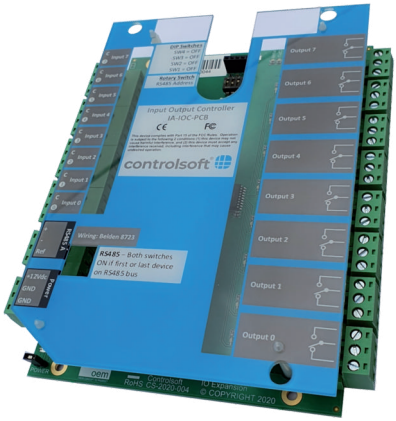
Part Codes: IOC-ACU
IOC-PCB
IOC-POE

## Introduction

The IOC Input/Output (I/O) Expansion Board is used to provide 8 additional programmable inputs and 8 additional programmable outputs to a Controlsoft iNet 1DR or 2DR installation. Each output provides voltage free changeover contacts rated at 3 Amps for maximum flexibility. Three variants of the product are available, IOC-ACU (in metal box with 2 Amp power supply), the IOC-PCB (PCB only) and the IOC-POE (in metal box with 3 Amp POE power supply)
The I/O Expansion Board PCB is shown below:




## Cable Specifications:

For RS485 connections we recommend using Belden 8723 or equivalent. This consists of 2 twisted pair cores within the cable, each pair screened to reduce interference and electrical noise. Do NOT use screened CAT5 / CAT5e / CAT6 .

**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 Reference connection.
The total distance of an RS485 network must not exceed 1Km (1000m) from end to end.

For wiring between the I/O Expansion Board and devices such as Request to Exit (REX) Buttons we recommend a 22 AWG or thicker gauge alarm cable.
To connect to locks, we recommend 18AWG or thicker gauge cable.

We recommend using cables with spare cores in case a core breaks or is damaged. Do not use CAT5 / CAT5e / CAT6 cables to connect locks or exit buttons.

# 2 Mount the Expander

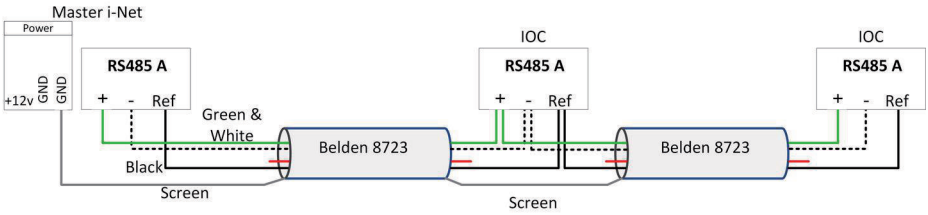
## Step 1: Mount the Expander

**Metal Boxed versions:** Use the metal box as a template and mark the wall. Drill the wall and plug if necessary, then screw the housing to the wall.

**PCB Version:** Fit the PCB in a suitable housing using the four self-adhesive feet supplied.

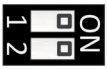
## Step 2: Connect the RS485 Bus

The RS485 bus must be wired with a twisted pair screened cable. Please refer to the cable specifications on page 1.
The RS485 '+' and '–' must be on the same twisted pair (e.g. Green & White). A correctly wired RS485 data line is shown in the diagram below.

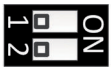



If the I/O Expansion Board is at the end of the RS485 bus, then the 2-way DIP switches **must** both be ON to ensure that the network is correctly terminated.

At either end of bus




In middle of bus




**Important!**

- The RS485 bus must not exceed 1Km end to end and must be terminated at each end.
- Do not spur/star off the RS485 bus to create a 3rd leg.
- Use Belden 8723 or equivalent.
- RS485 cable MUST consist of twisted pairs (e.g. Green and White).

## Step 3: Set the RS485 Address

Each device on the RS485 network must be assigned with an individual address unique to that network. The RS485 bus supports up to 16 devices, so the I/O Expansion Board has a rotary switch to set the address

| Rotary Switch | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bus Address | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |

**Important!**

- On an iNet based system, do **not** use address 0 for an I/O Expansion Board.
- Always keep a record of the location and address for each device to avoid duplication and confusion.
- For further information on RS485 Bus Addressing, please refer to the iNet Installation Instructions.
- The 4-way DIP Switch above the rotary switch MUST be configured so that all switches are OFF

## Step 4: Connect the Inputs

All 8 inputs on the I/O Expansion Board are fully programmable so any door contact, alarm signal, REX etc. can be connected to any of the 8 inputs. The function of each input is programmed via the Controlsoft Identity Access Lite, Professional or Enterprise software (please refer to the Identity Access Software Manual).

Inputs are connected to terminal blocks along the left-hand edge of the PCB. Each input has a red status LED to the right of the terminal blocks. This LED illuminates when the input is shorted.

## Step 5: Connect the Outputs

All 8 outputs on the I/O Expansion Board are fully programmable so any magnetic lock, door strike etc. can be connected to any output. The function of each output is programmed via the Identity Access Lite, Professional or Enterprise software (please refer to the Identity Access Software Manual)

Each output provides voltage free change-over contacts rated at 3 Amps.

A green status LED is provided to the left of each relay to indicate whether the output is activated (LED ON) or deactivated (LED OFF).

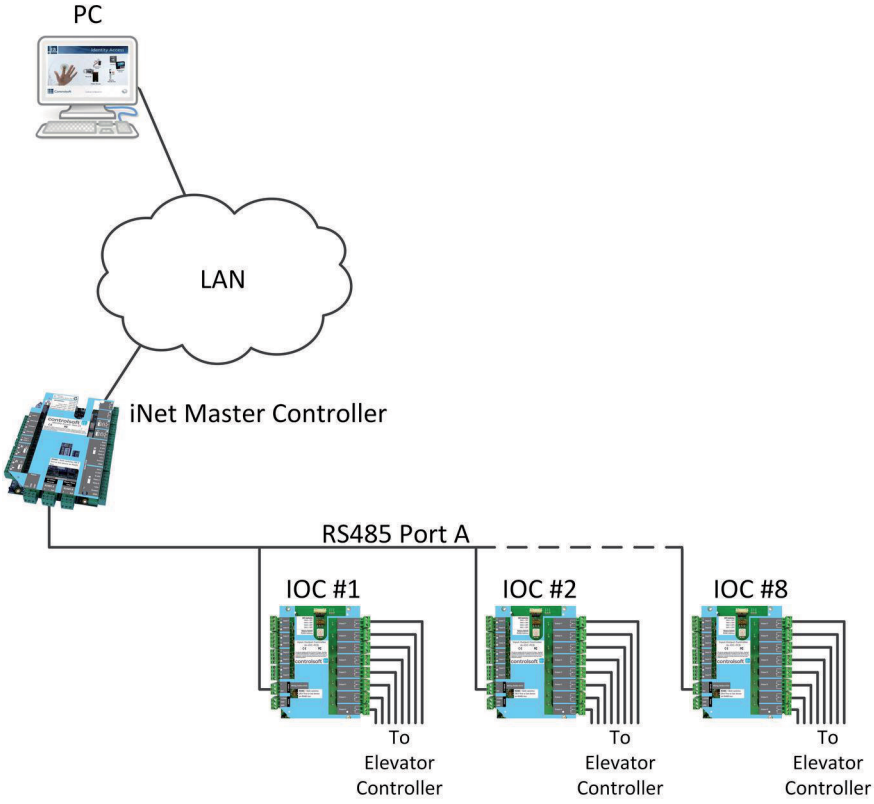
# 4 Configuring Elevators

One of the more common requirements for the IOC expander is to interface with elevators. This requires one relay output per floor, which are connected to inputs on the Elevator Controller.

The IOC Expanders are connected to a Master iNet controller using RS485 Port A and provide the outputs necessary to control the elevator buttons. Identity Access software supports elevator control for up to 64 floors, using up to 8 IOC expanders.

For further information on programming the elevator control function, please refer to the Identity Access Software Manual (Document No: 9010-0053).

**NOTE:** When a Master iNet is connected to one or more IOC I/O Expanders, it is not possible to use a downstream iNet on the same channel at the same time.



## Step 6: Connect the Power Supply

The I/O Expansion Board requires 12v power to operate. The PCB requires approximately 20mA when no relays are active, plus approximately 20mA per output.

Wire the power supply to terminal block marked '12V' and 'GND'.
A second GND terminal is provided for convenience.

LEDs:

**Power LED:** This will light when power is supplied. If the Power LED is off, check the power supply for correct operation, and check that all connections are correct.

**CPU LED:** This will flash rapidly during normal operation. If the CPU LED is permanently on or off there may be power problems or damaged circuitry.

**HOST LED:** This will flicker when the I/O Expansion Board is successfully communicating with the Master iNet via the RS485 bus.

**Important!**

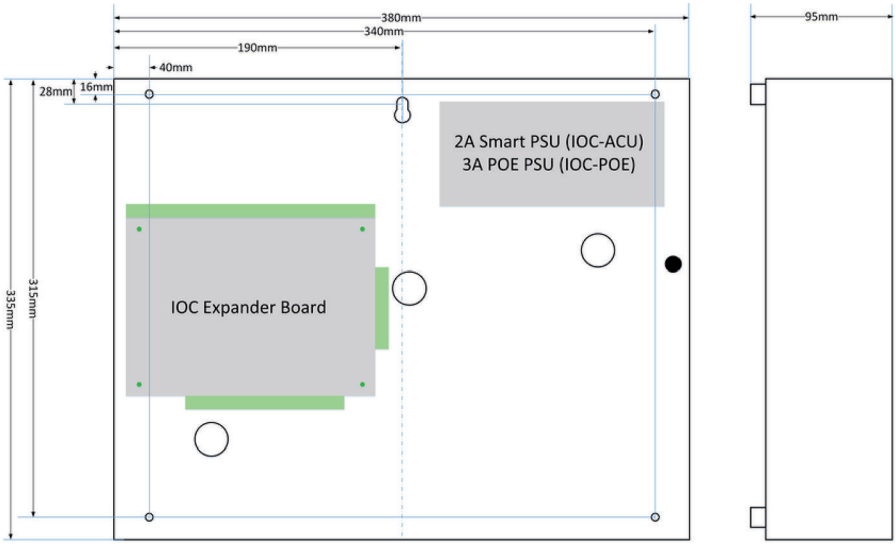
- The power supply MUST be earthed.
- The power supply must be able to deliver power for all devices connected to the I/O Expansion Board. Although the current required by the I/O Expansion Board is low, this will increase as different load devices are activated. The power supply must be capable of delivering worst case power requirements. Always allow some contingency when calculating the size of power supply required.

# 6 Fault Finding

| Fault | Possible Cause | Check |
|---|---|---|
| Power LED OFF | Power terminal block or Jumper marked POWER removed: | Check terminal block and jumper are fitted. |
| | Insufficient power: | Check Power Supply rating, measure voltage and current using a multi-meter. |
| | Cable fault: | Check cable for breaks or use a temporary cable. |
| HOST LED OFF | iNet is powered off: | Check iNet is powered on. |
| | RS485 cable is not connected to iNet: | Connect RS485 to RS485 Port A on the Master iNet. |
| | Cable is damaged: | Check cable using cable tester. |
| | Termination is set incorrectly: | Ensure it is correctly set on ALL RS485 Devices. |
| | RS485 cable is connected to incorrect RS485 port on the iNet: | Make sure RS485 is connected to RS485 Port A on the Master iNet |
| | REF is not connected to GND at the Master iNet: | Connect REF wire to GND at the Master iNet only to give a GND reference. |
| | RS485 Network is in a STAR topology: | Ensure the RS485 Network is NOT a STAR and is a BUS Topology. |
| CPU LED OFF | Power terminal block or Jumper marked POWER removed: | Check terminal block and jumper are fitted. |
| | Insufficient power: | Check Power Supply rating, measure voltage and current using a multi-meter. |
| | Cable fault: | Check cable for breaks or use a temporary cable. |
| IOC turns off when relay switches | No MOV installed: | Remove Lock from relay and test again, if IOC is OK, then install MOV and retest. |
| CPU LED Flashing | Normal Operation: | Normal Operation. |
| HOST LED Flashing | Normal Operation: | Normal Operation. |

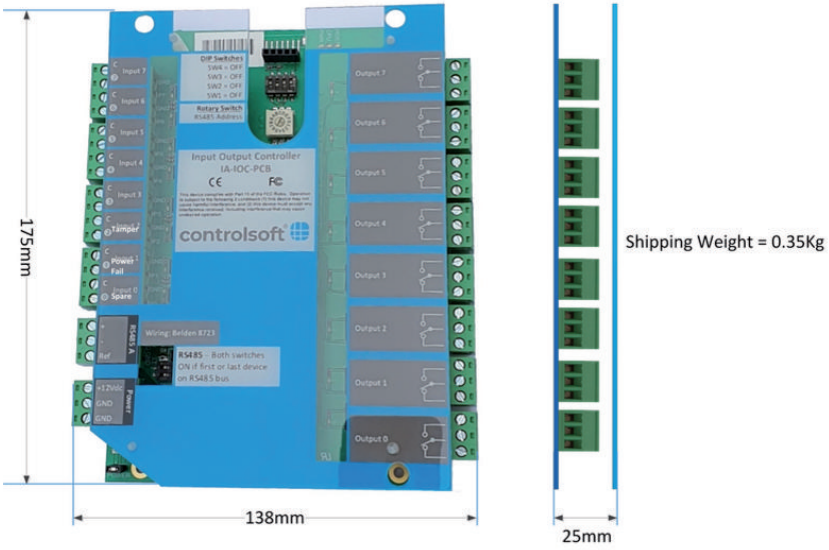
**Please refer to the iNet Installation Instructions when installing any devices on the RS485 bus.**

## IOC-ACU and IOC-POE

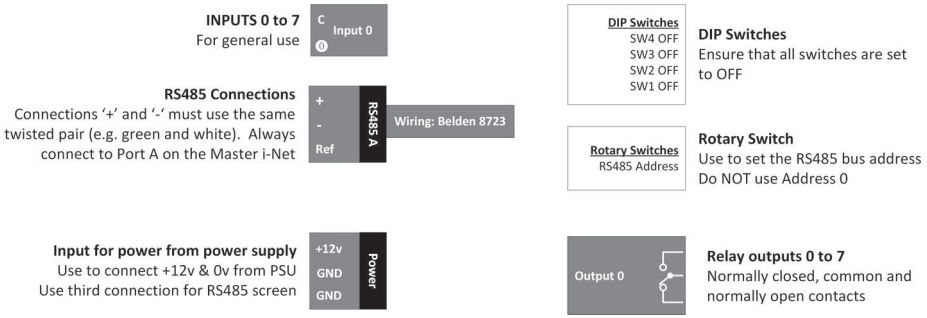



Shipping Weight = 3.6Kg

## IOC-PCB



# I/O Expander Cover Pictograms




**Caution:**
The "crossed out wheeled bin" logo on Controlsoft products indicates that this product should not be disposed of via the normal household waste stream.
To prevent possible harm to the environment or human health, please separate this product from other waste streams. For further information, contact your local government office or the retailer where you purchased product.
This information only applies to customers in European Union.
For other countries, please contact your local government to investigate the possibility of recycling your product.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This product is not suitable for retail sale.
All warranties are invalid if this product is not installed by a trained technician.