SECURITRON ISO 9001

SECURITRON MODEL DK-11 DIGITAL KEYPAD INSTALLATION & OPERATING INSTRUCTIONS

1. DESCRIPTION

Securitron's DK-11 is a one piece digital keypad specifically designed for control of electric locks. It is furnished on a single gang, stainless steel outlet box cover with plastic backbox. It includes multiple code capability which is programmable from the keypad and a 5A SPDT timed, control relay output. Two LED's are furnished. The green LED flashes as each key is pressed and the red LED turns on during the time that the DK-11 has released the door. Both LED's also provide programming prompts as will be explained later.

The DK-11 is not waterproof and is intended for **interior use**. However, an accessory cover (part # WCC) allows its use outside where direct, heavy rain is not expected. It should also not be employed in high security installations as with its one piece construction, an intruder could gain access to the electric lock power wires if he is able to dismount the DK-11. The power wires could then be shorted or opened (depending on the type of lock) to gain access.

2. PHYSICAL INSTALLATION

Note that the DK-11 is supplied with a choice of tamper resistant #6 spanner machine screws and conventional screws for attaching the plate to the backbox. Use of the tamper screws is recommended because of the DK-11's one piece construction.

Two backboxes are supplied with the DK-11. The blue backbox comes with a template and is used for **flush mounting** on dry wall or other material where a cut-out can be made. The beige two-piece backbox allows **surface mounting** on a variety of materials. To use the beige, backbox, note that its cover and base are snapped together and must first be separated by either pulling the outer rim of the cover away from the base or inserting a screwdriver into the four holes at the corners of the cover and prying the base loose. Once the base is separated from the cover, remove the large rectangular knockout in the center of the base by cutting around it with a knife and then popping it out. The base can then be mounted with the supplied #6 sheet metal screws and plastic anchors. The DK-11 mounts on the cover with the supplied #6 machine screws and the cover with DK-11 then snaps into the mounted base. Wires are usually pulled through the center of the base although it is also possible to attach plastic wiremold raceway to the side of the cover (note the knockouts on the inside of the cover sides). Raceway is **not recommended** because it's quite easy for anyone to attack the wires.

The DK-11 can be used outdoors with the optional rain cover (part #WCC) although we do not advise this use in areas exposed to heavy, direct rain. When used outdoors, you must supply a weatherproof, gasketed backbox (available from Securitron under part #WBB).

3. WIRING

FIG. 1: CIRCUIT BOARD OVERVIEW

1	+12 OR +24 VDC
2	0 VDC (NEG)
3	REX
4	NO
5	C
6	NC

REMOVE JUMPER
FOR 24 VOLT OPERATION
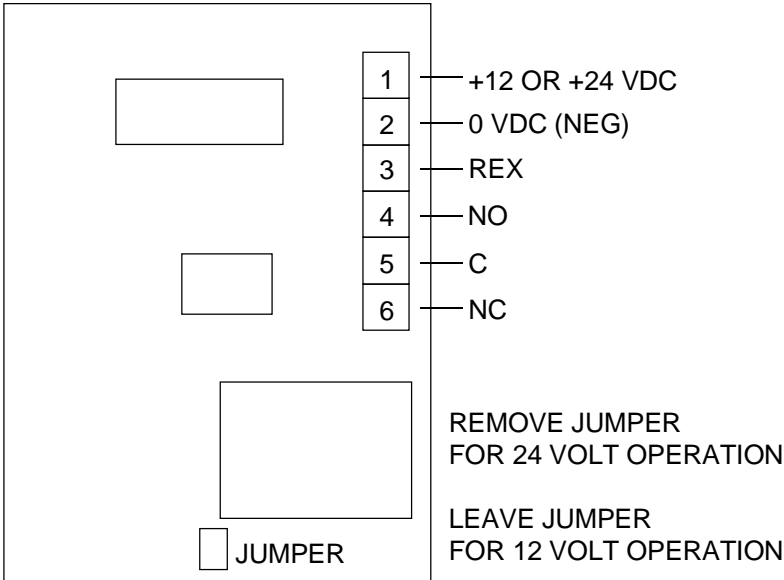
LEAVE JUMPER
FOR 12 VOLT OPERATION

JUMPER

Figure one shows the rear of the DK-11. You will make connections to the six terminals as shown in the drawing and either leave or remove the jumper block at the bottom of the board. **If you are using 12 VDC power, leave the jumper block in place. If you are using 24 VDC, remove the jumper block. Operation at 24 volts** with the jumper block in position **can damage the unit**.

Normally, operating voltage is selected to match the voltage required by the electric lock. Note that **the DK-11 will not operate on AC power**. It will, however, accept full wave rectified DC power (transformer + bridge rectifier). Regulated DC power is not necessary.

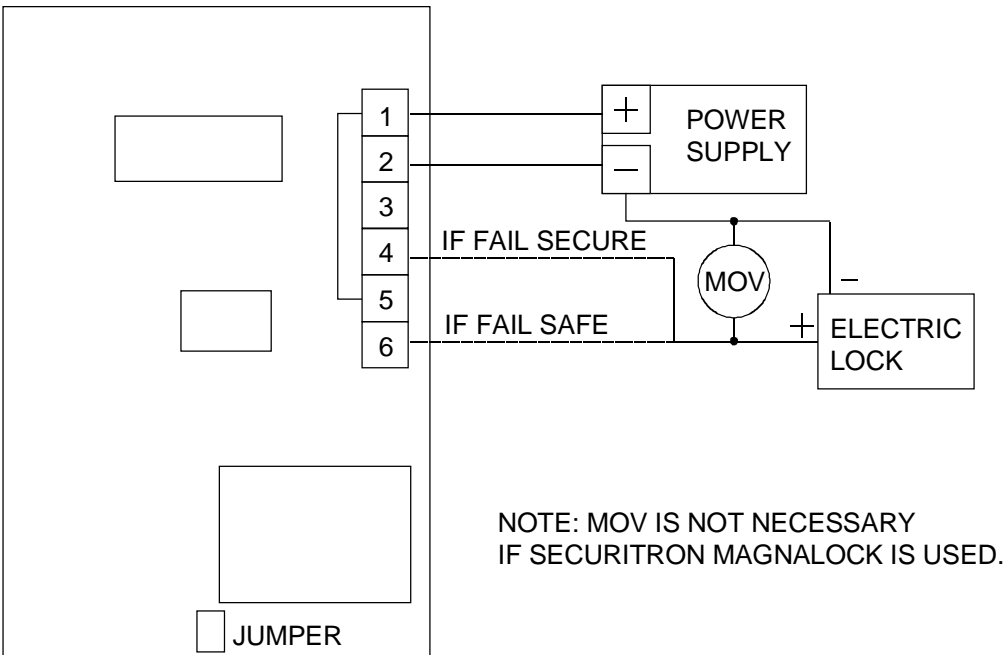The DK-11 will draw a maximum of **70 mA at 12 VDC or 24 VDC**.

Note that space does not permit numbering the six terminals on the circuit board. When making your connections, you have to refer to the drawing and mentally count off the terminals.

3.1 POWER & ELECTRIC LOCK WIRING

Wiring for installations that **don't use the REX** (request to exit) terminal are shown in Figure 2. This usually is an electric strike installation where a switch is not required for egress. For installation using (for example) a magnetic lock requiring a switch for egress, see Section 5.

Returning to Figure 2, power is input to terminals 1 and 2. **Observe polarity. Be sure that your power source has the capacity to operate both the lock and DK-11.** If the installation is "under-powered", the voltage of the supply will drop rapidly when the lock is energized and this can crash the microprocessor of the DK-11. After power has been connected, a wire should be run from terminal 1, the "+" power input, to terminal 5, the control relay common. **If the DK-11, however, is part of a lock control installation with other switching devices** controlling the same lock, the wire from terminal 1 to terminal 5 is often omitted as the DK-11's output relay may need to be in series or parallel with the other devices' contacts. The DK-11's relay contacts will be interconnected in a dry state with the other switches.

FIG. 2: POWER AND ELECTRIC LOCK WIRING

Note that if the lock is of the fail secure type (released when powered), utilize terminal 4 (N.O.). If it is of the fail safe type (released when power is removed), utilize terminal 6 (N.C.). All electromagnetic locks are fail safe. Electric strikes and solenoid bolt locks come in both versions. Note that the DK-11's control relay **has 5 amp contacts** which are sufficient for the great majority of electric locks. If, however, the lock to be used draws more than 5 amps, a second larger relay must be added by the installer.

An electronic component called a MOV is supplied with the DK-11. It is found in a plastic bag packaged with the unit. Figure 2 shows the MOV installed across the power wires to the electric lock. **Placement of the MOV should always be as close to the electric lock as possible for**

maximum effectiveness. There are two reasons for installation of the MOV. First, all electric locks have coils which generate a magnetic field which controls the operation of the lock. When power to a coil is turned off, the collapsing magnetic field generates a high voltage spark which arcs between the switch contacts. These switch contacts can be the DK-11's control relay or other switches mounted between the DK-11 and the lock. The MOV absorbs this high voltage spark and therefore greatly prolongs the life of the control relay or switch. Second, this spark generates electronic noise which can cause inconsistent operation of the DK-11. **If Securitron's Magnalock is being used with the DK-11, installation of the MOV is unnecessary as the Magnalock is already internally protected**. Many other electric locks, however, are unprotected and in no case will installation of the MOV cause any harm.

4. PROGRAMMING

The DK-11 has ten numbered keys and a pound (#) and star (*) key. Each of these keys is read separately by the unit, so the DK-11 is a true 12 digit access device. This provides excellent security against a code being guessed. Also, the DK-11 employs non-volatile EEPROM memory so that all programming is retained in a power failure.

Another point to note is that all DK-11 codes will operate the unit when their sequence is entered regardless if other incorrect digits were entered before. For instance, if the correct code is 2-2-6-7, the unit will operate if 8-2-2-6-7 is entered. An exception to this is if a total of 16 wrong digits are entered. In that case, an **alarm function** comes into play. The keypad will lock itself out for 30 seconds and the two LED's will flash alternately. This feature discourages attempts to guess the code.

Before learning all programming options for the DK-11, you **should decide how you want the unit to be used**. Then learn only the appropriate programming for that use. This simplifies the task of operating the unit and cuts down on unneeded service calls.

The programming questions to ask are: do you want a "**fixed**" code that will either never be changed or changed only rarely? Or do you want regular code changes from the keypad? This issue depends on the amount of security called for in the application. Finally, do you want multiple codes? The DK-11 supports four. The purpose of multiple codes is to assign different codes to individuals or groups. Then if a code needs to be changed, the other individuals or groups need not go to the trouble of learning a new code. This is a convenience issue.

4.1 FIXED PROGRAMMING

When the unit is powered up, it will flash both LED's for an indefinite period if it has no codes programmed (30 seconds if previously programmed). This is an invitation to put the unit into program mode. If you've already powered the unit, remove power for five seconds and reconnect it. You should see the flashing LED's. Then press pound (#) and star (*) at the same time. **This action puts the DK-11 into program mode** and this will be signaled by the **green LED only flashing**. If it doesn't work, you might not have hit pound and star simultaneously so try it again. The green LED will flash for only 30 seconds if no key is pressed. If you let the green LED flash for 30 seconds, both LED's will resume flashing. The unit is prompting you to put it into program mode (by pressing pound/star) because it has no codes in it. If the unit has a code in it, the green LED will simply stop flashing after 30 seconds.

Once you get the flashing green LED, press key 8 (the green LED will stop flashing) and then without pausing star-star (**). Then notice that the red light will flash twice and the green LED will resume flashing. You are still in program mode. Immediately press key 1 and then enter your code from two to seven **digits** (you can't use # or * but repeating digits is OK). In general, longer codes provide more security but are less convenient to remember and enter. However, many users like seven digit codes as they can be phone numbers, which are easy to remember. Do not pause while you're entering the code **as any time there is more than a five second gap between keys being pressed, the unit will stop reading the sequence**. When you have completed entering your code, wait until you see the red LED display two pulses one second apart. This will take five seconds for a 2-6 digit code but will occur immediately if you've chosen a seven digit code as the digit limit has been reached. The two pulses signal that your code has been accepted. It's the same feedback signal you got when you entered 8** earlier. The green LED will resume flashing which shows you are still in program mode. You can **exit program mode** by either pressing pound and star simultaneously again or waiting 30 seconds. If you get a single long flash of the red LED instead of the double flash, it shows that your entry was not accepted. This can occur if you try to use # or * in a code or if you entered only one digit rather than the minimum two. The unit will then return to program mode and you should repeat the programming steps detailed earlier by pressing 1 and then your code. After your code has been **entered and accepted**, re-enter it. The door should open. You have completed programming

and to **change this "fixed" code**, you simply put the unit into program mode (unpower, repower and hit pound/star), and then press 1 followed by the new code. The old code is automatically replaced. Note that we haven't required you to hit 8**. This is a special command that **erases any other codes** that may have been in the unit (it can hold multiple codes). On a first time installation the unit should have no codes in it but erasing prior to programming is a good discipline.

Below we show a step by step summary.

> *Power up unit (both LED's flash)*
>
> *Press pound (#) and star (*) simultaneously within 30 seconds (green LED only flashes)*
>
> *Press key 8 followed by star/star (**) to erase old codes (confirmed by two red pulses)*
>
> *Green LED resumes flashing.   Press key 1 (flashing stops)*
>
> *Enter code from two to seven digits without pausing (confirmed by two red pulses)*
>
> *Press pound and star simultaneously or wait 30 seconds to end*
>
> *Re-enter code (door should open)*

4.2 KEYPAD CHANGEABLE PROGRAMMING

In this application, two codes are programmed into the DK-11. The first, called the **Program code** acts as a **password** which allows changing the User code. It is the User code which is employed regularly to gain access. Knowledge of the Program code should be restricted to security management as its only use is to change the User code. With this method of operation, higher security is obtained because the end user can change the User code regularly or any time he feels it has been compromised.

When the unit is powered up, it will flash both LED's for an indefinite period if it has no codes programmed (30 seconds if previously programmed). This is an invitation to put the unit into program mode. If you've already powered the unit, remove power for five seconds and reconnect it. You should see the flashing LED's. Then press pound (#) and star (*) at the same time. **This action puts the DK-11 into program mode** and this will be signaled by the **green LED only flashing**. If it doesn't work, you might not have hit pound and star simultaneously so try it again. The green LED will flash for only 30 seconds if no key is pressed. If you let the green LED flash for 30 seconds, both LED's will resume flashing. The unit is prompting you to put it into program mode (by pressing pound/star) because it has no codes in it. If the unit has a code in it, the green LED will simply stop flashing after 30 seconds.

Once you get the flashing green LED, press key 8 (the green LED will stop flashing) and then without pausing star-star (**). Then notice that the red light will flash twice and the green LED will resume flashing. You are still in program mode. Immediately press key 0 (the green LED will stop flashing) and then enter your Program code from 5 to 7 **digits** (you can't use # or * but repeating digits is OK). By pressing **zero**, you are informing the unit that you are about to enter a Program code. For security reasons, Program codes must be at least five digits long. Do not pause while you're entering the code **as any time there is more than a five second gap between keys being pressed, the unit will stop reading the sequence**. When you have completed entering your Program code, wait until you see the red LED display two pulses one second apart. This will take 5 seconds if you have chosen a five or six digit code length but will occur immediately if you've chosen a seven digit code as the digit limit has been reached. The two pulses signal that your code has been accepted. It's the same feedback signal you got when you entered 8** earlier. The green LED will resume flashing which shows you are still in program mode. If you get a single long flash of the red LED, it shows that your **entry was not accepted**. This can occur if you try to use # or * in a code or if you entered less than five digits. The unit will then return to program mode and you should repeat the programming steps detailed earlier by pressing 0 and then your Program code. Once your Program code has been accepted, exit program mode by either pressing pound and star simultaneously (green LED stops flashing) or waiting 30 seconds.

We want to explain the purpose of the 8** operation that you performed earlier. This is a special command that **erases any other codes** that may have been in the unit (it can hold multiple codes). On a first time installation the unit should have no codes in it but erasing prior to programming is a good discipline.

Next, re-enter your Program code and then press pound and star simultaneously within five seconds. This tests your new Program code and will have the effect of putting the DK-11 back into program mode (green LED flashes). The only purpose of the Program code is to put the DK-11 into program mode without the inconvenience of removing power. Press key 1 which

tells the unit you are about to enter a User code in memory location #1. Without pausing, enter your User code from two to seven digits. After five seconds, you will see the two red LED pulses which confirms your User code. If you get the single long flash (code not accepted), you may have entered an illegal User code in a special sense which requires a detailed explanation. We provide that discussion in the next section.

The green LED will then resume flashing which shows you are back in program mode. Exit program mode by either pressing pound and star simultaneously again or waiting 30 seconds. Then re-enter your User code. The door should open. You have completed programming a Program and User code. Below we show a step by step summary.

> *Power up unit (both LED's flash)*
>
> *Press pound (#) and star (*) simultaneously within 30 seconds (green LED only flashes)*
>
> *Press key 8 followed by star/star (**) to erase old codes (confirmed by two red pulses)*
>
> *Green LED resumes flashing.   Press key 0 (flashing stops)*
>
> *Enter Program code from 5 to 7 digits without pausing (confirmed by two red pulses)*
>
> *Press pound and star simultaneously or wait 30 seconds to exit program mode*
>
> *Re-enter Program code followed by pound/star simultaneously (green LED flashes)*
>
> *Press key 1 within 30 seconds (green LED stops flashing)*
>
> *Enter User code from two to seven digits without pausing (confirmed by two red pulses)*
>
> *Press pound and star simultaneously or wait 30 seconds to end*
>
> *Re-enter User code (door should open)*

Now the owner of the installation can easily change his User code any number of times by knowing the Program code and following the last **five** steps shown above in the summary. Should you wish to **change the Program code**, it is the same procedure except that when you've used the old Program code to put the unit in program mode (green LED flashing), you press key 0 instead of key 1 and then enter a new Program code. It's no longer necessary to ever unpower the unit to put it into program mode once it has a Program code. Any time a new code is entered, the old one is automatically erased. The first key pressed when the DK-11 is in program mode **identifies the meaning of the next key sequence**. Key 1 identifies a new User code. Key 0 identifies a new Program code. There are other single digit identifying commands as later sections will explain.

4.3 SUBSET USER CODES

When you recognize that the DK-11 accepts multiple codes of different lengths, it is possible that one code will be a subset of another. For example, suppose you programmed "1-3-3-5-8" and then programmed "3-3-5" as another code. When you try to enter 1-3-3-5-8, you can't because when the unit sees the sequence 3-3-5, it will operate. Obviously, you should be careful to avoid selecting any code that is a subset of another, but mistakes can happen.

Where a mistake can cause a serious operational problem is if a **User code is a subset of the Program code.** This is a common risk as the program code is often longer than the User codes for greater security. The following scenario could occur. A Program code (for example) of 2-9-5-5-1 is in use but a User code of 9-5 is programmed. The Program code can't be input as the door opens as soon as the sequence 9-5 is hit. Therefore the unit can't be put into program mode by entering the Program code and the offending User code can't be changed. Many end users will not know how to recover from this situation by depowering the unit so a service call will result.

The DK-11 has an operational feature that can prevent this from happening. When you attempt to program a User code into a unit that **already has a Program code**, the User code will be rejected if it is a subset of the Program code. You will receive a long red flash indicating "code not accepted." This useful feature, however, does not work in reverse. If a User code is already in the unit and you program a new Program code of which the User code is a subset, the Program code will be accepted but you will not be able to use it.

So, on initial programming **always program the Program code first**. Be careful when you change the Program code. The best way to do it safely is to first erase all codes (8**) and then program the new Program code followed by the new User codes.

Note that it is not much of a problem if a User code is a subset of another User code. The door will open if either code is entered and the problem can be corrected by use of the Program code.

4.4 ADDING MULTIPLE CODES

The DK-11 has memory locations for up to four User codes. This allows separate codes for individuals or groups which is a benefit because when one code is changed (usually owing to a security worry), the people who use the other codes don't have to learn a new code.   To program the additional User codes, you follow the procedures described above for setting the User code in memory location 1 but you employ memory locations 2, 3 and 4. For example, once the unit is in program mode (green LED flashing), pressing key 2 followed by a code will enter a second User code. The same is true when you enter key 3 and key 4 as identifying commands. When you're programming multiple User codes, note that you can enter them one right after another. When a code is accepted, the unit signals by two red flashes. It then automatically goes back into program mode and another code can be immediately entered without exiting program mode. Be sure to test all the codes you have entered before you consider programming complete. You can **individually erase any code** (including the Program code) by entering program mode, pressing the identifying command for the code (0-4) and then waiting 5 seconds until you get a **single red pulse**.

Some customers question why the DK-11 doesn't support more User codes. We limited it to four because the DK-11 does not have the capability of printing out all the codes in its memory. With a lot of User codes, it becomes too easy for the owner to lose track of what is in memory.

4.5 SETTING THE TIME RANGE AND TOGGLE MODE

The DK-11 will release the lock it controls for a default time of 5 seconds when a correct User code is entered. This can be changed to any value from **1-99 seconds** by entering a special programming sequence. With the unit in program mode, enter key 9 followed by any **two digit** entry from 01 to 99. You will then see the double red flash immediately. If you get the single "error" flash, you probably entered only one digit. Then exit program mode (simultaneously press pound/star or wait 30 seconds). Enter a correct User code to test that the changed time is working.

The DK-11 will operate in **toggle mode** if key 9 followed by 00 is entered when the unit is in program mode. In toggle mode operation, the relay will energize when a correct code is entered and deenergize when a correct code is entered a second time.
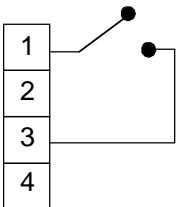
4.6 IDENTIFYING COMMAND SUMMARY

Once the unit is in program mode (green LED flashing), the next key pressed is called an identifying command as it sets the meaning of the next key sequence. This has been explained in detail in Section 4. The chart below provides a quick summary of these individual command keys.

Command Key	*Next Sequence entered*
0	*Enter Program code- 5 to 7 digits*
1	*Enter User code in memory location #1- 2 to 7 digits*
2	*Enter User code in memory location #2- 2 to 7 digits*
3	*Enter User code in memory location #3- 2 to 7 digits*
4	*Enter User code in memory location #4- 2 to 7 digits*
8	*Enter ** to erase all codes*
9	*Enter 2 digit new time range, 01-99 seconds. Enter 00 for toggle mode.*

5. THE REX FUNCTION

Often, when the DK-11 is used, provision must be made to allow people to use the door freely from the inside. If an electric strike is used, exit may be accomplished by purely mechanical means. If, on the other hand, a solenoid operated or **electromagnetic lock** is used, free exit is only **possible if a switch on the inside releases the lock**. Connection of this switch or switches is most easily accomplished by using the DK-11's REX input found on terminal 3. (REX stands for Request To Exit). When a momentary normally open switch connects
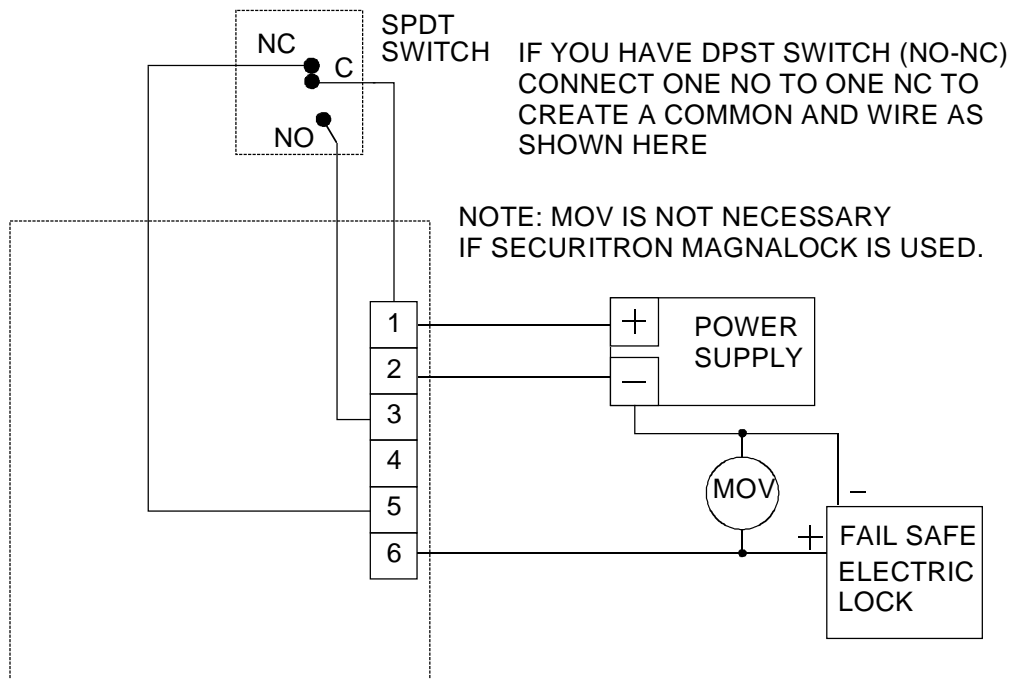
this terminal to terminal 1 (+V), the DK-11's control relay will operate, opening the lock for the amount of time set on the DK-11's timer (see drawing to the right). The result is the same as if the DK-11's keypad was used from the outside of the door. Any number of normally open switches can be connected in parallel to terminals 3 and 1 to release the door from several points on the inside if desired.

There are some special characteristics as to how the REX input works. First, it does not start the timer when the input is closed but rather when it reopens. This means that you can use the REX input to release the door for an extended period of time. As long as terminals 1 and 3 remain connected, the lock will be released. When they disconnect, the lock will remain released for the amount of time programmed. This extended release capability is useful in certain applications. The REX input is also retriggerable. This means that if the lock has been released and the REX input is triggered, the release time will be extended to the full value that has been programmed.

When using exit switches, the possibility must be considered that an electronic failure may occur to the DK-11 and a person will not be able to exit. **If the DK-11 controls the only door exiting the area, additional steps should be taken to improve the reliability of the exiting so as to avoid trapping someone.** This can most easily be done by implementing a secondary means of releasing the lock not dependent on the DK-11's REX input. Additional switch contacts should be used which directly control the electric lock. In the case of a fail-safe lock, which should always be employed when there is only one exit path, this can be easily accomplished with "double break" wiring between the exit button, electric lock, and DK-11. The exit button must have normally open and normally closed contacts (SPDT or DPST). All Securitron exit buttons have this capability. It should then be wired according to Figure 3. When the exit button is depressed, its normally closed contacts directly break power to the lock while its normally open contacts activate the DK-11. In effect, the lock is released twice. Note that the NC contacts are placed in the circuit before the DK-11's relay. This is to aid possible troubleshooting. It is usually easier to get to the DK-11 board than to get to the push button wiring in a service situation. With wiring as shown in Figure 3, the push button NC contacts can be metered on the DK-11 board. If for any reason a failure occurs with the DK-11, a person can still exit by holding the exit button down while pushing the door open. **Note, you should always consult your local building department when securing doors that are part of an emergency exit path to make sure you are complying with local codes.**

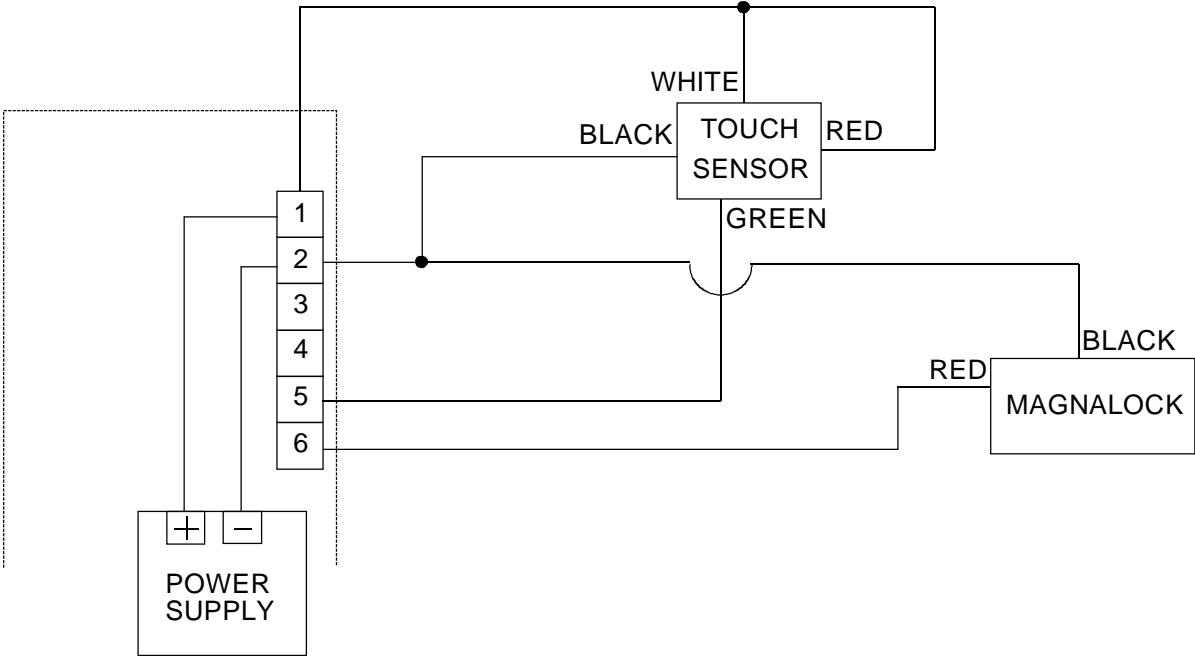### FIG. 3: DOUBLE BREAK WIRING FOR FREE EGRESS

There is one final point to make about operation of the REX input. When the DK-11 is put into toggle mode, you enter a code once to release the door and a second time to secure it. The REX input operates differently in toggle mode. It becomes a **momentary override**. If the REX input is closed when the door is locked, the door will release for as long as the REX input is

maintained closed. If the REX input is closed when the door is released, the door will lock for as long as the REX input is maintained closed. This suits typical application needs.

6 WIRING WITH SECURITRON'S TOUCH SENSE BAR AND MAGNALOCK

The DK-11 is often used with Securitron's Touch Sense Bar and magnetic lock. The following drawing shows wiring for this particular configuration. Note that the REX input is not used. Since touching the bar opens the door in a single motion, you do not want to activate the DK-11's timer which would only serve to keep the lock released for a longer time, thereby reducing security. Another potentially confusing element is that the Touch Sense Bar is also a powered device which operates most reliably when it is constantly powered.

FIG. 4: WIRING OF DK-11, TOUCH SENSE BAR AND MAGNALOCK

MAGNACARE LIMITED LIFETIME WARRANTY

SECURITRON MAGNALOCK CORPORATION warrants that it will replace at customer's request, at any time for any reason, products manufactured and branded by SECURITRON.

SECURITRON will use its best efforts to ship a replacement product by next day air freight at no cost to the customer within 24 hours of SECURITRON's receipt of the product from customer. If the customer has an account with SECURITRON or a valid credit card, the customer may order an advance replacement product, whereby SECURITRON will charge the customer's account for the price of the product plus next day air freight, and will credit back to the customer the full amount of the charge, including outbound freight, upon SECURITRON's receipt of the original product from the customer.

SECURITRON's sole and exclusive liability, and customer's sole remedy, is limited to the replacement of the SECURITRON product when delivered to SECURITRON's facility (freight and insurance charges prepaid by customer). The replacement, at SECURITRON's sole option, may be the identical item or a newer unit which serves as a functional replacement. In the event that the product type has become obsolete in SECURITRON's product line, this MAGNACARE warranty will not apply. This MAGNACARE warranty also does not apply to custom, built to order, or non-catalog items, items made by others (such as batteries), returns for payment, distributor stock reductions, returns seeking replacement with anything other than the identical product, or products installed outside of the United States or Canada. This MAGNACARE warranty also does not apply to removal or installation costs.

SECURITRON will not be liable to the purchaser, the customer or anyone else for incidental or consequential damages arising from any defect in, or malfunction of, its products. SECURITRON does not assume any responsibility for damage or injury to person or property due to improper care, storage, handling, abuse, misuse, or an act of God.

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