Contactless Smartcard Reader Setup

January 11, 2013

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

There are two basic configurations: Desktop and Remote.

Desktop is more simple to set up. The reader is directly connected to the PC and draws its power from a keyboard socket.

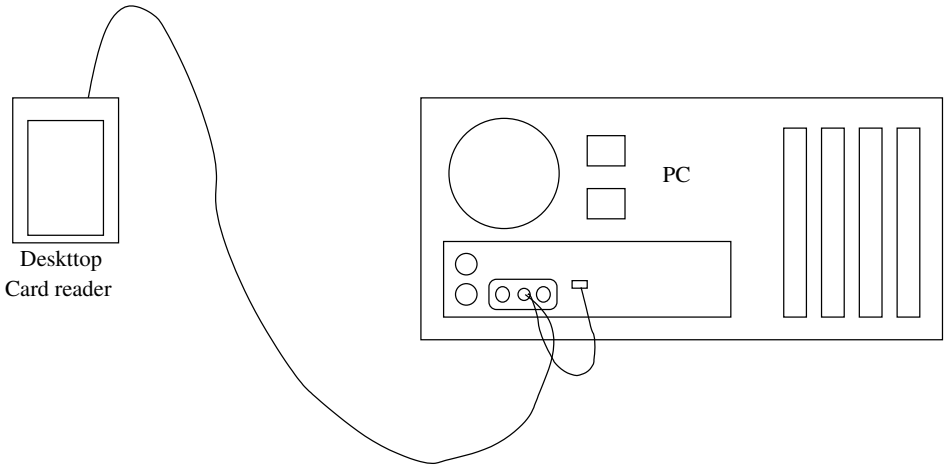
Remote involves a long cable and a separate power-supply for the reader. This allows the reader to be positioned next to a doorway for example. It also provides for the reader to participate directly in access control by triggering an electric strike, latch, magnetic lock, or sliding door to open.

1 Desktop Reader:

Desktop Card Readers are suitable for issuing cards and identifying members at a computer terminal.

Basic Desktop Reader.

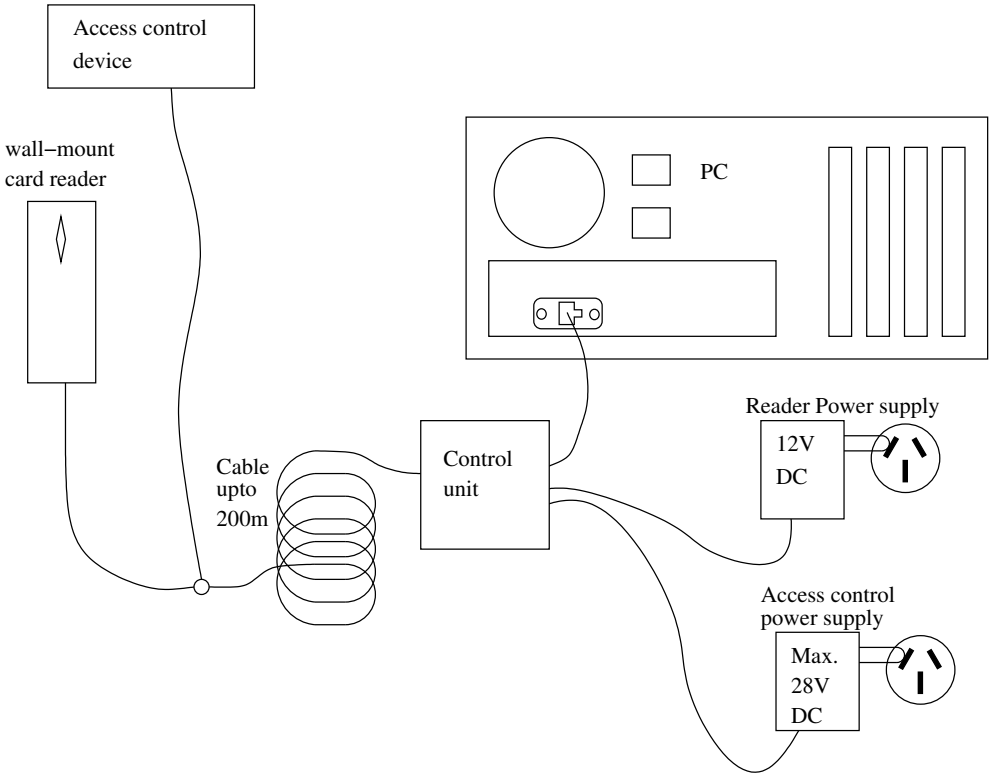
The Basic Desktop Reader has a two-colour LED indicator light. It sounds a tone and indicates with the light when it recognises a card. It connects to a RS232 serial port and a keyboard socket for power.



	Length	Width	Thickness
Basic Desktop Reader	**110mm**	**81mm**	**26mm**

2 Remote Readers.

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



3 Access Control

The reader can be used in conjunction with the GymMaster software to control doors gates and turnstiles electrically.

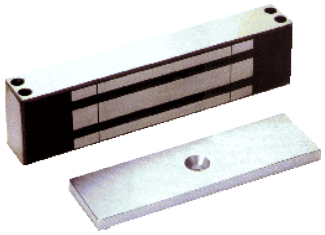
Choosing the Right Lock.

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.

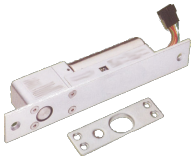
We suggest that you contact the person you would contact for maintenance on your door or a locksmith to assist in choosing and to fit your lock.

- **Magnetic Lock**
  MAGNETIC LOCKS (or magnalocks) 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 Bolt**
  This device is an electrically operated bolt lock. It is best suited to doors that swing in both directions. As with the magnetic lock, egress controls will be needed to let people out.

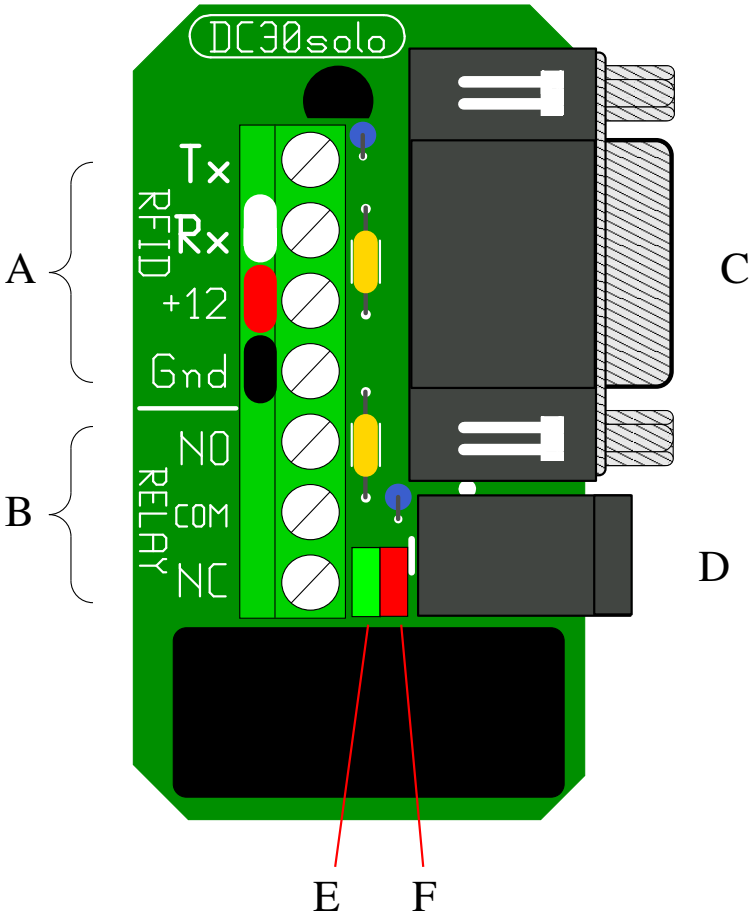


- **Egress Buttons**
  These controls are used to unlock doors from the inside.

4 The Control Unit

This illustration shows the Control 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 $^{+}\!\!\odot\!\!^{-}$).
- LED "E" (green) indicates that the PC is signaling to unlock the door.
- LED "F" (red) indicates the 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 control 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.

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 can cause a voltage spike on the wires to the access control. This can couple to the reader 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.

4.4 12V Supply

Connect a 12V supply capable of at least 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 asserted, indicating a signal that will 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.

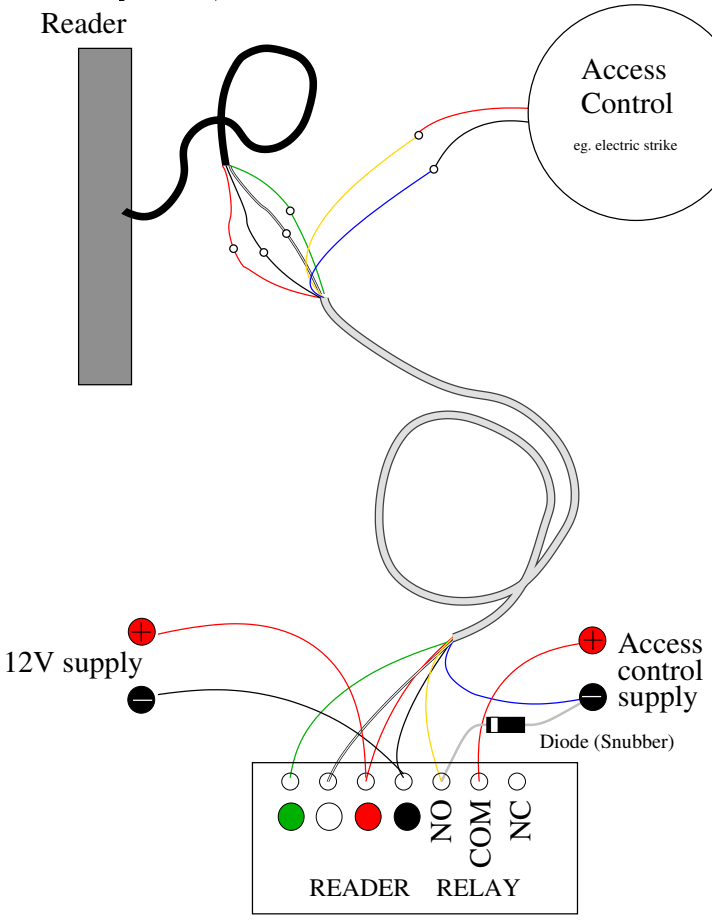
6 Sample Wiring Diagrams

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

6.1 Fail Secure

For a fail-secure access control device like ELECTRIC STRIKE, where there is a mechanical exit method.

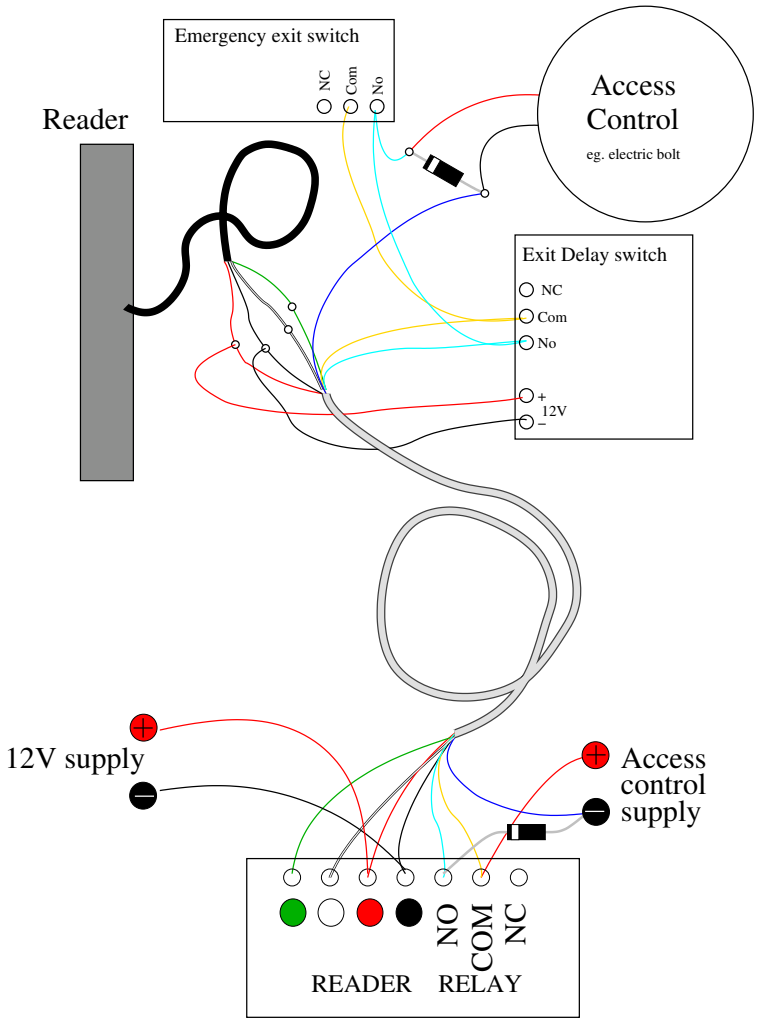
If they are the fail safe type which requires electric current to unlock and locks when not powered, wire the circuit as follows.



Control Unit

6.1.1 Fail Secure with Emergency Exit

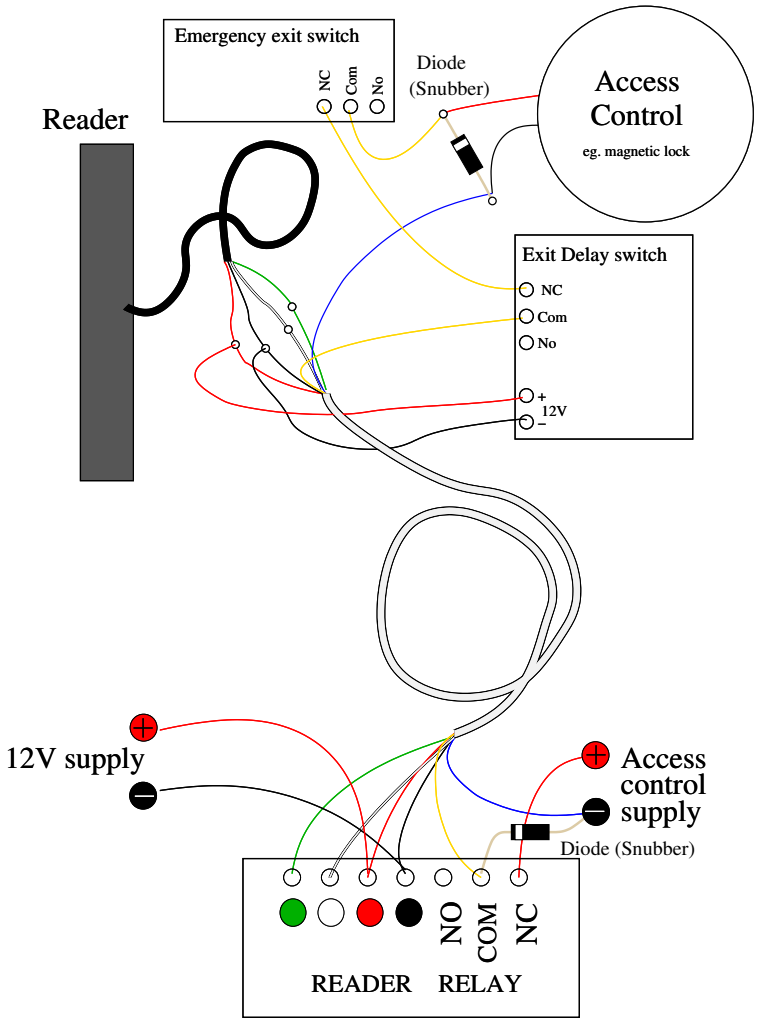
For a fail-secure access control device like ELECTRIC STRIKE or ELECTRIC BOLT where there is a need for an electric door release control on the inside of the door, wire the circuit as follows.



Control Unit

6.2 Fail Safe

For a fail-safe access control device like MAGNETIC LOCK, ELECTRIC STRIKE or ELECTRIC BOLT. If they are the fail safe type which requires electric current to lock and unlocks when not powered, wire the circuit as follows.



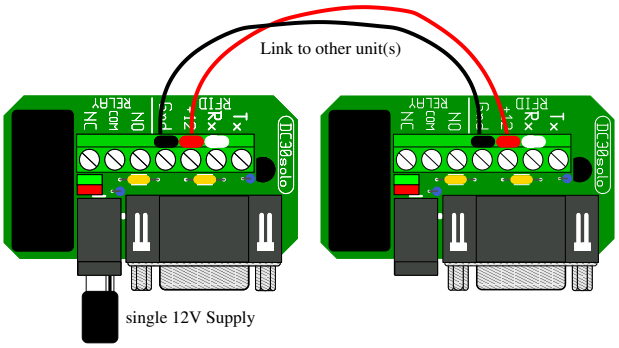
Control Unit

7 Combinations of Control Units

There are several useful ways in which multiple control units can be interconnected. In these illustrations the connections to the reader and PC are not shown.

7.1 Single 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 (+) and access control (-) to 12V supply (-)



7.2 Bi-Directional

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

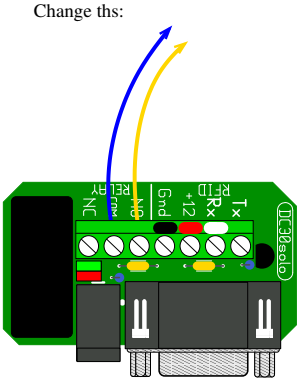
These wiring patterns can be used in combination with the power supply sharing wiring pattern above.

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

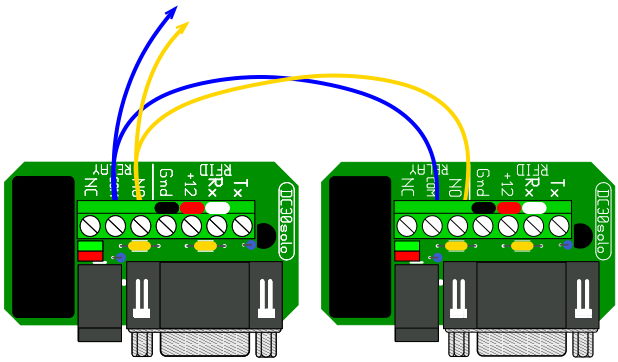
7.2.1 Normally Open Contacts

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

Change ths:



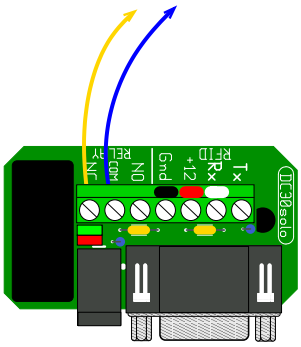
To this:



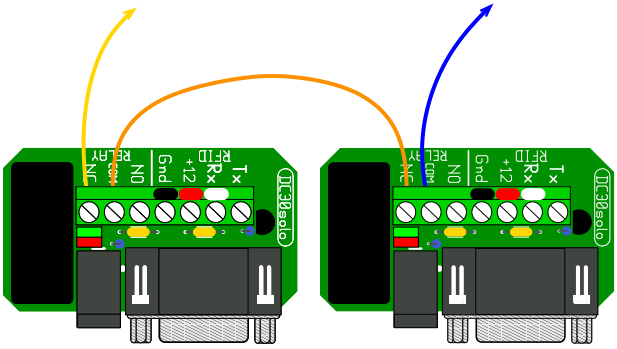
7.2.2 Normally Closed Contacts

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

Change ths:



To this:

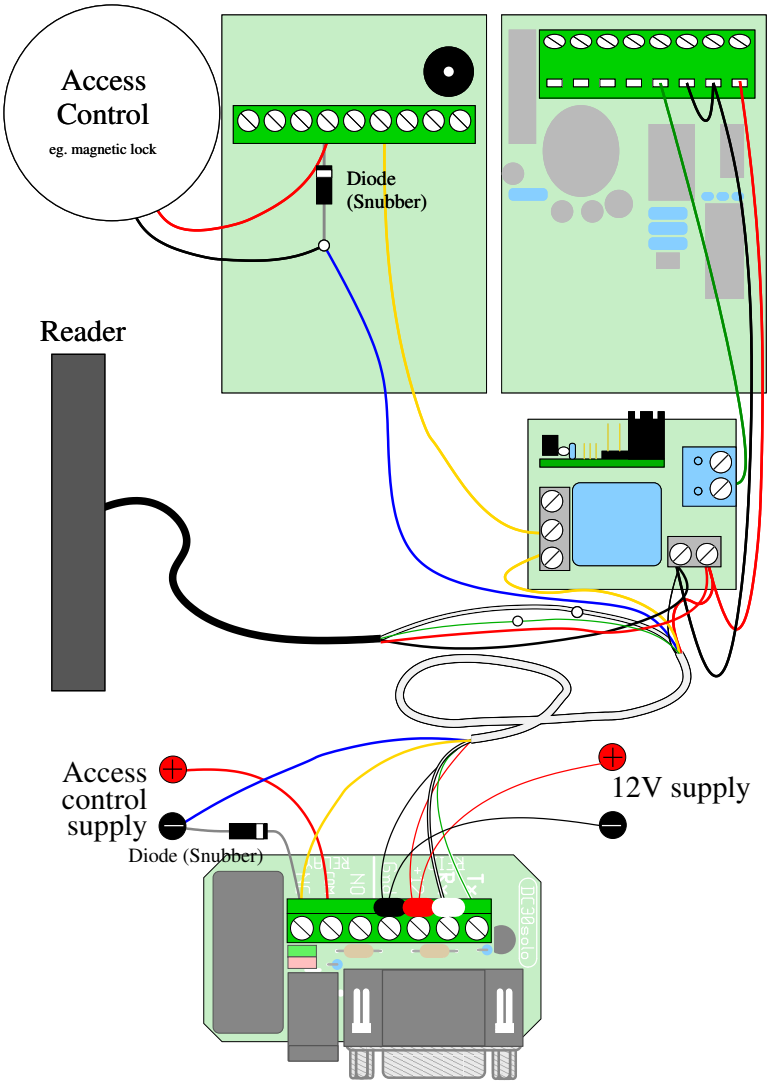


7.3 Multi-Control Units

For sites with several RFID stations a multiple controller unit may be supplied consisting of several control 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.

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.



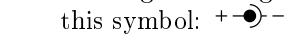
9 Troubleshooting

9.1 Control 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 power supply and check that it the power supply works.
  - I.e. unplug the power supply from the socket on the control unit.
  - The power supplies we send have a red LED that should light up if it is working.
  - If the power supply is not working, check that it is plugged into a working outlet.
- Having confirmed that the power supply works, re-connect it to the control unit.
  - I.e. plug it back in.
- If the red LED on the control unit comes on, it is working.
- If nothing happens the cable from the power supply to the control 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 power supply goes out there is an electrical fault, it could be one of:
  1. a faulty control unit (unlikely).
  2. wiring fault (short circuit) somewhere on the card reader cable.
  3. something on the card reader cable is consuming too much power.

9.1.2 Green LED Won't Extinguish, And Door Remains Unlocked

- Confirm that GymMaster is seeing the tags.
- The green LED should only light when the door unlocks. If it is on permanently there is some sort of software problem. Check that the cardsentry for the door is using one of the access control reader types e.g. "TE125", "ASCII Access Control", or "TE5000".
- Check that some other software is not using the serial port.
- Check that the door is not set to "open/unlocked".

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 door is not set to locked and that the current time is within the facility's open hours.

9.2 Interaction with GymMaster

9.2.1 RFID Tags Not Seen by GymMaster

- Check that cardsentry is installed and configured correctly.

    1. GymMaster settings.
    2. GymMaster preferences.
    3. Card readers.
    4. Card reader hardware setup.
    5. Restart GymMaster after making changes.

9.2.2 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 NRE reader to the other system.

10 Revision History

1. Jan 2010. Original.
2. Jul 2010. Corrected wiring for fail secure exit button, updated control unit graphic.
3. Jun 2011. Control unit model DC30 released. Graphics updated, more detail added.
4. Oct 2011. Combinations of control units, indicate RFID wiring colours on DC30 detail.
5. Mar 2012. On the importance of snubbers.
6. Jan 2013. Formatting improvements.

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