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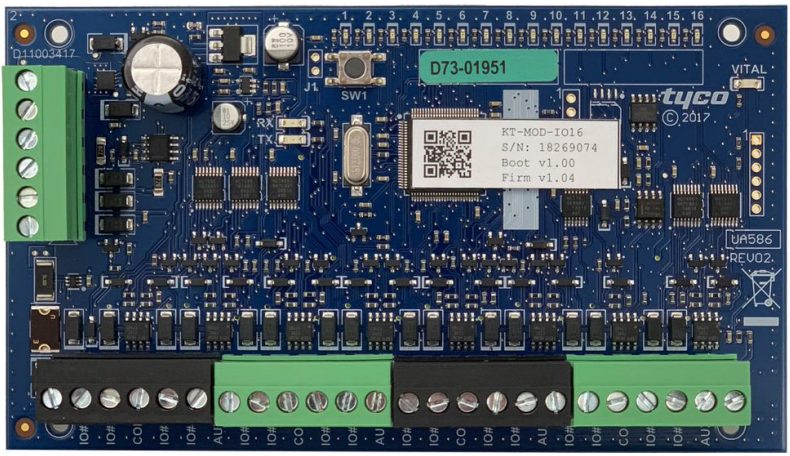
KT-MOD-IO16 RS-485 Input/ Output Module Installation Guide



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Safety instructions

Important: Never install the equipment during a lightning storm.

This equipment, KT-MOD-IO16 RS-485 Input/Output Module, shall be installed and used within an environment that provides the pollution degree max 2 and over voltages category II NON HAZARDOUS LOCATIONS, INDOOR only. The equipment is FIXED and PERMANENTLY CONNECTED and is designed to be installed by Service Persons only;
[service person is defined as a person having the appropriate technical training and experience necessary to be aware of hazards to which that person may be exposed in performing a task and

of measures to minimize the risks to that person or other persons.] The equipment is installed in a metallic cabinet that meets the applicable requirements for a FIRE ENCLOSURE.

1. Avoid **setting up** the equipment near heaters, air conditioners, ventilators, and/or refrigerators; DO NOT select a place that exposes the equipment to direct sunlight, excessive heat, moisture, vapors, chemicals or dust.
2. If **during the installation** a knockout on the cabinet that is used to install the equipment is removed, it is the installer's responsibility to ensure that the same degree of protection for the cabinet is provided by the use of bushings, fittings, adequate sealant, etc.
3. The metallic **cabinet must be secured to the building structure before** operation. Use four (4) stainless steel tapping screws #8, 32 mm (1.25 in.) to mount the cabinet.
4. The **ground connection** must be as shown within the included diagram, or equivalent. The cabinet that is used to install the equipment must have an appropriate ground connection.
5. **Internal wiring** must be routed in a manner that prevents the following conditions:

    - Excessive strain on wire and on terminal connections
    - Loosening of terminal or connection
    - Damage of conductor insulation
    - Reducing the clearance between SELV (Safety Extra Low Voltage) circuits and NON-POWER Limited Circuits (Battery wires)
    - Route the battery wires away from the rest of the SELV circuit

6. It is the end-user and/or installer's responsibility to ensure that the disposal of the used batteries is made according to the waste recovery and recycling regulations applicable to the intended market.
7. There are **no serviceable parts within the equipment**. For any issues regarding the equipment please contact your installer.
8. **DISCONNECT POWER BEFORE SERVICING**.

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United States and Canada	Toll free	+1 888 222 1560
United States and Canada	Toll free	+1 800 507 6268 option 4

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- For technical training inquiries, email latam.certificaciones@jci.com.

Table 2: Latin America and Caribbean telephone numbers

Area	Call type	Opening times: 08:00 to 20:00 (EST)
Latin America and Caribbean	Toll free	+1 800 507 6268
Latin America and Caribbean	Toll free	+1 800 392 2873
Argentina, Buenos Aires	Direct	+54 11 5199 3104
Brazil, Sao Paolo	Direct	+55 11 3181 7377

Table 2: Latin America and Caribbean telephone numbers

Area	Call type	Opening times: 08:00 to 20:00 (EST)
Chile, Santiago	Direct	+56 2 3210 9662
Colombia, Cali	Direct	+57 2 891 2476
Colombia, Medellin	Direct	+57 4 204 0519
Costa Rica, National VOIP	Direct	+506 4 000 1655
Dominican Republic, Santo Domingo	Direct	+1 829 235 3047
El Salvador, San Salvador	Direct	+503 2 136 8703
Guatemala, Guatemala City	Direct	+502 2 268 1206
Mexico, Mexico City	Direct	+52 55 8526 1801
Panama, Panama City	Direct	+507 836 6265
Peru, Lima	Direct	+51 1 642 9707
Venezuela, Caracas	Direct	+58 212 720 2340

Europe, Middle East, and Africa

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Table 3: Europe, Middle East, and Africa telephone numbers

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Europe, Middle East, and Africa	Direct	+31 475 352 722
Bahrain	Direct	(0)800 04127
Belgium	Direct	+0800 76 452
Denmark	Direct	+45 4494 9001
France	Direct	+0800 90 79 72
Germany	Direct	+0800 1806 757
Greece	Direct	00800 312 294 53
Ireland	Direct	+1800 94 3570
Israel	Direct	+972 772 201 350
Italy	Direct	+39 0230 510 112
KSA	Direct	+96 6800 8500 509
Kuwait	Direct	(0)22062915
Lebanon	Direct	01 426 801, new dial tone and then dial 8552 3436 77
Nordic Countries	Direct	04494 9001
Oman	Direct	(00) 8007 4364
Qatar	Direct	(00) 800100841
Russia	Direct	81 0800 2052 1031
South Africa	Direct	+27 (0) 10 100 3292
Spain	Direct	+900 99 31 61

Table 3: Europe, Middle East, and Africa telephone numbers

Area	Call type	Opening times: 08:00 to 18:00 (CET)
Turkey	Direct	+00800 3192 3007
United Arab Emirates	Direct	(0)800 0310 7123
United Kingdom	Direct	+44 330 777 1300

Asia Pacific

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Table 4: Asia Pacific telephone numbers

Area	Call type	Opening times: 09:00 to 18:00 (CST China Standard Time) and 09:00 to 19:00 (India Time)
Asia Pacific	Toll free	+ 800 2255 8926
Australia	Direct	+1 800 580 946
China	Direct	+86 21 6163 8644
India	Direct	+91 80 4199 0994
Oceania and New Zealand	Direct	+64 9942 4004

Introduction

The RS-485 Input/Output Module expands the input and output functionality of KT-400, KT-1, and KT-2 controllers. The module features 16 terminals for use as inputs or outputs that are configurable in lots of 4. It is compatible with EntraPass 8.10 and later. Use this guide to install and wire the module.

Box contents

When you open the product box, check that it contains the following items:

- One KT-MOD-IO16 RS-485 Input/Output Module.
- One accessory kit containing four plastic standoffs and thirty-two 5.6K EOL resistors.
- *KT-MOD-IO16 RS-485 Input/Output Module Installation Guide*.

Technical specifications

The following table lists the technical specifications of the KT-MOD-IO16.

Table 5: Technical specifications

Type	Description
Dimensions (H x W x D)	31.5 x 146 x 82.6 mm (1.25 x 5.75 x 3.25 in.)
Weight	118 g (1/4 lb)
Operating temperature	0°C to 49°C (32°F to 120°F)
Operating humidity	0 to 85% non-condensing
Input voltage	9.5 VDC to 14 VDC
Current consumption	Typical: 500 mA at 12 VDC (25 mA for each terminal) Max: 1.5 A at 12 VDC (45 mA for each terminal)
RS-485 LED indicators	2 LEDs for the RS-485 communication (RX, TX)
Vital LED indicator	LED indicating the module status
Inputs/Outputs	16 I/Os: configurable in lots of 4
Inputs	I/Os that are configured as inputs support normally closed (NC) and normally open (NO) contacts. Inputs support no end-of-line, single end-of-line, and double end-of-line zone loops.
Outputs	I/Os that are configured as outputs (open-drain outputs) can sink up to 750 mA each at 9.5 to 14 VDC. Each module can sink a maximum of 4 A.
Input/Output LED indicators	16 LEDs for the I/O status
Aux power outputs	4 terminals wired together to supply up to 1.5 A at 9.5 to 14 VDC out of the input power. These outputs are supervised and current limited.
SPI port	I/Os #9 to #12 that are configured as SPI ports can support a daisy-chained SPI bus that consists of 8 KT-MOD-REL8 modules. Each module can provide 8 Form C relay outputs.
Terminal blocks	Removable type, color coded, supports 12 to 30 AWG cables
Tamper	NC input (NEOL)
Mounting	Mount the PCB in a compatible cabinet. The KT-MOD-CAB is recommended.
Communication	RS-485 AES 128-bit
RS-485 cabling	2 twisted pairs, unshielded, up to 1200 m (4000 ft). For more information, see Installing and wiring the KT-MOD-IO16.
Input wiring	Up to 600 m (2000 ft)

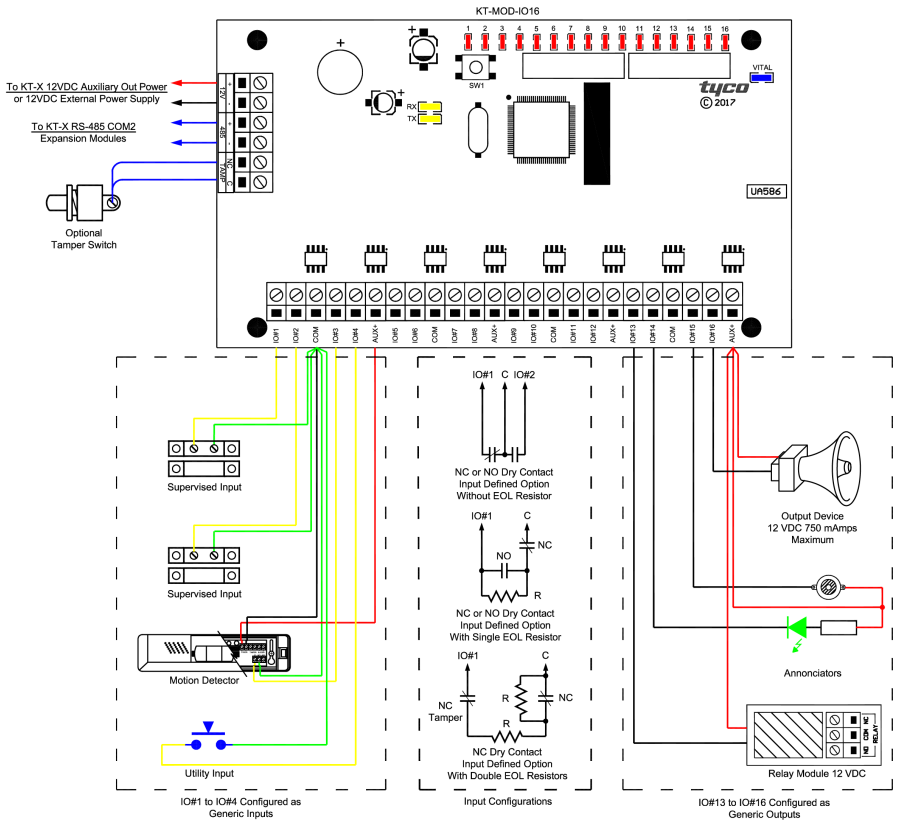
Table 5: Technical specifications

Type	Description
Firmware	Field upgradable using RS-485. To verify the firmware version of the KT-MOD-IO16, refer to the relevant software User Manual.
Certifications	FCC, CE, RoHS, WEEE, UL 294 and UL 1076 listed subassembly
Connections for each KT controller	Up to 62 modules for each KT controller using RS-485 COM2.
Warranty	Limited lifetime

Basic wiring diagram

The following figure illustrates the basic wiring configuration of the KT-MOD-IO16.

Figure 1: Basic wiring diagram



The following table describes the wiring, condition, and state of each input configuration.

Table 6: Contact input configuration

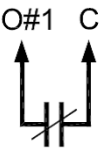
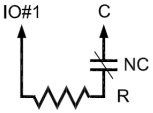
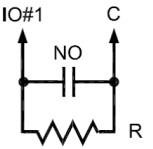
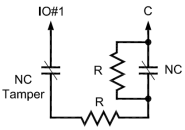
Input configuration	Contact type	Wiring	Condition	State
Dry contact without an EOL resistor	NC		A short is detected.	Secure
			An open condition is detected.	Alarm
	NO		An open condition is detected.	Secure
			A short is detected.	Alarm

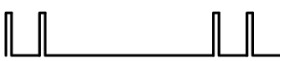
Table 6: Contact input configuration

Input configuration	Contact type	Wiring	Condition	State
Dry contact with a single EOL resistor	NC		The contact is closed and the EOL is detected.	Secure
			A short is detected.	Alarm
			An open condition is detected.	Alarm
	NO		The contact is opened and the EOL is detected.	Secure
			A short is detected.	Alarm
			An open condition is detected.	Alarm
Dry contact with a DEOL resistor	NC		Both the alarm contact and the tamper contact are closed so that only one EOL resistor is detected.	Secure
			The alarm contact is opened, the tamper contact is closed so that the two EOL resistors are detected.	Alarm
			A short is detected.	Trouble
			An open condition is detected.	Tamper

Vital LED indicator chart

The following table lists the LED sequences of the KT-MOD-IO16.

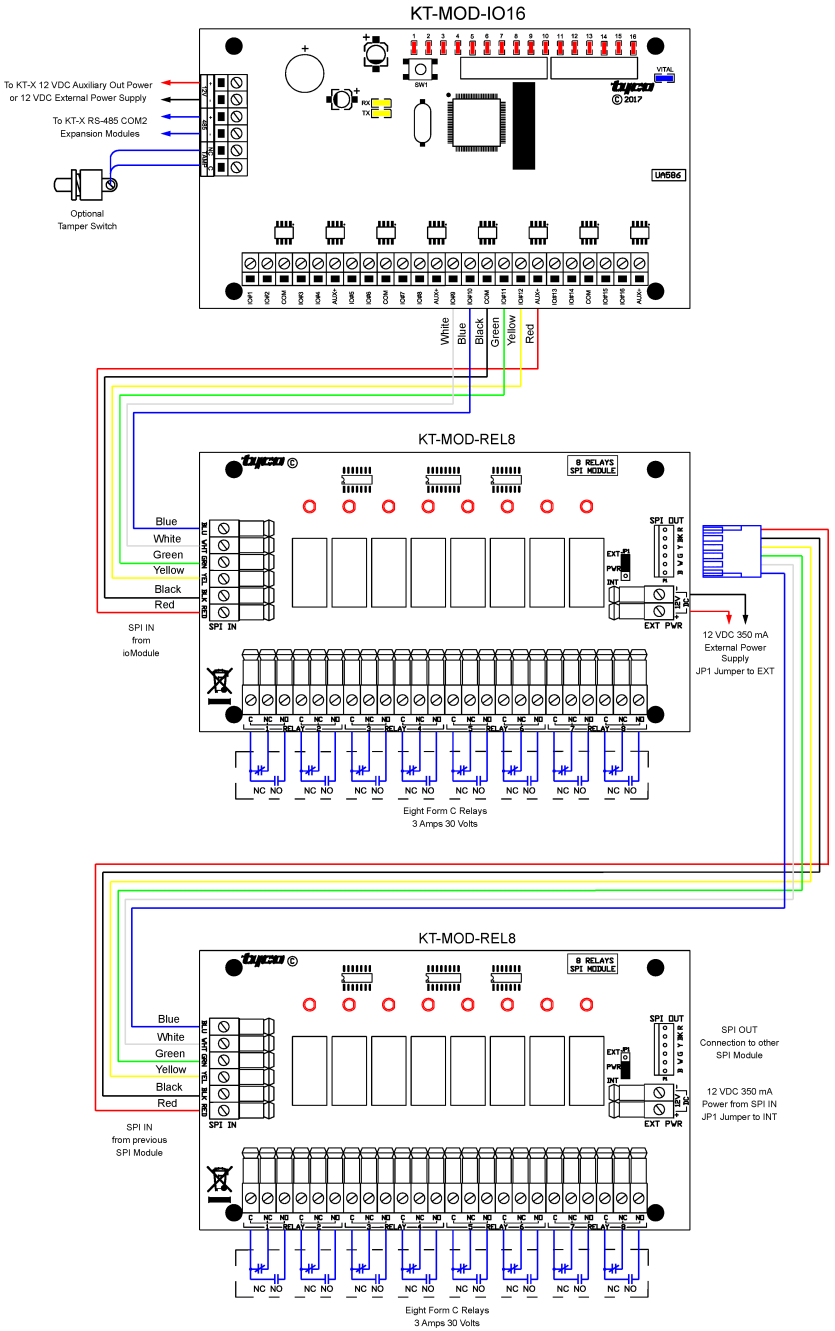
Table 7: Vital LED indicator chart

Device state	LED sequence	Description
Firmware upgrade		Quick pulses. 5 pulses every second at 50% duty cycle.
Factory default		Continuous long pulses
Unassigned module		2 short pulses
Assigned module communicating		1 short pulse
Assigned module lost communication		Continuous short pulses

SPI modules

The following figure shows how to wire serial peripheral interface (SPI) modules.

Figure 2: SPI modules wiring diagram



SPI information

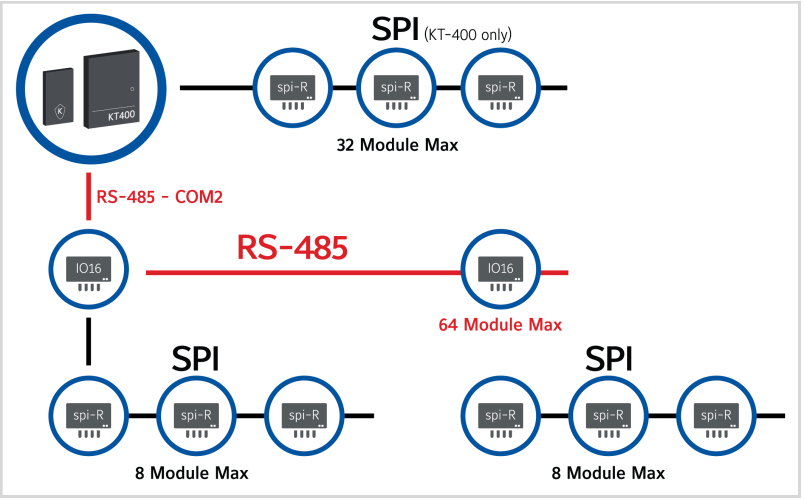
Each KT-MOD-IO16 can support 8 SPI relay modules, up to a total of 64 relays (SPI) for each module. These can be with or without elevator control.
You can have a total of 32 SPI relay modules (KT-400 only).

Power limitations from KT controllers

See the following list of power limitations:

- The specifications for KT-MOD-REL8 modules or KT-MOD-IO16 modules apply up to a maximum of 32 modules.
- The KT controller can power up to three KT-MOD-REL8 modules and one KT-MOD-IO16 module, depending on your configuration.
- Use the KT-MOD-REL8 module input and jumper setting to add an external power source.

The following figure illustrates the maximum system configurations.
Figure 3: Maximum system configurations



Resetting the KT-MOD-IO16

Perform a soft reset or a factory default reset on the KT-MOD-IO16 by using the SW1 button on the module board.

Executing a soft reset

- Press the **SW1** button for more than 100 ms (debounce) but for less than 3 seconds.

The module restarts with its previous definitions and configuration, and puts all defined outputs, including the SPI relay output, into their normal secure state.

Executing a factory default reset

- Press the **SW1** button for more than 3 seconds.

To confirm that 3 seconds have passed, all of the IO red LEDs flash on-off until you release the button. The module restarts with its default definitions.

Input and output terminals

The input/output terminals support the following configurations:

- All inputs/outputs support an input mode for a no end-of-line input configuration. They also support a single end-of-line input configuration and a double end-of-line input configuration.
- All inputs/outputs support an open-drain output mode.
- Four inputs/outputs support an SPI interface.

The following table lists the KT-MOD-IO16 and the KT-MOD-REL8 connections.
Table 8: KT-MOD-IO16 and KT-MOD-REL8 connections

Terminal	Wire color	SPI interface
I/O #9	White	SS - Subordinate Select
I/O #10	Blue	MISO - Master Input, Subordinate Output
COM	Black	COM
I/O #11	Green	SCLK - Serial Clock
I/O #12	Yellow	MOSI - Master Output, Subordinate Input
+12 V	Red	+12 V

Mounting the KT-MOD-IO16

Mount the KT-MOD-IO16 in a compatible KT-MOD-CAB or KT-400-CAB cabinet. Alternatively, mount the KT-MOD-IO16 in a dry and secure location.

To mount the KT-MOD-IO16 in a compatible cabinet, complete the following steps:

1. Insert the four plastic standoffs through the mounting holes of the KT-MOD-IO16.
2. Secure the cabinet to the wall. Use the appropriate wall anchors to secure the cabinet to drywall, plaster, concrete, brick, or other surfaces.
3. Affix the module plastic standoffs to secure the module to the cabinet.

Installing and wiring the KT-MOD-IO16

To install and wire the KT-MOD-IO16, consider the following guidelines:

Wiring regulations

All cables must comply with the following regulations:

- National Electrical Code
- NFPA 70
- Local electrical codes
- Canadian Electric Code C22.1. This applies to installations in Canada.
- BSI Standard BS7671, latest edition. This applies to installations in the United Kingdom.

Wiring an SPI module

To wire an SPI module to the KT-MOD-IO16, use the KT-MOD-SPI-16 cable that is supplied with the SPI module. Alternatively, use another 6 conductor cable. Cut the cable at the header end and strip the wires.

Note: Kantech does not supply a cable with the KT-MOD-IO16.

Wiring the KT-MOD-IO16

To wire the KT-MOD-IO16, consider the following guidelines:

External power to 12 VDC input

- **Recommended cable type:** The length of the cable and the amount of power supplied by the KT-MOD-IO16 determine the size of the wire you should use. Use the appropriate wiring size for your application. In some cases, you can use one or two wires of a CAT5 cable for the negative side and one or two wires of a CAT5 cable for the positive side. In other cases, use a 22 AWG cable or bigger. The terminal blocks support 12-30 AWG wires.

  Note: The voltage drop between the power source and the KT-MOD-IO16 should not exceed 10% of the supplied voltage in the worst condition when all devices that are powered from the module are energized at the same time.

RS-485 bus

- **Recommended cable type:** Twisted pair, unshielded cable, 22 AWG or CAT5.
- **Maximum length:** 1200 m (4000 ft)

Tamper input

- **Recommended cable type:** 22 AWG or CAT5

  Note: Internal to cabinet.

Zone inputs

- **Recommended cable type:** 22 AWG or CAT5
- **Maximum length:** 600 m (2000 ft)

Outputs and AUX power

- **Recommended cable type:** The length of the cable and the amount of power supplied by the KT-MOD-IO16 determine the size of the wire you should use. Use the appropriate wiring size for your application. In some cases, you can use one or two wires of a CAT5 cable for the negative side and one or two wires of a CAT5 cable for the positive side. In other cases, use a 22 AWG cable or bigger. The terminal blocks support 12-30 AWG wires.

  Note: If you use an external power source, make sure that you wire the COM terminal to the negative side of the power source correctly because the return current comes from one of the COM terminals.

COM

- **Recommended cable type:** The length of the cable and the amount of power supplied to the outputs, if any, determine the size of the wire you should use. Use the appropriate wiring size for your application. In some cases, you can use one or two wires of a CAT5 cable. In other cases, you use a 22 AWG cable or bigger. The terminal blocks support 12-30 AWG wires.

  Note: To power a load on an output, if you use a power source that is not supplied through the AUX+ output, ensure that you wire the COM terminal to the power source correctly because the return current comes from one of these terminals.

SPI port

- **Recommended cable type:** Use the cable that comes with the KT-MOD-REL8. Cut the appropriate end of the cable and strip each wire. Connect the wires to Inputs/Outputs #9 to #12. You can use other 22 AWG wiring.
- **Maximum length:** 1 m (3 ft)

  Note: To identify the terminals, see Figure 1.

Compliance specifications

United States

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can

radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The user is cautioned that changes and modifications made to the equipment without approval of the manufacturer could void the user's authority to operate this equipment.

Canada

CAN ICES-3 (B)/NMB-3(B)

Europe

CE Mark - This product complies with the requirements of the EMC directive.
This equipment must not be modified for any reason and it must be installed as stated in the Manufacturer's instructions. If this shipment (or any part thereof) is supplied as second-hand equipment, equipment for sale outside the European Economic Area, or as spare parts for either a single unit or system, it is not covered by the Directives.

Australia and New Zealand

RCM Mark, Australia/NZ Emissions Compliant

UL

To comply with UL listings, the following requirements must be met:

- Installation locations and wiring methods shall be in accordance with the National Electric Code, ANSI/NFPA 70.
- Install the KT-MOD-IO16 in a KT-MOD-CAB housing cabinet.
- Use a UL recognized tamper switch rated 1/4 A, 30 VDC on every housing cabinet.
- Use only a class 2 power limited UL 294 or UL 1076 listed power supply, such as the Kantech part number KT-PS4085 power supply, to power the KT-MOD-IO16.
- The combined load for all circuits must not exceed 1.5 A at 12 VDC nominal (9.5-14 VDC).
- AUX and open-collector outputs rated 1.5 A at 12 VDC nominal (9.3-14 VDC) for compatibility requirements to power other devices.
- Use only UL listed cables.
- Cables that enter or exit the cabinet are limited to 98.5 ft (30 m).
- Do not connect to a receptacle that is controlled by a switch.

UL 294 performance levels

Destructive attack: I
Endurance: IV
Standby power: I
Line security: III

Note: Line Security Level III requires an audible **and** visual signal at the monitoring station (EntraPass) and at the protected premise (KT-MOD-IO16 module and KT-1, KT-2, or KT-400 controller).

To set up audible and visual signals in EntraPass, complete the following procedures:

Creating a task builder action for audible and visual signals in EntraPass

1. On the EntraPass main menu, click the **Definition** tab, and click **Task Builder**.
2. In the **Task Builder** window, click the **New** icon.
3. In the **English** field, enter a name for the task.
4. Click **Command**.
5. In the **SmartLink Task Builder** window, from the **Component Type** list, select **Relay**.
6. From the **Command** list, select a relay action, for example **Toggle relay activation**.
7. From the **Component** list, select a relay on the controller. Use this relay for the audible signal.
8. In the **SmartLink Task Builder**window, from the **Component Type** list, select **Relay**.
9. From the **Command** list, select a relay action, for example **Toggle relay activation**.
10. From the **Component** list, select a relay on the controller. Use this relay for the visual signal.
11. Click **OK**.
12. Click **Save** and close the window.

Note: Audible and visual signaling devices must be connected to the controller's relays and located near to the KT-MOD-IO16 module. Depending on the audible or visual device you use, you may require an external power supply.

Creating a trigger and alarm sound in EntraPass

1. On the EntraPass main menu, click the **Devices** tab and click **Controller**.
2. From the **Controller** list, select the controller.
3. Click the **Trigger and Alarm** tab.
4. Right-click and select **New trigger**.
5. In the **Trigger and Alarm** window, in the **English** field, enter a name for the trigger.
6. On the **General** tab, from the **Component Type** list, select **Controller**.
7. From the **Controller** list, select the controller.
8. From the **Trigger schedule** list, select **Always valid**.
9. From the **Task Builder** list, select the task that you created in Creating a task builder action for audible and visual signals in EntraPass.
10. On the **Events** tab, click **Controller communication failed**.
11. On the **Alarm notification** tab, from the **Alarm schedule** list, select **Always valid**.
12. From the **Desktop alarm** list, select **Always valid**, and **Save**.
13. To create an alarm sound, complete the following steps:

    a. On the EntraPass main menu, click the **Options** tab and click **Multimedia Device**.
    b. On the **Sound** tab, from the **Priority** list, select the priority level associated with the event **Controller communication failed**. The default is priority level 3.
    c. Click **Assign alarm sound** and select an alarm sound from the list.
    d. Click **OK**.

14. On the EntraPass main menu, click the **Desktops** tab, right-click one of the eight desktop views and select **Properties**.
15. In the **Desktop properties** window, in the **Alarms Desktop** pane, select **Messages screen** and click **OK**.

When a controller's communication fails, a message displays in the desktop view and an alarm sounds.