controller is connected to downstream iNet Controllers using 'RS485 Port B' OR to I/O Expanders/OSDP/Aperio Devices using 'RS485 Port A' • Ensure that the 4 way DIP switch is set correctly. • Ensure that each device has a unique address on the bus, where address 0 is reserved for the Master iNet Controller and addresses 1 to 15 are used for downstream devices.
How do I reset the IP address and password of the iNet controller?	There is a reset button close to the rotary switch, press until the RESET LED lights (approx 7 seconds), then release. The iNet then reboots twice and changes its IP address changes to **10.0.1.230**. The password can be set in the controllers webpage or using the iNet IP Utility.
When the door unlocks the iNet controller becomes unresponsive	When the Lock changes state, it can generate back EMF, which can damage the iNet controller. Make sure that every lock is fitted with a supplied MOV, connected across the coil in the lock. **NOTE: Not fitting a MOV will reduce the operational life of the relays, and will invalidate products warranty.**

Further information is available from our FAQs at
https://desk.zoho.com/portal/controlsoft1/en/kb/controlsoft/faq

Spares Pack

US-2DR-PCB is supplied with a spares pack containing 4 x MOVs

Specifications

The 2DR (all variants) is for use in low voltage, class 2 circuits only

Electrical	
Input voltage	10.5Vdc to 15.0Vdc
Current (no load)	120mA
Relay contacts voltage rating	30Vdc
Relay contacts current rating	2A
Current available per reader port	500mA
Reader port voltage	10.5Vdc to 15.0Vdc
Environment	
Operating temperature	0°C to 55°C
Humidity	Up to 85% RH
Moisture Resistance	Low (Indoor Use Only)
Communication	
Ethernet network speed	10 / 100 Mbps
Ethernet bandwidth requirement	200 Kbps
Ethernet encryption	AES-256 Bit
DHCP support	Yes (fixed IP recommended)
RS485 network speed	9600 Baud (Port A) 115,200 Baud (Port B)
Features	
Maximum Number of Cardholders	200,000
Maximum Number of Time Zones	63
Maximum door open time	1800 sec
Doors per iNet 2DR	1 or 2
Wiegand Readers per iNet 2DR	2
iNet Devices per RS485 bus	Master plus 15 Downstream
OSDP Readers per iNet 2DR	8
Assa Abloy AH30 Wireless Hubs per iNet 2DR	8
Doors per iNet 2DR using Aperio Locks	32
Events stored in iNet with server disconnected	250,000
Dimensions	
US-2DR-PCB	175 x 135 x 25 mm 6.9 x 5.4 x 1 inches
Performance Levels	
Destructive Attack - Level I | Line Security - Level I | Endurance - Level IV | Stand by Power - Level I	

17 Product Compliance

Product Compliance & Limitations

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

US-2DR-PCB: Power must be provided via a separate UL Listed DC supply, Power-Limited, power source capable of providing standby power. This is to be wired into the “GND” and “+” 12DC Power terminals.

The controller must be mounted in a UL listed enclosure.

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 (Remote door release etc.) have not been evaluated by UL and cannot be used for UL294 installations.
The US-2DR-PCB Does not have remote access features.

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 button must be used.
Door contact- A UL listed contact must be used.
Break glass- A UL listed break glass must be used.
Fire door interface- This feature has not been evaluated by ‘UL’ and must not be used in UL294 installations.
NOTE: This product has been evaluated by UL for Access Control use only.

FCC Compliance
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Controlsoft is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user’s authority to operate the equipment.
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.
To request a printed copy of this manual, please contact support@controlsoft.com

iNet Cover Pictograms

Reset Switch
Press to reboot. Hold approx 7 seconds until Reset LED pulses to reset IP address to 10.0.1.230 and password



Network Port
Connection to LAN



Spare / AUX 2
Input for general use



Batt Fault
Connect to PSU Battery fault output



Tamper
Connect to housing tamper switch



PSU Fail
Connect to PSU Mains Fail output



Breakglass Monitoring/AUX 1
Connect to Breakglass, OR for general use if not required



Inputs for Door 2
Door Contact = 'C' and input 3
Request to Exit = 'C' and input 2



Inputs for Door 1
Door Contact = 'C' and input 1
Request to Exit = 'C' and input 0



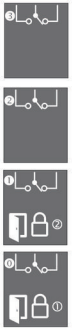
Input for power from power supply
Use to connect +12v & 0v from PSU
Use third connection for RS485 screen

Output for power to Lock
Use to supply 12v to the Lock



Option Switches
Dip Switches
Use to configure RS485 bus configuration

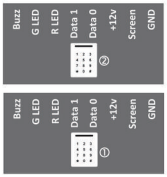
Rotary Switch
RS485 Address
Rotary Switch
Used to define the RS485 address



Relay outputs 2 and 3
Normally closed, common and normally open contacts for general use (e.g. Door Alarms)

Relay output 1 for Door 2
Normally closed, common and normally open contacts

Relay output 0 for Door 1
Normally closed, common and normally open contacts



Wiegand Readers
Readers for doors 1 and 2



RS485 Ports
Port B is for connection between iNet controllers
Port A is for any other RS485 compatible devices.

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+27 (0)10 595 1266
+1-800-340-1407

support@controlsoft.com

www.controlsoft.com

controlsoft®
access control

Information on all our products can be found on our website www.controlsoft.com

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