

# 1 Contactless Smartcard Reader Setup

This document covers the wiring and physical setup of the contactless (proximity) card (and tag) readers supported by gymmaster.

There are two basic configurations Desktop and Remote

Desktop is by far the simpler, the reader is connected to the PC serial port and draws it power from a USB socket.

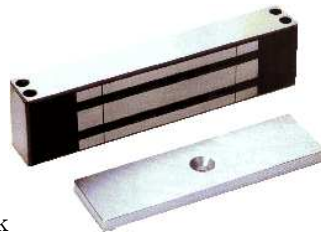
Remote involves a long cable and a separate power-supply for the reader this allows the reader to be positioned next to a doorway for example, it also provides for the reader to participate directly in access control by triggering an electric strike, latch, magnetic lock, turnstile, or sliding door to open..

## Choosing the Right Lock.

To use the reader for access control the door (or gate, turnstile etc) must be fitted with an electrically operable lock.

There are several types of electric which can be used some examples are shown below.

We suggest that you contact the person you would contact for maintenance on your door or a locksmith to assist in choosing and to fit your lock.



- Magnetic Lock

MAGNETIC LOCKS (or maglocks) are powerful electromagnets that hold the door closed using a very strong magnetic force (typically equivalent to the weight of several hundred kilograms). When the electric current is interrupted the magnetic force stops and the door can be opened. MAGNETIC LOCKS are suited to doors that open in one direction only. Controls for ordinary and emergency egress will need to be fitted inside the door.



- Electric Strike

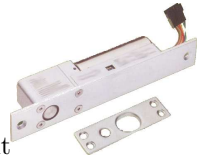
An ELECTRIC STRIKE is suitable for single doors that open with an ordinary latch handle, the outside handle should be lockable and the inside

handle should open the latch while the outside handle is locked, the ELECTRIC STRIKE is fitted to the frame of the doorway. When it receives a signal it lets go of the latch allowing the door to open.



- Electric Lockset

In operation an ELECTRIC LOCKSET is much like the electric strike, it allows unrestricted egress while only allowing entrance when triggered by an electric signal. The difference is that it is fitted into the door itself.



- Electric Bolt

This device is an electrically operated bolt lock, it is best suited to doors that swing both directions. As with the magnetic lock egress controls will be needed to let people out.

- Egress Buttons

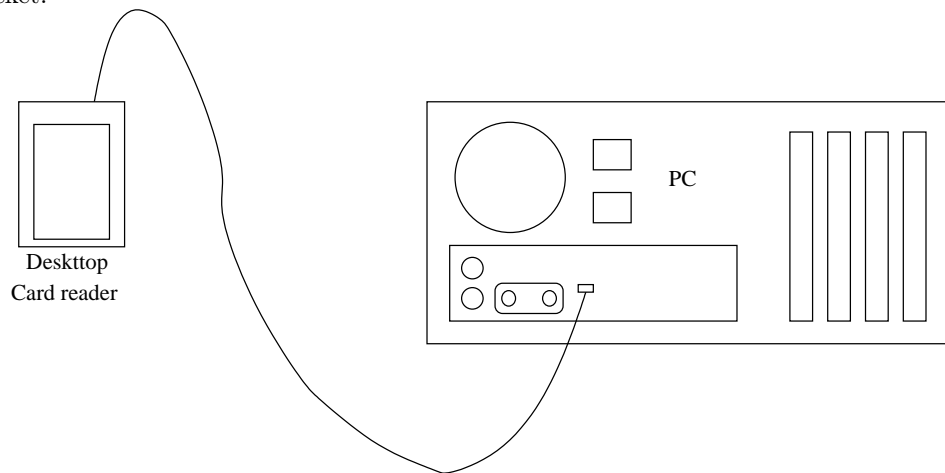
These controls are used to unlock doors from the inside

## 2 Desktop Reader:

Desktop card readers are suitable for issuing cards and identifying members at a computer terminal.

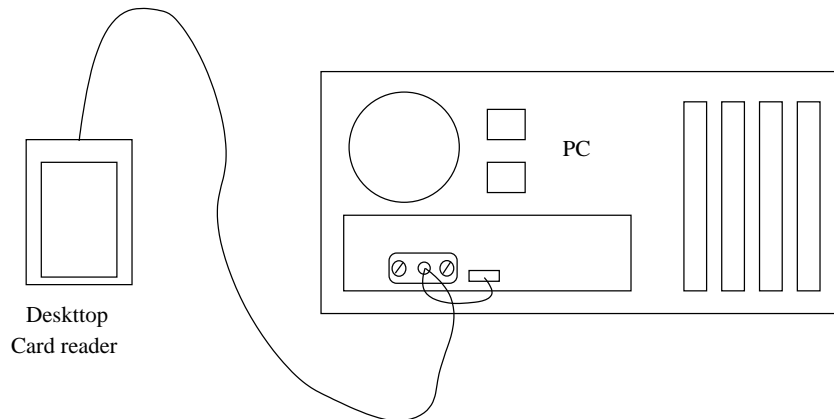
### Desktop reader.

The desktop reader has a two-colour LED indicator light and sounds a tone and indicates with the light when it recognises a card (or tag). It connects to a USB socket.



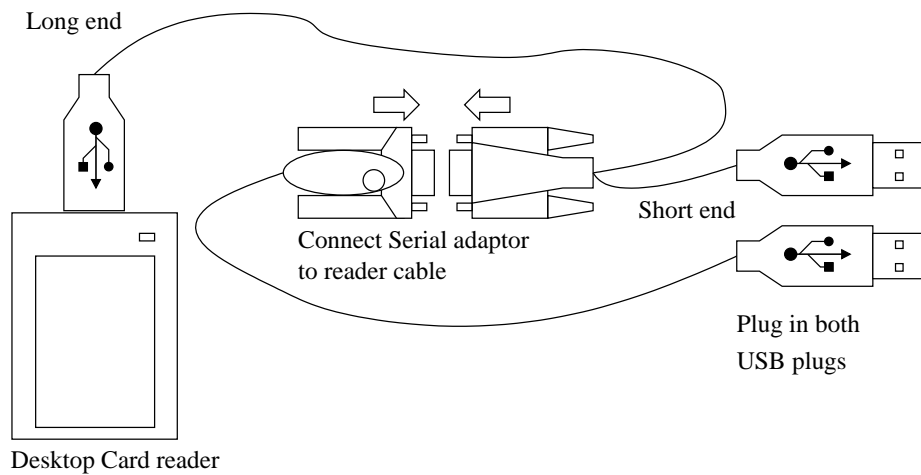
## 2.1 125kHz Desktop Reader

The reader for 125kHz tags has a different connection method. It connects to a RS232 Serial port to send the tag ID and to a USB socket for power. Both connections are necessary for operation. Both ends of the cable look the same but they are not interchangeable. Connect the long end to the reader and both plugs on the short end to your computer.



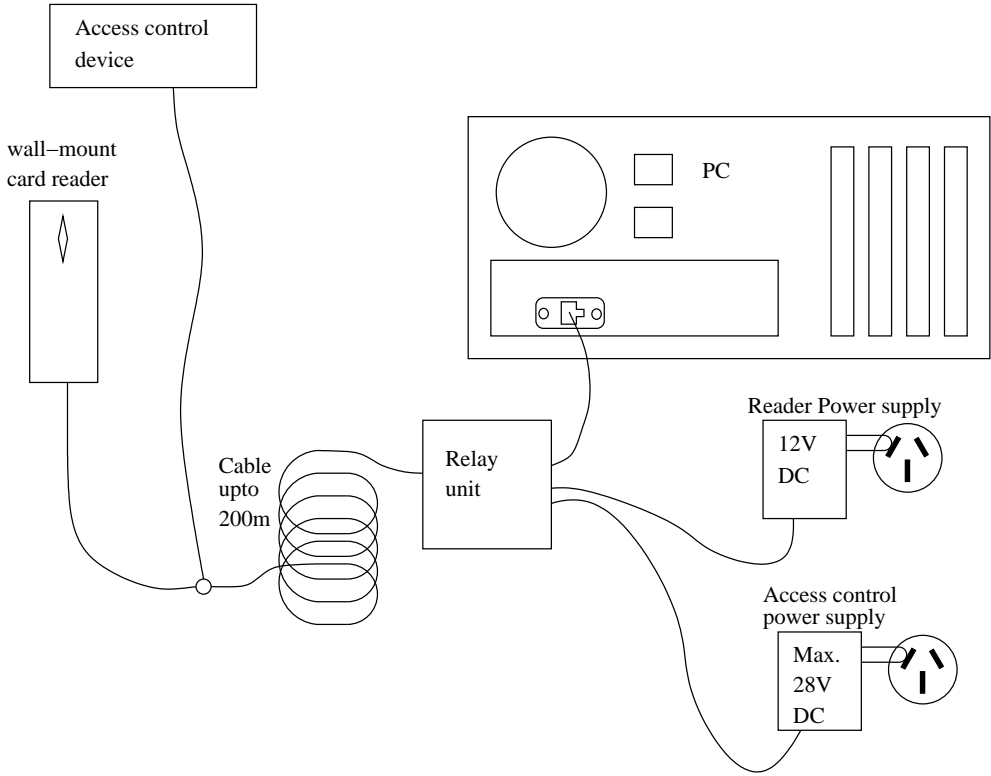
### 2.1.1 USB-serial

If your PC does not have a 9-pin serial port you can use a USB-to-serial adaptor cable. Connect the adaptor to the 9-pin on the reader cable and plug both USB plugs into your computer.

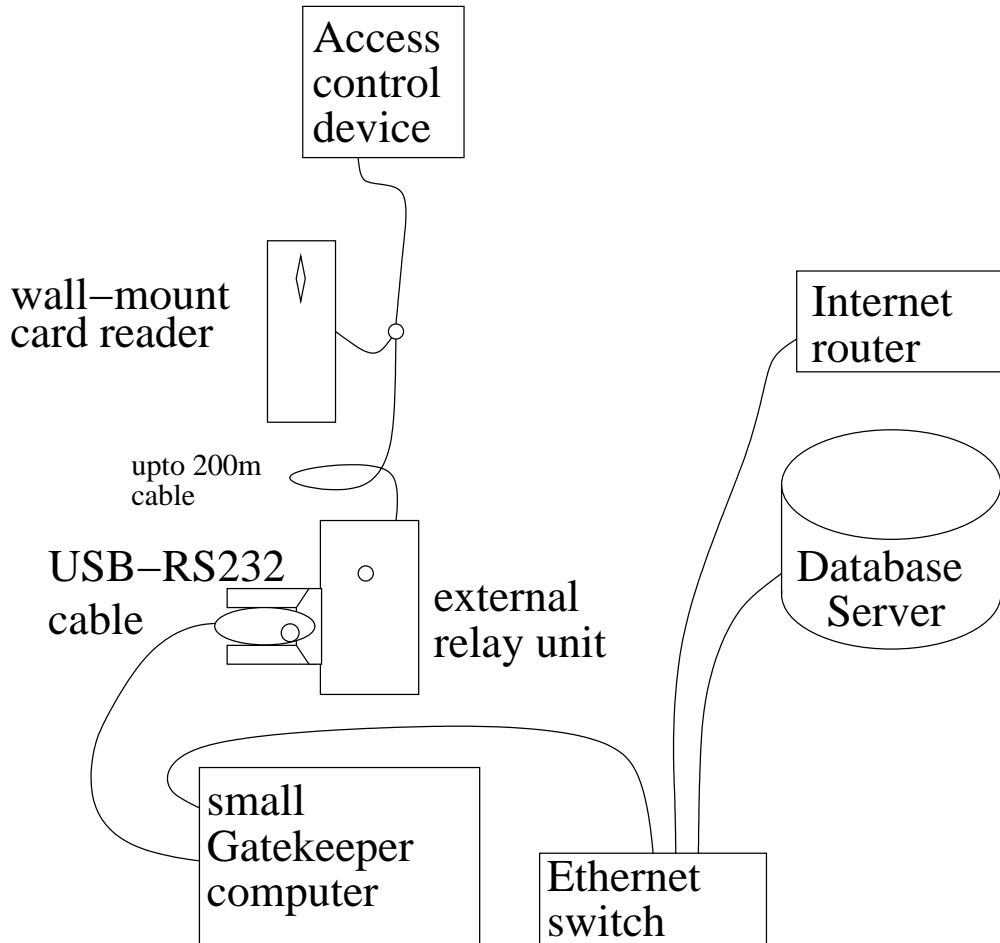


### 3 Remote readers.

remote readers can perform all the functions of desktop readers, but in addition have the ability to be connected electrically to a door, gate, or turnstile to control access. .



### 3.1 RS232 readers on gatekeeper



These RFID reader do not contain a relay to activate the access control, instead an external relay unit is used which connects to the gatekeeper using a USB to RS232 cable. Power supplies not shown.

Gatekeepers will sometime be used to operate desktop readers, the readers connecto to the USB ports.

Not shown: all power connections.

## 4 The Relay Unit

This Illustration shows the Relay Unit (Model DC30)

(open the case by carefully prying off the base)

the Screw terminals "A" are for connection to the RFID device

the screw terminals "B" are for the access control system

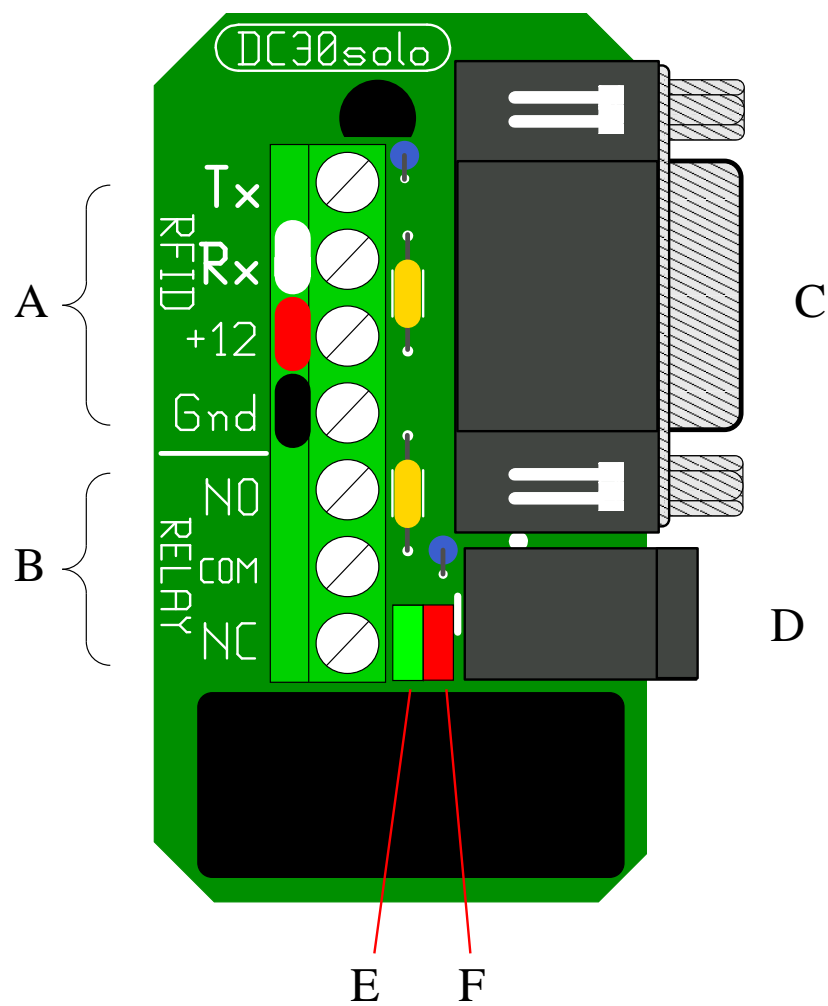
socket "C" is for connection to an RS232 serial port

socket "D" is for connection to a 12V DC supply

to power the RFID device (2.1mm inner 5.5mm outer center positive+ -).

LED "E" (green) indicates that the Serial port is signaling to unlock the door

LED "F" (red) indicates presence of the 12V supply.



## 4.1 RFID terminals

These terminals are for connection to the RFID device. The Tx terminal connects to the green wire on the RFID, the Rx terminal with the white wire, the +12 with the red wire and the GND with the black. Up to 100m of cable can be used between the relay unit and the RFID device, we recommend CAT5 network cable for this purpose

**Tx** Connect the green wire from the reader to here

**Rx** Connect the white wire from the reader to here

**+12** Connect the red reader wire here, may also be used as an alternative DC 12V supply positive input

**Gnd** Connect the black wire from the reader here, may also be used as alternative DC 12V supply common

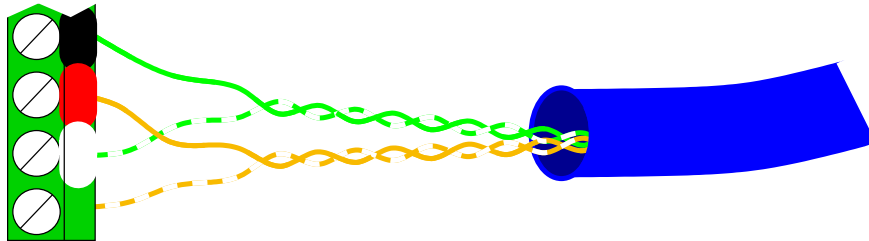
### Using “Cat-x” Cable

When using twisted-pair cable (eg:Cat-5, or Cat-6) correct pairing of the signal wires to the reader is important, especially on long runs.

Put the reader red and green wires on one pair and the reader white and black on another pair

We have consistent good results with the following mapping

signal	RFID	Cat.X
Ground	black	green
+12V	red	orange
TXD	white	white-green
RXD	green	white-orange



The other conductors in the cable (not shown) can be connected to the relay terminals to operate the lock circuit.

## 4.2 Relay terminals

These Terminals are for signaling the access control device. We recommend loads of over 2A are not connected directly to these terminals but a second relay used as a buffer instead.

**NO** relay normally open contact



**COM** relay common terminal

**NC** relay normally closed contact

No provision is made for an entry/exit delay for inputs other than from the card reader. If an exit delay is needed for an exit button that must be provided separately.

As access control devices are often inductive switching off the current can cause a voltage spike on the wires to the access control, this can couple to the reader's wires and destroy it. A snubber should be fitted near any switch or relay contacts, for DC circuits a silicon rectifier diode such as IN4001 is well suited.

### **4.3 RS232 socket**

This socket is for connection to the computer via an RS232 cable or an RS232 to USB adapter. the RXD and TXD and ground pins of this socket are connected internally to the corresponding 'A' terminals. the RTS pin is used to activate the relay.

Thus any serial cable used must connect at-least pins 2,3,5,and 7.

### **4.4 12V supply**

Connect a 12V supply capable of atleast 300mA, the socket suits a 2.1x5.5mm barrel connector with the centre positive.

This socket is connected directly to the +12 and Gnd pins of connector "A" so that multiple units can be powered from a single 12V supply by connecting the 12+ and Gnd of the additional unit(s) to the +12 and Gnd of the first (allow an additional 300mA more power supply capacity for each additional connected unit)

### **4.5 Green LED**

This lights when the RTS signal on socket C is asserted, indicating a signal that should open the door,

### **4.6 Red LED**

This is the power LED. It indicates presence of power

## 5 The RFID reader

The RFID reader has several wires but only 4 of them are used by our system the unused wires should

be insulated from one another. The 4 wires that are used are coloured red, black, white, and green.

### 5.1 RFID Readers with screw terminals

Some readers have screw terminals instead of wires. use the following key to interpret the diagrams. All other terminals are not used.

Terminal	wire colour
VCC	red
GND	black
TXD	white
RXD	green

### 5.2 Three-wire RFID readers

Some readers use only three wires, If you are supplied readers with only three wires, connect the red, and black wires as illustrated, and connect the third wire as the white wire is shown in the illustrations. We recommend that you install the green wire shown in the diagrams but leave it unconnected at the reader end, as it may be needed for future RFID readers.

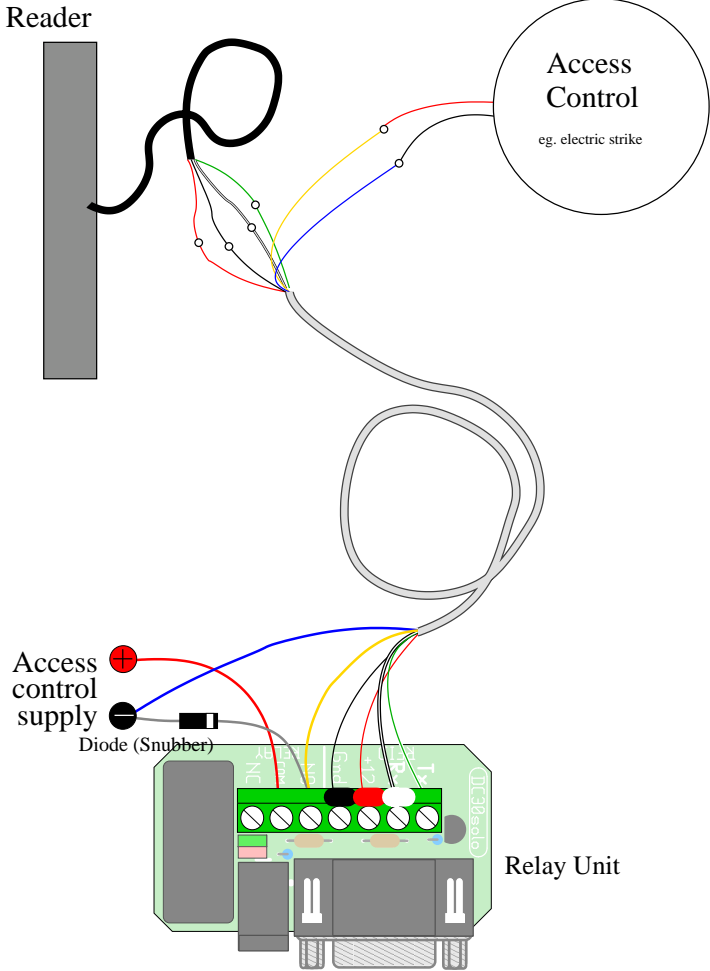
## 6 Sample Wiring diagrams

These wiring diagrams are intended as examples of how the relay unit and RFID device may be installed.

If you are using CAT-5 cable to the reader be sure to follow the pairing instructions at 4.1 on page 8

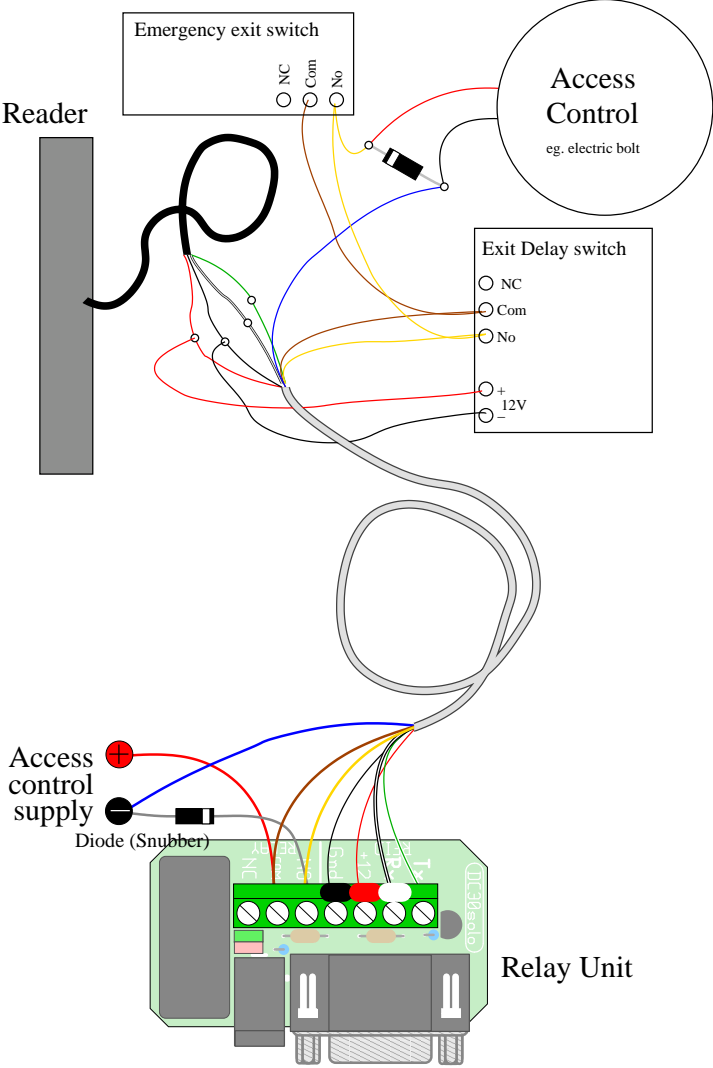
### 6.1 Fail Secure

For a fail-secure access control device like electric strike, where there is a mechanical exit method. If they are the fail safe type which requires electric current to unlock and locks when not powered wire the circuit as follows.



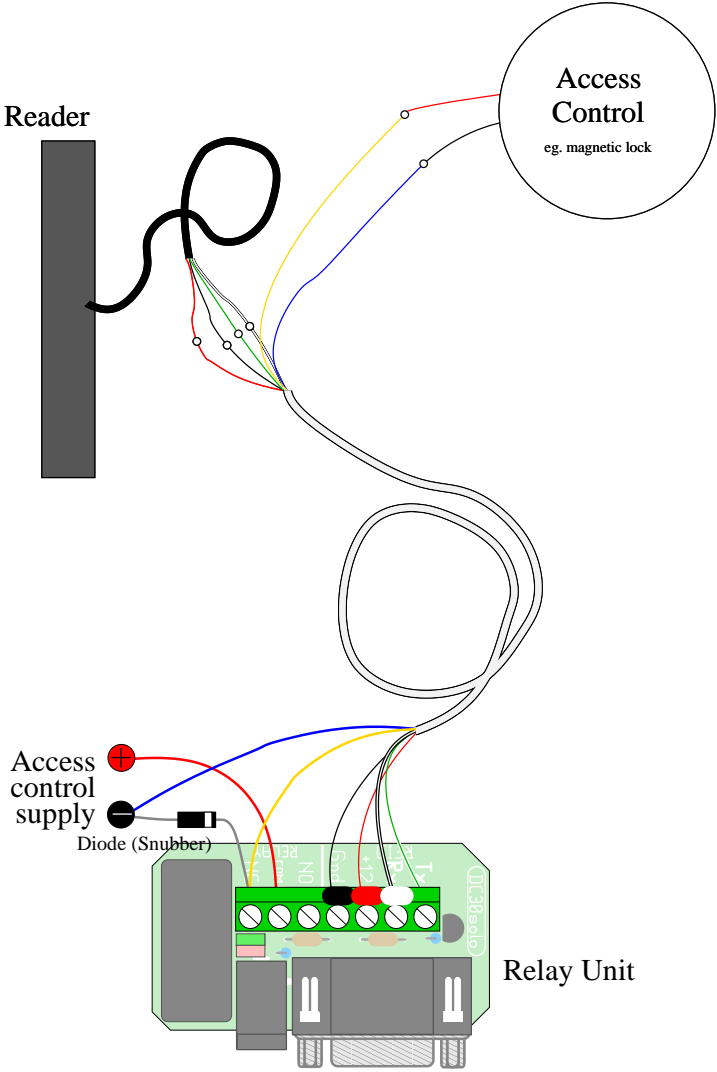
**6.1.1 Fail secure with emergency exit**

For a fail-secure access control device like electric strike or electric bolt where there is a need for an electric door release control on the inside of the door wire the circuit as follows.



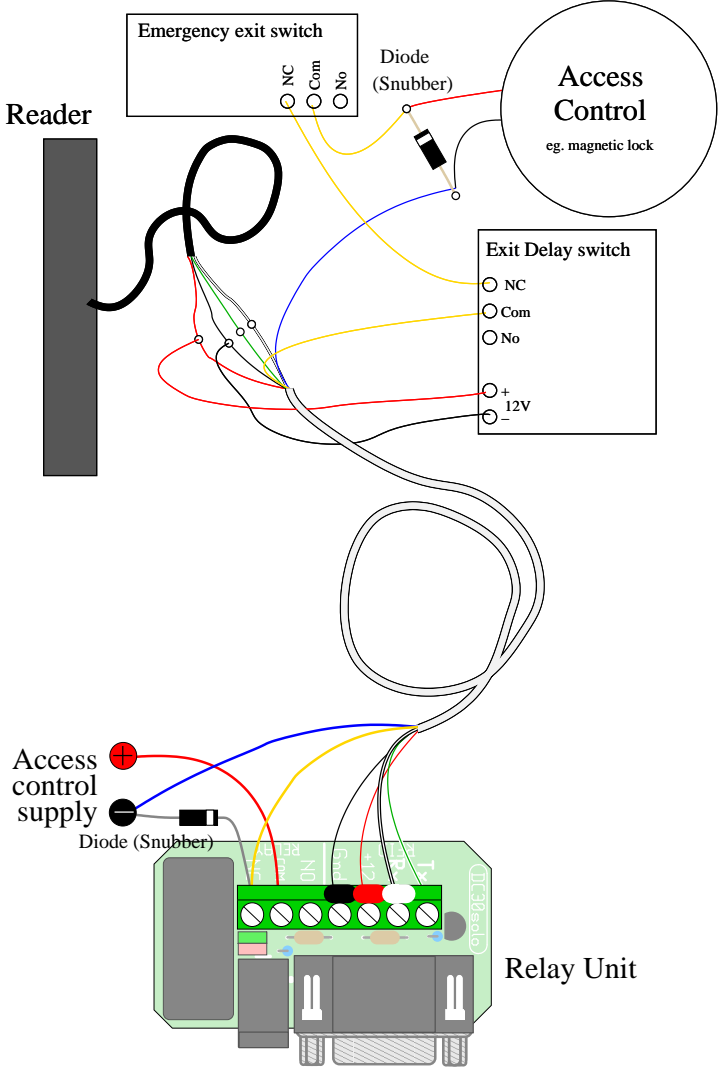
### 6.2 Fail safe

For a fail-safe access control device like electric strike, or electric latch. If it is the fail safe type which requires electric current to lock and unlocks when not powered wire the circuit as follows.



**6.2.1 Fail safe with emergency exit**

For a fail-safe access control device like magnetic lock or electric bolt. If they are the fail safe type which requires electric current to lock and unlocks when not powered and an exit button is required the circuit is as follows.

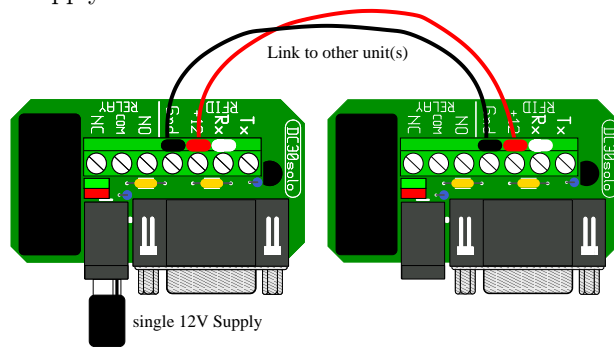


## 7 Combinations of relay units

there are several useful ways in which multiple relay unit can be interconnected.  
in these illustrations the connections to the reader and PC are not shown.

### 7.1 multi-relay units

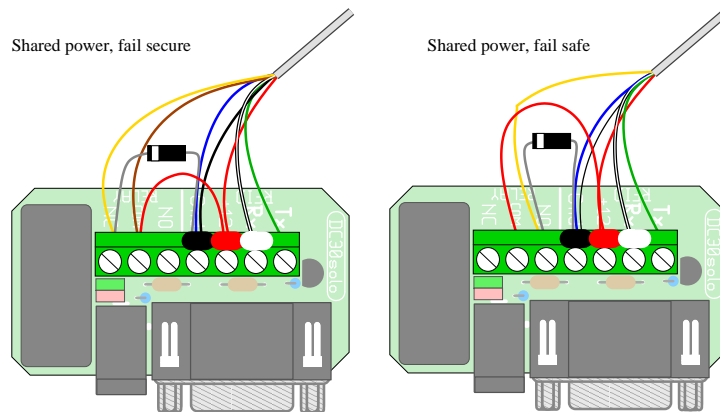
for sites with several RFID stations a multiple controller unit may be supplied consisting of several relay units, with a single DC input socket. A power supply capable of at least 300mA multiplied by the number of RFID units should be used. Alternatively multiple single units may be interconnected to share a single 12V supply.



Alternatively the powersupply can be connected to the screw terminals instead of to the socket

### 7.2 Shared lock power supply

If the access control operates from 12V it can be powered from the same supply as the reader as long as the 12V supply for the reader is powerful enough to operate both devices at the same time. In this case to connect access control (+) to +12V supply access control (-) to GND



Note: the brown wire only used for fail safe with exit button

### 7.3 bi-directional

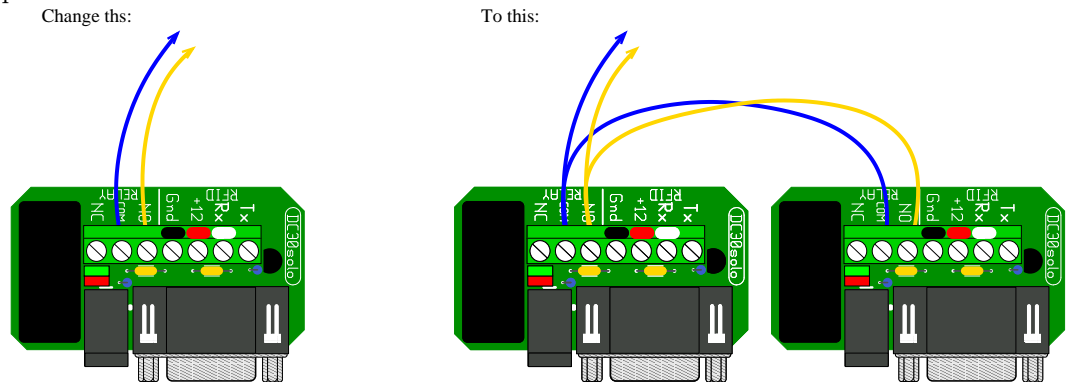
When you want to have readers both sides of the door you need to combine the relay contacts.

These wiring patterns can be used in combination with the powersupply shairing wiring pattern above.

the wiring pattern you should use depends on which relay contacts are being used.

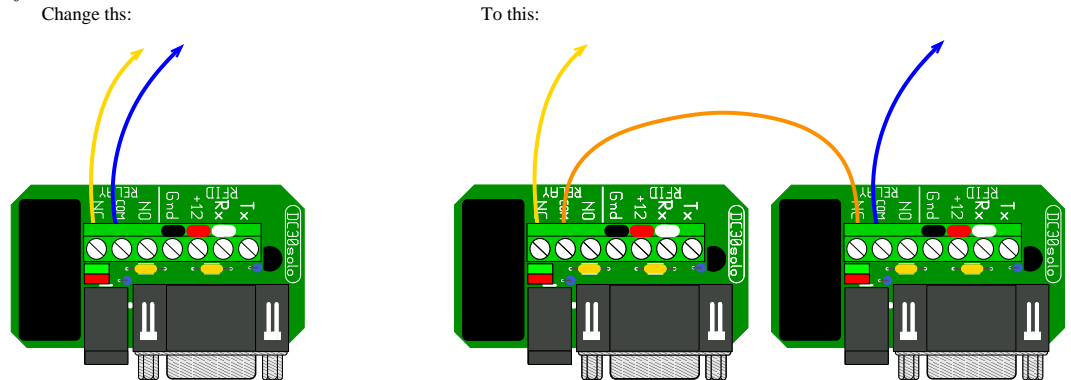
#### 7.3.1 Normally Open contacts

In arrangements where the normally open (NO) contacts are used wire the relays in parallel



#### 7.3.2 normally closed contacts

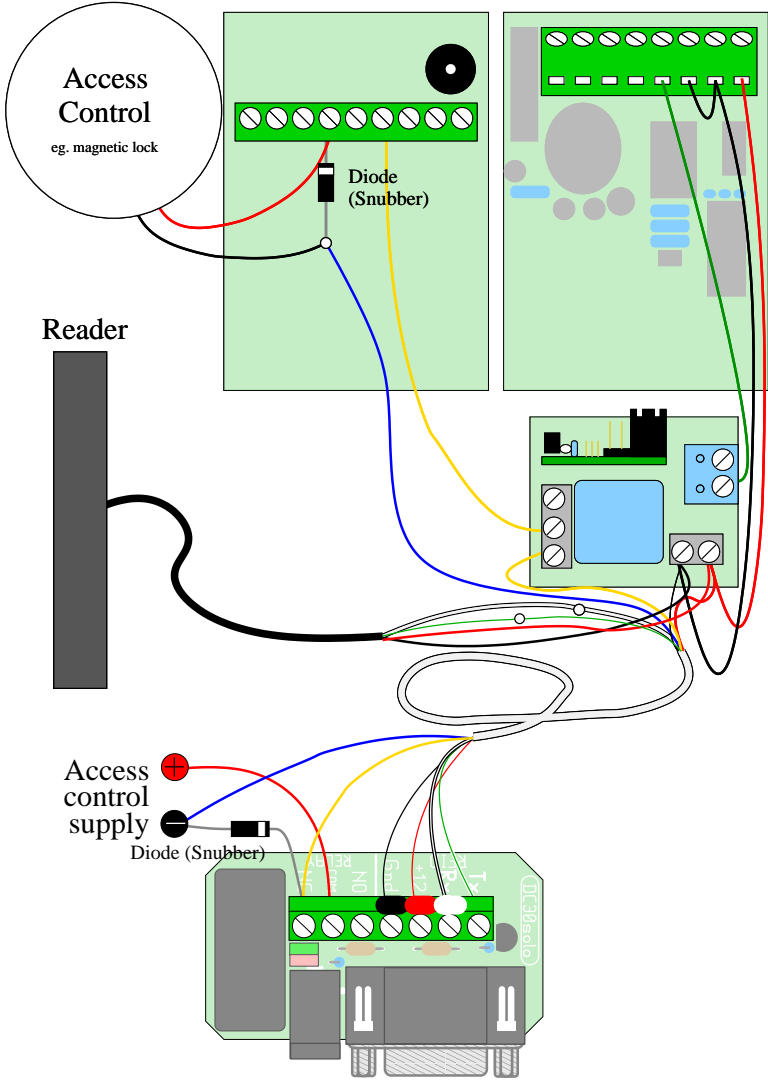
In arrangements where the normally closed (NC) contacts are used wire the relays in series





# 8 Prox rex.

Prox-Rex is a New Zealand made exit button, emergency exit button and timer unit that can be used in fail-safe settings. the following is one way to set it up.




## 9 Troubleshooting

### 9.1 Relay unit

#### 9.1.1 Red Led not lit.

The red LED on the control indicates that the power supply to the reader is operating, it should normally be Lit.

if it is not lit:

- disconnect the powersupply and check that it the powersupply works.
  - eg: unplug the powersupply from the socket on the relay unit
  - the powersupplies we send have a red LED that should light up if it is wirking
  - if the powersupply is not working check that it is plugged into a working outlet
- having confirmed that the powersupply works re-connect it to the relay unit.
  - eg: plug it back in
- if the RED led on the relay unit comes on, it is working.
- If nothing happens the cable from the powersupply to the relay unit is faulty, or the plug has incorrect polarity
  - the polarity of the plug can be changed by removing the tip and rotating it 180 degrees about its long axis. The arrow should indicate this symbol: +  -
- If the LED on the powersupply goes out there is an electrical fault, it could be one of
  1. wiring fault (short circuit) somewhere on the card reader cable.
  2. something on the card reader cable is consuming too much power.
  3. a bad powersupply
  4. a faulty relay unit (unlikely)

#### 9.1.2 Green LED won't extinguish, and door remiains unlocked

- confirm that gymmaster is seeing the tags
- the green led should only light when the door should unlock, if it is on permanently there is some sort of software problem, check that the card-sentry for the door is using one of the access control reader types eg:” “TE125”, ”ASCII Access Control” (125kHz tags), or “TE5000” (13.56MHz Mifare tags)

- check that some other software is not using the serial port
- check that the door is not set to “open/unlocked” in gymmaster.

### **9.1.3 Green LED wont light and door won’t unlock**

- check that the RFID tags are being read correctly
- check that the reader is functioning correctly and that gymmaster is interpreting the codes correctly
- check that all plugs are connected correctly
- check that the cable between the serial port and the relay unit connects pin 7
- check that the door is not set to locked and that the current time is within the facility’s open hours.
- Any cable used to connect the relay unit to a serial port must connect at-least RXD, TXD, SG, and RTS (pins 2,3,5, and 7)

## **9.2 Power supply**

- The power supply must provide 12V DC, It is recommended that an uninterruptable powersupply is used to back it up.

## **9.3 Interactiion with gymmaster**

### **9.3.1 RFID tags not seen by gymmaster**

- if the reader is connecte to your gymmaster computer check that cardsentry is installed and configured correctly,
  1. gymmaster settings
  2. gymmaster preferences
  3. card readers
  4. cardreader hardware setup
  5. restart gymmaster after making changes.

### **9.3.2 Rfid tags interpreted incorrectly**

- check that the correct type of RFID reader is selected
  1. for 125Khz EM4100 tags ASCII Access Control is recommended except where there are existing cards using the TE125 system, if the card numbers come out different try swapping the new reader to the other system.

## 10 Revision history

1. Jan 2010. Original.
2. Jul 2010. Corrected wiring for fail secure exit button, updated relay unit graphic.
3. Jun 2011. relay unit model DC30 released. graphics updated, more detail added.
4. Oct 2011. Combinations of relay units, indicate RFID wiring colours on DC30 detail
5. Mar 2012. On the importance of snubbers.
6. Nov 2012. serial port pin 7 essential.
7. July 2013 rename “control unit” to “relay unit”
8. Aug 2013 clean up text, reorder document sections.
9. june 2015 changed cyan wire to brown, fail safe without exit button, diagrams for “share power with lock”. RFID readers with 3 wires or with screw terminals.

## 11 Copyright

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