WARNING: This manual contains information on limitations regarding product use and function and information on the limitations as to liability of the manufacturer. The entire manual should be carefully read.

KT-100™ Door Controller

Installation Manual

Kantech Systems - Access Control and Accessories

Kantech Systems

Web Site: www.kantech.com

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Section 1: KT-100 Features

The KT-100 Door Controller contains all the intelligence and necessary inputs/outputs to manage one door; it is also easily linked to a network controlling up to 32 doors.
The KT-100 Door Controller features include:

Speed selection. The KT-100 automatically detects the loop communication speed as set at the system workstation.

Trouble reporting. The KT-100 constantly supervises power supply conditions and reports "Low power" status to the system. The power output is protected against short-circuits and surges by a self-resetting PTC. The locking device is supervised for short to ground or open circuits. It also monitors all the equipment for any failure or tampering. Any abnormal condition is reported to the software.

Downloadable firmware. The firmware program is stored in the controller's flash memory; it can be easily updated from the system's workstation without changing the memory chips.

Integration with a client alarm system. The KT-100 Controller allows the ability to arm/disarm any client alarm system. In addition, interfacing with an external alarm system allows the installer to assign the appropriate user permission to arm or disarm the external alarm system. Optionally, adding a keypad will increase the security as cardholders will be required to enter a valid code in addition to presenting a valid card at the door reader. For details about using the KT-100 Controller to interface another alarm panel, refer to "Using the KT-100 with an external alarm panel" on page 12.

Technical Specifications

Input power	9.5 to 14 VDC / 50mA + accessories (Max. 750 mA)
Dimensions (H•W•D)	11.4 cm x 7.0 cm x 3 cm (4.5"; 2.75"; 1.25"), mounted in a standard single gang electrical box without any additional enclosure
Weight	110 g (0.22 lbs)
Operating temperatures / Humidity range	From 2^0 C to 40^0 C (35^0 F to110^0 F) / 0-95% (non-condensing)
Reader types	Wiegand, proximity, bar code, magnetic, integrated keypad and others
Control relay outputs	2 relay outputs, 12VDC, 25mA max/each. Open collector to ground (use form C relays such as Kantech/KT-RM1 if needed)
	2 control relay outputs, 30VAC/DC, 50mA (max) each. Two Opto-isolated contacts per relay
Monitored input zones	4 monitored input zones, NO/NC, with or without end of line resistors
Points maximum wiring	600 meters (2,000 feet) - (AWG #22)
Door strike output	1 form C output, 12VDC, 250 mA max, supervised
Auxiliary outputs (LED, BUZ)	2 outputs, open NPN collector for door access and status 25mA max, 12 DC each
Reader power output	5VDC @ 150mA protected
Communication port	RS-485
Communication speed	From 1200 to 115,200 baud (automatic detection)
Reader communication interface	ANSI, SIA, ABA clock and data, Wiegand 5 conductor
Flash memory	64 K
RAM memory	128 K
Backup battery	Lithium battery, up to 10 years retention (data and RTC operation)
Network autonomy	Distributed data and processing
Certifications / Listing	FCC Part 15, Class B

Section 2: Mounting and Wiring the KT-100 Door Controller

Step 1•Unpacking the KT-100

The KT-100 Controller has been designed to be mounted on a wall in a single gang electrical box without any additional enclosure.

Before installing the KT-100 Door Controller:

1. Unpack the KT-100 Controller package. The following items are required to install the KT-100:
    ◗ KT-100 Controller with accessory kit (included),
    ◗ PC4204 DC Power Supply with battery backup (suggested, not included),
        ◗ AC transformer; Input: 120 or 230 VAC; Output: 16 VAC, 40VA, class 2 (not included)
        ◗ One 12-volt lead-acid battery 7A/h (not included)
        ◗ Ground clamp (not included).
2. Verify the content for any missing item/part or damaged component. Any missing or damaged item should be reported immediately.

Step 2•Selecting a Mounting Location

The KT-100 Door Controller should be accessible for ease of installation and maintenance.

Select an ideal indoor location using the following guidelines:

◗ Stay away from electrical or communication devices: controllers must be located at a minimum distance of 2 m (6 feet) from any high voltage equipment or wiring (> 230 Volts) and from electrical equipment susceptible of generating electrical interference, at a minimum distance of 1 meter (3 feet) from telephone equipment or lines, and at a minimum of 8 meters (25 feet) from any transmitting equipment.
◗ The controller should be mounted indoors in a secure location providing normal temperature and humidity levels.
◗ Controllers should be located close to the controlled door.
◗ Physical access, using keys, on controlled door must be provided so that the KT-100 can easily be accessed for servicing in case of malfunctions.

Step 3•Installing the Power Supply

The suggested power supply is the KT-PC4204.
The power supply cabinet (Kantech part no. KT-4051CAB) is large enough to accommodate the battery backup supply and the necessary wiring connections for most applications. EMT (Electrical Metallic Tubing) conduit knockouts are provided in 2.2 cm (7/8") on all sides of the cabinet.

NOTE: Power should only be applied to the unit when all connections are completed and tested.

For details on installing the KT-PC4204, refer to "Mounting the KT-PC4204" on page 11.

NOTE: If you are installing another type of power supply, refer to the manufacturer's instruction.

Step 4•Installing the KT-100 Unit

The following diagram illustrates a typical door layout:

Door handle. The outside door handle (or knob) should be permanently locked. The access controller should always be the one which unlocks the door by releasing the electric lock. The inside door handle should be free (unlocked) to permit safe exit in case of emergency. To prevent a door from being left manually unlocked, make sure there are no lock/unlock buttons on the inside doorknob.

Door closer. A standard hydraulic door closer is almost mandatory to insure that the door closes automatically after an entry and to prevent "door open too long" or "door left open" alarms.

Door contact. When the door is locked, the access controller supervises the door contact and will report a "door forced open" alarm if the door is opened without the use of a card. When the door is unlocked, the condition of the door contact is still supervised but no alarms are generated.

Exit detector and exit button. The exit detector or button will warn the system of the pending opening of a free exit door by a user leaving the protected area.

Local door alarm. The local door alarm is integrated in the IoProx Door Reader for outside and in the T-Rex for inside. It provides audible indication of an abnormal condition. The most common conditions to be reported locally are "door forced open" and "door open too long" events.

Reader and keypad. A keypad only installation is considered less secure than a reader only installation. Adding a keypad to a reader significantly increases the level of security.

Step 5•Connecting the Door Locking Device

The lock NC, NO and +12VDC terminals are located on the top left of the KT-100 Controller terminal strip.
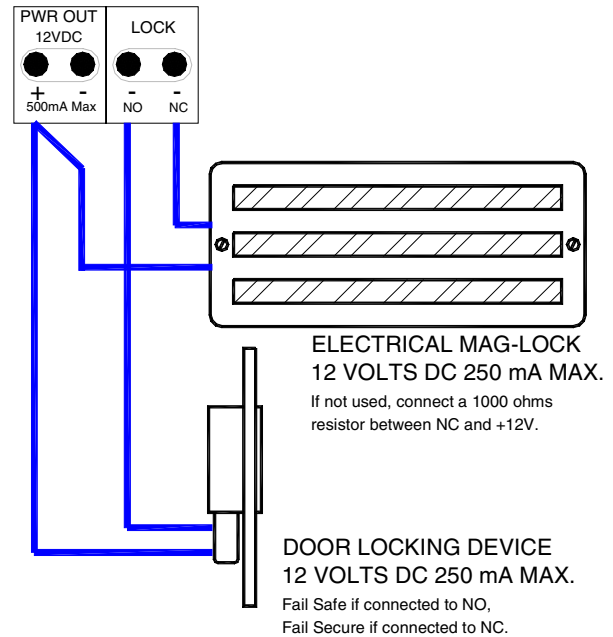The locking device output is controlled by the software according to preset parameters for allowing access or unlocking doors according to schedules and access levels.
The NO or NC output can operate DC powered locking devices such as electromechanical strikes and can be configured to operate in fail-safe or fail-secure modes (normal or reverse action). The maximum permitted current is 250mA @ 12VDC per output.

NOTE: Use 1K ohm end-of line resistor between +12VDC and NC if not used. This resistor is already included in the box (KT-100-ACC).

To connect the door locking device:

1. Connect the negative wire from the door strike to the NO output and optionally, the door magnetic lock to the NC output.
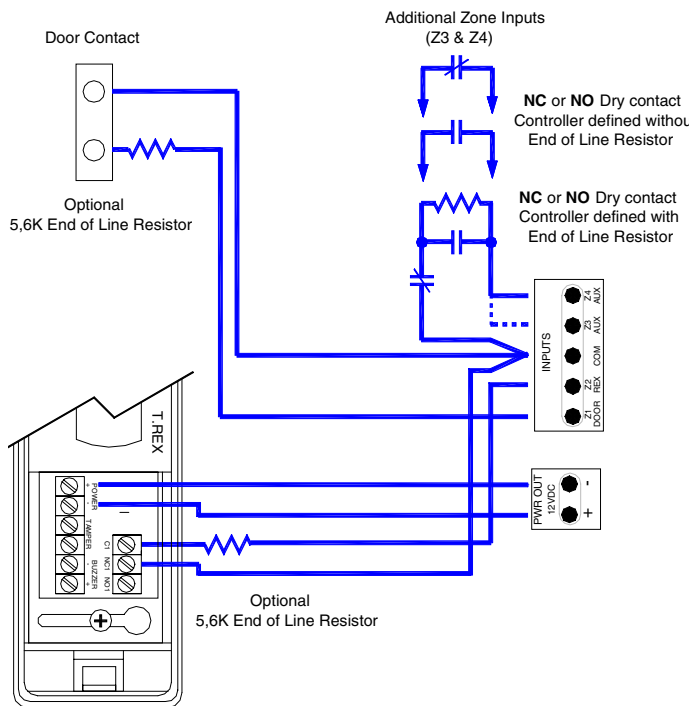2. Connect the positive wire to the +12 VDC output.

ELECTRICAL MAG-LOCK
12 VOLTS DC 250 mA MAX.
If not used, connect a 1000 ohms resistor between NC and +12V.

DOOR LOCKING DEVICE
12 VOLTS DC 250 mA MAX.
Fail Safe if connected to NO,
Fail Secure if connected to NC.

WARNING!*Controlled door locks may be governed by regulatory bodies and should always be installed according to local regulations. In most instances, there are strict limitations to installing fail-secure devices and fail-safe locking devices such as magnetic locks or other similar locking devices on doors used as emergency exits.*

Step 6•Hooking up Inputs

The KT-100 has an on-board capability of monitoring 4 input zones. Each input is supervised with or without end-of-line resistors (5.6K ohm). The maximum distance of one line is 600 m (2,000 feet) with AWG#22 (Kantech part #CBL-R2).
By default, inputs 1-2 are reserved for the door contact and the request to exit. The door contact is assigned to input 1 (Z1) and the associated request-to-exit detector to input 2 (Z2). There is no obligation to follow these rules but such a standard convention makes it easier for servicing.

To connect inputs:

1. Connect devices between inputs Z1 to Z4 and COM.

Door Contact

Additional Zone Inputs
(Z3 & Z4)

NC or NO Dry contact
Controller defined without
End of Line Resistor

NC or NO Dry contact
Controller defined with
End of Line Resistor

Optional
5,6K End of Line Resistor

Optional
5,6K End of Line Resistor

2. Connect resistors (included with KT-100) for all inputs 5.6K ohm (if selected).

NOTE: *Inputs can be defined with none or one end-of-line resistor according to parameters defined in your EntraPass Special Edition software.*

Step 7•Connecting Readers and Keypads

The maximum allowable distance between the readers and the KT-100 controller varies by reader type. Please consult the reader manual for details.

WARNING! *Connecting the red wire lead (or power lead) of a 5VDC reader to the 12VDC terminal may damage the reader. Refer to the reader installation procedure for proper power connection. Up to 2 readers can be connected to a KT-100. They can be installed on one door to control both entry and exit.*

To connect the reader (entry and exit) refer to the diagram below:
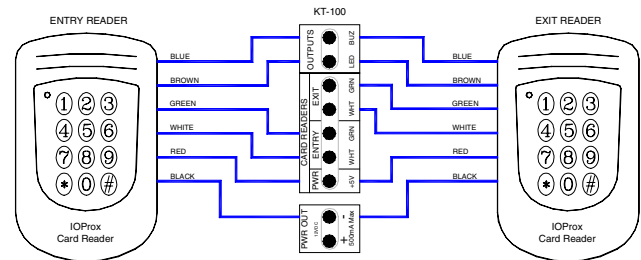

NOTE:

◗ *The 12 VDC auxiliary power can also be used to power low current audible devices usually located at the controlled door. Auxiliary outputs can be connected to readers & local warning devices to be used for visual and audible signals.*

◗ *Auxiliary output "LED" provides visual feedback of access operation; auxiliary output "BUZ" can activate audible warning devices, such as T.REX, to signal door alarms.*

Step 8•Connecting Control Relay Outputs

The KT-100 provides two opto-isolated contacts (R1 & 2) and two control outputs (R3 & 4). R1 & 2 can be used as either as dry contacts.

◗ R1 & R2: maximum voltage = 30 volts AC/DC; maximum current = 100 mA total; (R1 & R2).

◗ R3 & R4: maximum voltage = 12 volts DC; maximum current (each relay) 25 mA

NOTE: *Use a KT-RM1 (optional) to switch larger currents or voltages or to supply a dry contact.*
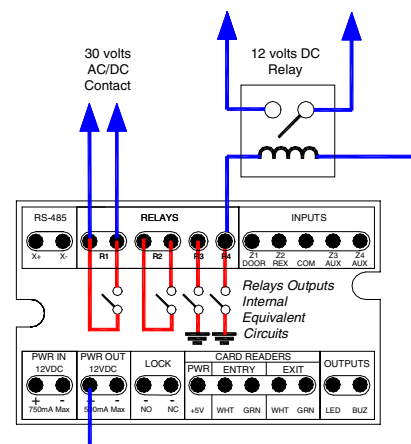

## Step 9•Connecting the Tamper Switch

Optionally, a tamper switch may be installed on the unit to detect unauthorized opening of the cabinet. For this purpose, you may use the MUSB1 box for surface mount (Optional - Kantech part # KT-100TAMP).

The normally closed tamper switch is connected to an input. It is recommended to choose an unused input (3 or 4) as tamper input.

1. Install the KT-100TAMP tamper switch in the MUSB box as illustrated below.
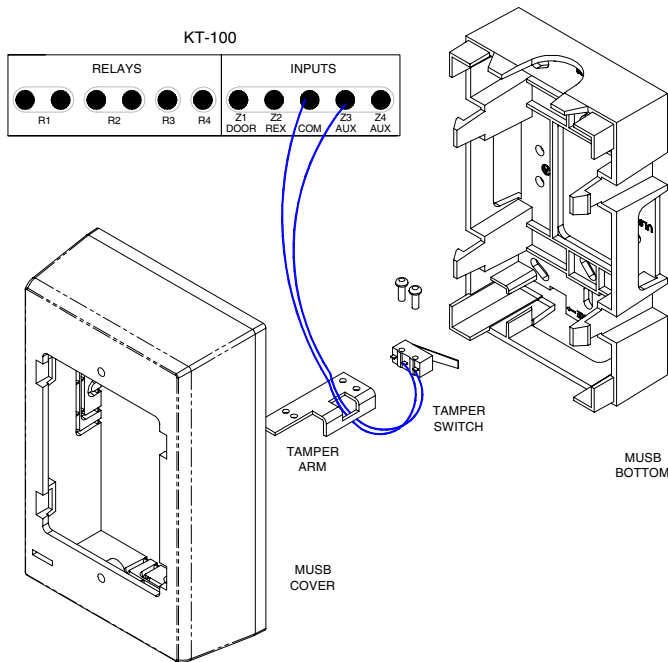
◗ When using the USB-485: connect a 120 ohm end-of-line resistor on the last KT-100 only (X- & X+). You do not need to connect the first KT-100 since the USB-485 contains an end-of-line resistor.
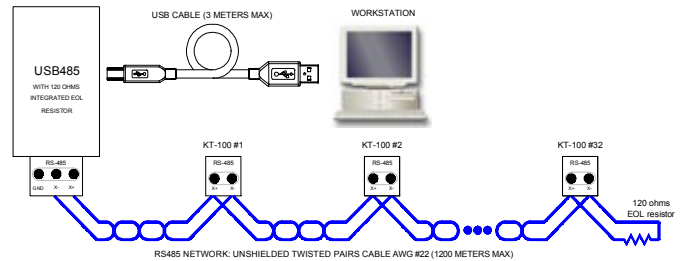
NOTE: *After you have completed all the necessary steps, you may power the KT-100 by connecting the AC power and the battery.*

Step 10•Connecting the KT-100 to the RS-485 Bus

Controllers are linked together through their RS-485 screw terminal. The maximum communication loop length with the appropriate cable is 1.2 kilometers (4,000 feet) from the last controller to the workstation.

NOTE: *Do not connect several KT-100 controllers at a single point or in a "Y" or "spider web networks".*

The RS-485 communication loop should be wired with Ethernet Category 3 double twisted pair network cable (see cable specifications Belden 1227A or equivalent). The RS-485 loop can operate from 1,200 to 115,200 baud, under normal conditions. The baud rate depends on the loop length and the environment (Refer to Step 2 "Selecting a Mounting Location" on page 5).

NOTE: *Intermittent communication problems or erratic operation may require to slow down the network speed to 9,600 or 19,200 baud. Varying the network speed does not perceptibly change the operation speed of the system. Usually, most installations should be set at 19,200 baud.*

To link KT-100 Door Controllers:

1. Connect the RS-485 cable to X1+, X1- and GND.
    ◗ If you are not using the USB-485 or VC-485: connect a 120 ohm end-of-line resistor at the interface of the first and last KT-100 (X- & X+);

Section 3: Appendix

Typical KT-100 Wiring Diagram
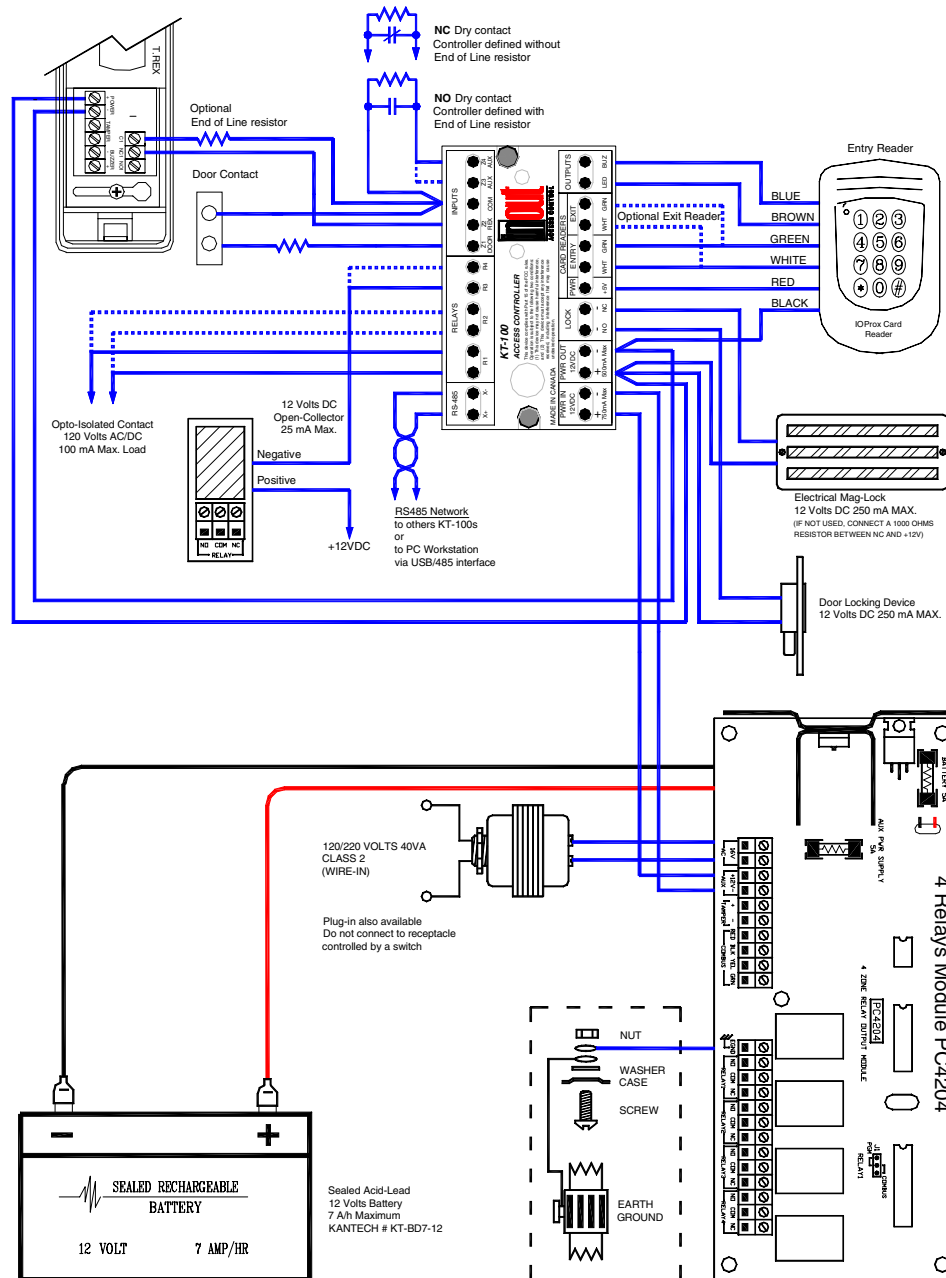
KT-100 Compliance Notices

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. This class B digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. The KT-100 is also compliant with EN55022: 1994, amendment 1: 1995, Class B.

Troubleshooting Communication Problems

The KT-100 default initialization is done at Kantech. The following steps should only be done if:

◗ You changed the software (e.g.: you were using WinPass, then installed EntraPass) and there is no communication,

◗ You replaced an existing KT-100 by another one on a loop,

To enable the default initialization (hard reset):

1. Disconnect the transformer and the battery from the PC4204 power supply.

2. Remove all connections of Z1 (DOOR) and R3 terminals.

3. Place a jumper between the Z1 (DOOR) and R3 terminals.

4. Apply AC power to the transformer. The VITAL LED should flash 4 times. This means that the controller is in the initialization mode.

5. Disconnect the jumper. When the controller is communicating with the PC, the VITAL LED will flash 3 beats at a time.

6. Reconnect the battery.
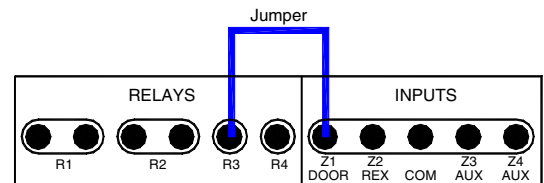
KT-100 Controller Maintenance

To ensure the best operating conditions, it is highly recommended to test the KT-100 controller by performing the following tests.

Bi-annual test for battery

This test will ensure that if a power failure occurs, the battery will be able to support normal operations. This test should be performed twice a year.

1. Remove AC power from the power supply and power the controller using the battery for one hour.
2. Once the test has been performed successfully, reconnect the AC power to the power supply. No low power or power failure events should be reported to the system workstation.

Annual test for emergency lithium battery

Measure voltage of lithium battery when power is totally removed from the controller (AC & DC power). To ensure maximum operation and prevent loss of power, if the lithium battery voltage measures below 2.5 VDC, please contact your distributor to return the KT-100 for maintenance.

Mounting the KT-PC4204

The KT-PC4204 package should include the following items:
- ◗ One KT-PC4204 circuit board,
- ◗ One ground wire assembly,
- ◗ Five plastic standoffs,
- ◗ One 5 A replacement fuse.

The KT-PC4204 should be located inside a compatible cabinet (Kantech part no. KT-4051CAB), mounted on a dry, secure location. Preferably, it should be placed at a convenient distance from the connected devices.

To mount and connect the power supply:

1. Press the five plastic stands offs through the mounting holes at back of the cabinet.
2. Secure the cabinet to the wall in the desired location. Use appropriate wall anchors when securing the cabinet to dry wall, plaster, concrete, brick or other surfaces.
3. Press the circuit board into the plastic stands offs to secure the module to the cabinet.
4. Mount the power supply unit.
5. Install 120 / 230VAC / 16VAC, 40VA, class 2 wire-in or plug-in transformer.
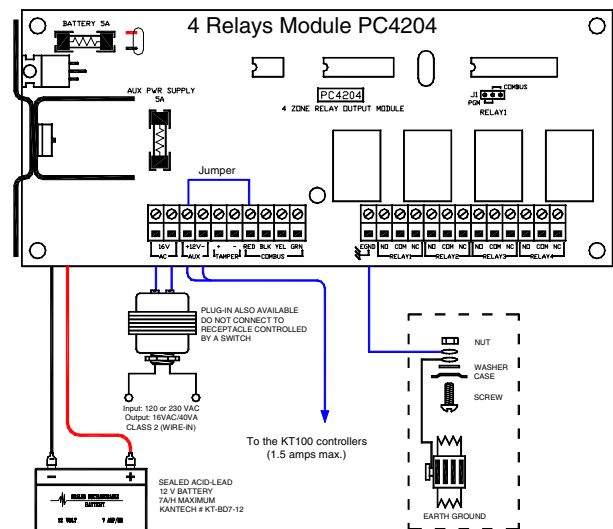
6. Place battery in the cabinet. If the AC supply is removed form the PC4204, the backup 12volt battery (if fully charged) will support normal operation for up to 12 hours. An internal battery verification will cut the output power if the battery voltage level falls below 9.5 V DC.
7. Connect the AWG#18 grounding wire to EGND

NOTE: Since the KT-100 uses high performance communications, proper grounding must be provided to ensure proper operation. An AWG#18 single conductor solid copper wire must be used to ground each KT-PC4204 power supply to a good earth ground as per the local electrical code (be careful of ground loops). The ground clamp should be located below any other ground.
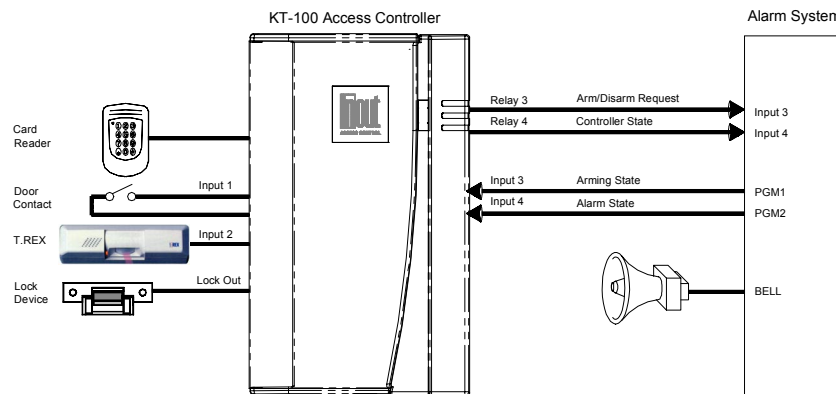
Using the KT-100 with an external alarm panel

To interface the KT-100 to an external alarm panel:

1. Connect the KT-100 two inputs (zone 3 and 4) to the external alarm status relay (PGM1 and PGM2)

2. Connect the KT-100 two outputs (Relay 3 and 4) to the external alarm system arming status inputs (input 3 and input 4). These will be used to arm/disarm the external alarm system as illustrated below.

   ◗ The **KT-100 Input (Input 3**, in the example) is used to indicate the arming state of the client party alarm system. An abnormal status indicates to the KT-100 that the external alarm system is armed.

   ◗ The **KT-100 input (Input 4,** in the example) is used to indicate the alarm state of the external alarm. An abnormal status tells the KT-100 that the external alarm system is in alarm.

◗ The **KT-100 output (Relay 3,** in the example) is used as an arm/disarm request of the third party alarm system. This output is pulsed once to arm or disarm the alarm system according to the current arming state.

◗ The **KT-100 output (Relay 4,** in the example) is connected to a local bell or to warn the alarm panel of an abnormal condition from the door.

◗ Optionally, one KT-100 input zone can be defined as an arming/disarming request input for the external alarm panel. In this case, the arming/disarming request will depend on the door or external alarm. For example, an arming/disarming request may be triggered by an access request, a code entered on the keypad and/or a schedule, depending on the door status (open or closed) and the alarm system status (armed or disarmed).

NOTE: For details about interfacing the KT-100 Door Controller with an external alarm system, please contact our Customer Assistance at 1 888 KANTECH.