



Long Distance Ethernet Solution

Pace4KR

- Four Port Single Pair Ethernet Media Adapter/Switch
- IEEE 802.3cg Ethernet, SPE over UTP

Pace4KRQ

- Four Port Single Pair Ethernet Media Adapter/Switch
- IEEE 802.3cg Ethernet, SPE over UTP
- LINQ™ Networked Managed

Installation Guide



Rev. 071824

More than just power.™

Installing Company: _____ Service Rep. Name: _____

Address: _____ Phone #: _____



Overview:

Altronix Pace4KR and Pace4KRQ are 4-port SPE (Single Pair Ethernet) Media Adapter/Switches that transmit data and power via twisted pair (2-wire, UTP or shielded) in a PoE(+) compliant format. In addition to new SPE (UTP) Ethernet network installations for Surveillance-cameras/Security/Industrial/BMS/HVAC/Elevator Controllers, applications include upgrading of legacy networks, i.e. LONworks, RS485, 4-20ma Control Loops, etc. by using the existing two wire cabling, thus saving rip-out & reinstallation costs.

Operationally, the Pace4KR/Pace4KRQ is connected to a PoE midspan/endspan switch at the headend and passes network data and power to the remote PaceKT Series transceiver(s) over UTP up to 1km (1,000m, 3,280 ft.). Pace1KT & Pace2KT transceivers can connect to one or two remote devices, such as a camera(s) or controllers, respectively. For non-enable PoE devices, only data will be transmitted. Cable distances and multi-node device drop-offs are facilitated by using one of the two Pace2KT ports for the continued network link in a daisy chain manner.

For a direct T1L remote device, use Pace1K12/24S adapter to split T1L data & power for a compatible device - see Fig. 2, pg. 4.

Pace4KRQ features built-in LINQ™ Network Power Management which facilitates monitoring, reporting and control of power/diagnostics.

Features:

Agency Listings:

- CE European Conformity.

Input Power:

- 12/24V power supply.

UTP Connection:

- Wire type: Twisted pair (2-wire, UTP or shielded).
- Speed: 10Mbps, Full Duplex.
- Distance: 1km (1,000m, 3,280 ft.), 16/2 AWG or higher @ 10Mbps
(see *Maximum Length of Cable Type vs. Total Power Consumption*, pg.4)

Ethernet Uplink Connection(s):

- Uplink Ports:
 - Pace4KR: Two (2) (see Fig. 3, pg. 5).
 - Pace4KRQ: One (1).
- Connectivity: RJ45, auto-crossover.
- Wire type: 4-pair CAT5e or higher.
- Distance: up to 100m from midspan to Pace4KR(Q) receiver (headend), 100m from PaceKT transceiver to device
- Speed: 10/100BaseT, half/full duplex, auto negotiation. PoE compliant to IEEE 802.3af (15W) and PoE+ compliant to IEEE 802.3at (25W) delivered to device by Pace4KR(Q). Power provided by Pace4KR(Q) to PaceKT by PoE protocol (See note on Page 4).

LED Indicators:

- **Yellow and Green LED (RJ45 jack):**
IP Link status, 10/100Base-T/active.
- Status LED for each UTP port

Environmental:

- Operating and storage temperature:
 - 40°C to 75°C (- 40°F to 167°F).
- Relative humidity: 20 to 85%, non-condensing.

LINQ Technology (Pace4KRQ Only):

- Remote network management allows for camera/device reset and monitoring.
- PoE port management via Dashboard IP management program.
- Provides local and/or remote access to critical information via LAN/WAN.
- Email and Windows Dashboard Alert notifications report real-time diagnostics.
- Event log tracks history.

Applications:

- Upgrade LONworks, RS485, 4-20mA control loops to Ethernet over existing wire pair.
- Industrial infrastructure control and remote sensor over extended 1,000m distances.
- Building Automation, Surveillance & Security, BMS & HVAC, Elevators.
- Utilize twisted pair for new installations or retrofit of T1L IP devices over existing twisted pair cabling.

Mechanical:

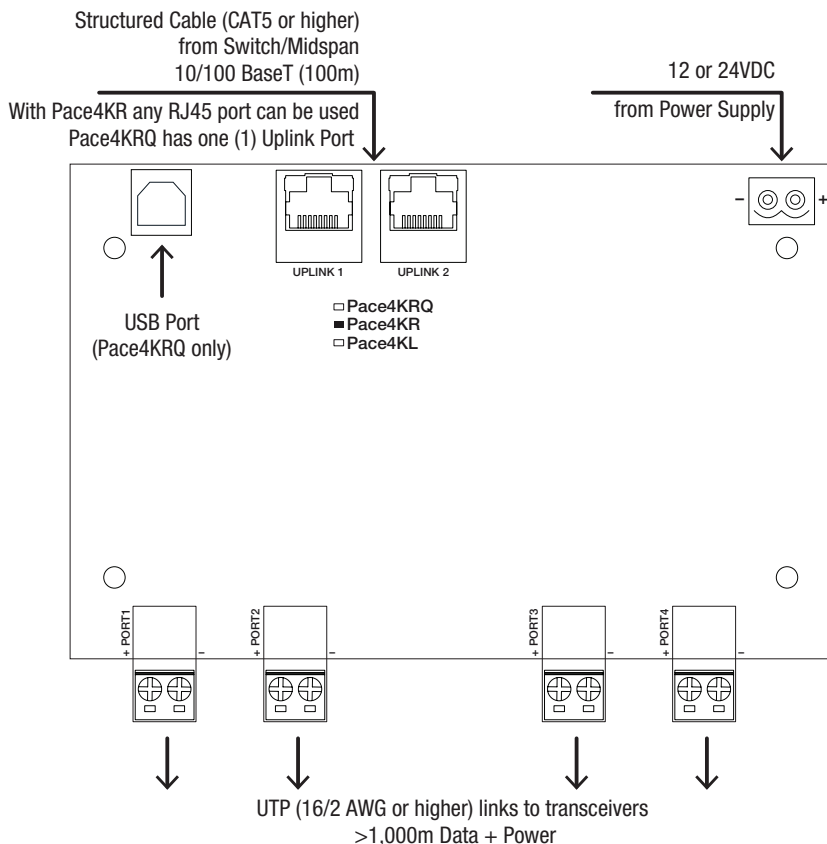
- Dimensions (W x H x D approx.):
5.5" x 3.6" x 1.125" (139.7mm x 91.4mm x 28.6mm).

Installation Instructions:

Wiring methods shall be in accordance with the National Electrical Code/NFPA 70/ANSI, and with all local codes and authorities having jurisdiction. Wiring should be UL Listed and/or Recognized wire suitable for the application. Pace4KR/Pace4KRQ is not intended to be connected to outside plant leads and should be installed indoors within the protected premises. They are intended for indoor use only.

1. Mount Pace4KR/Pace4KRQ in the desired location/enclosure (mounting hardware is included).
Unit should be mounted in proximity to ethernet switch/network.
2. Connect structured cable from ethernet midspan or endspan device to either RJ45 jack marked [Uplink 1] or [Uplink 2] on Pace4KR or to RJ45 jack marked [Uplink 1] on Pace4KRQ (Fig. 1, pg. 3).
3. Connect 12/24V power supply to connector marked [12/24V Input - +], observing polarity.
4. Connect UTP to connectors marked [Port1] through [Port4] (Fig. 1, pg. 3), observing polarity.

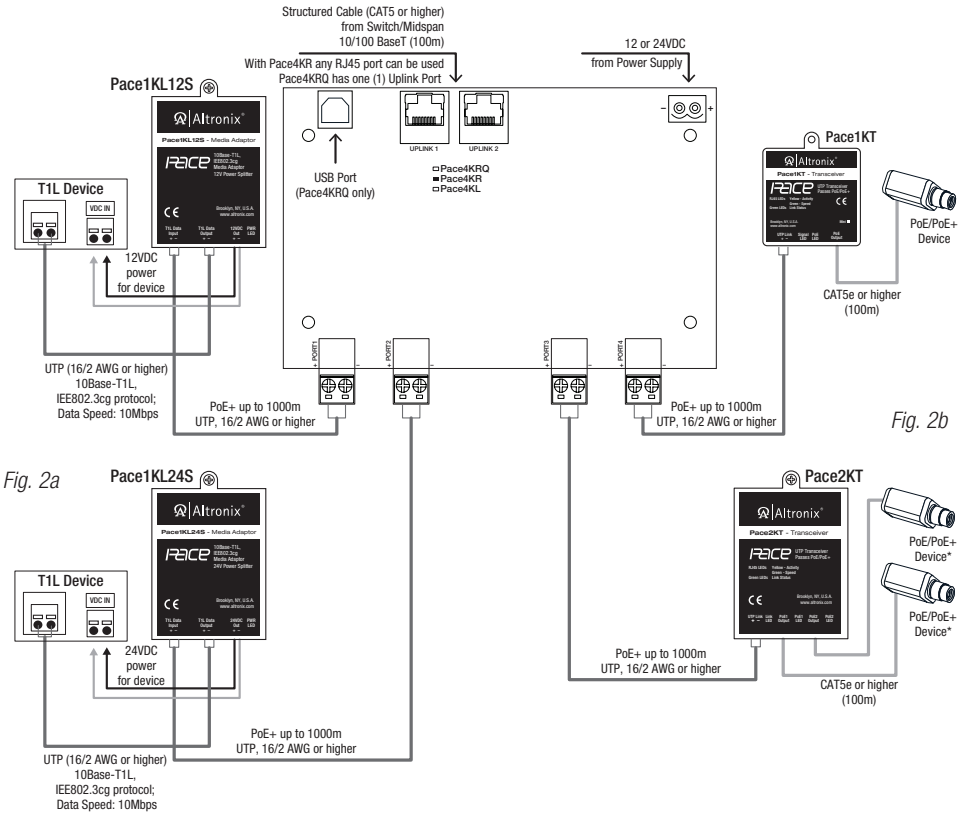
Fig. 1



Typical Applications:

1. If the system employs 10Base-T1L, IEEE802.3cg compliant devices such as Security/Industrial/BMS/Elevators/HVAC Controllers and sensors, etc., use Altronix Pace1KL12S (12VDC) or Pace1KL24S (24VDC) SPE (Single Pair Ethernet) media adapters/splitters (order separately). They pass the T1L data to the device and separately provide 12V or 24V power to the device (Fig. 2a).
2. If the system employs PoE devices, such as cameras or controllers, use Altronix Pace1KT or Pace2KT transceivers (order separately). They pass network data and power from the switch via UTP up to 1km (1,000m, 3,280 ft.) to one (Pace1KT) or two (Pace2KT) remote 10/100 PoE devices. Data only is supplied for non-enabled devices (Fig. 2b).

Fig. 2



Maximum Length of Cable Type vs. Total Power Consumption:

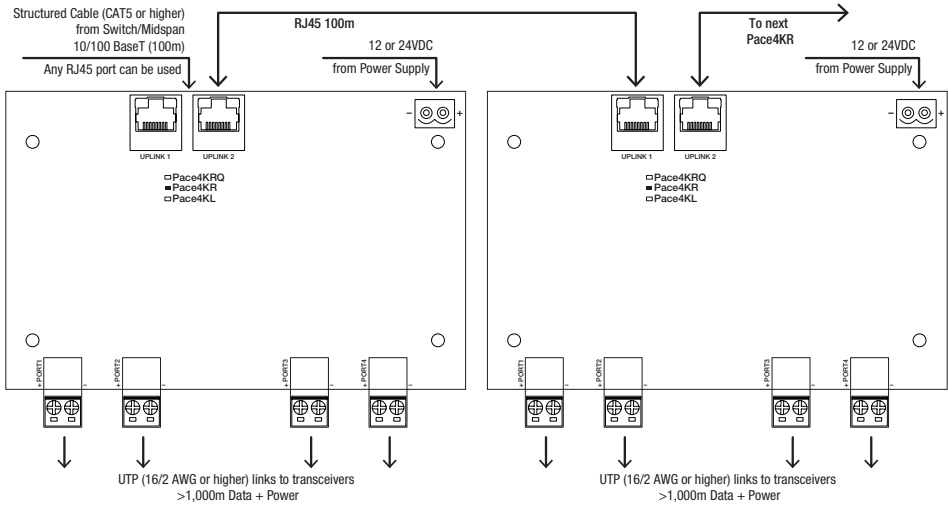
Wire type	Total Power Consumption	Max. Data Distance	Max. Power Distance
18 AWG (2-wire, UTP)	7.5W	1,000m (3,280 ft.)	1,996m (6,548 ft.)
	15W	1,000m (3,280 ft.)	998m (3,274 ft.)
	30W	1,000m (3,280 ft.)	269m (882 ft)
16 AWG (2-wire, UTP)	7.5W	1,000m (3,280 ft.)	3,169m (10,396 ft.)
	15W	1,000m (3,280 ft.)	1,584m (5,196 ft.)
	30W	1,000m (3,280 ft.)	427m (1,400 ft.)

Note: Calculations based on 56VDC starting voltage from power source and accounts for a 10VDC voltage drop. IEEE standards voltage range requirement for powered devices are:
 PoE (15W) - 37VDC to 57VDC, PoE+ (30W) - 44VDC to 57VDC)

Daisy-Chaining Pace4KR:

Two Uplink ports on Pace4KR allow for seamless expansion of the system without sacrificing any of data ports. Connect 4-pair CAT5e or higher cable (up to 100m) between [Uplink] terminals of up to four (4) Pace4KR adapters for up to sixteen ports.

Fig. 3



Technical Specifications:

Parameter	Description
Connections	RJ45 for CAT5/6 or higher ethernet link. UTP (2-wire) screw terminals for 10Base-T1L, IEEE 802.3cg compliant devices connection.
Input Power Requirements	Midspan or switch port connected. 12/24VDC power supply.
Indicators	Yellow (RJ45 connector): On - Link, Off - No Link, Blinking - Activity. Green (RJ45 connector): On - 100Base-TX, Off - 10Base-T.
Environmental Conditions	Operating Ambient Temperature: - 40°C to 75°C (- 40°F to 167°F). Storage Temperature: - 40°C to 75°C (- 40°F to 167°F). Relative Humidity: 20 to 85%, non-condensing. Operating Altitude: - 304.8 to 2,000m.
Regulatory Compliance	CE European Conformity.
Weights (approx.)	Product: 0.4 lb. (0.18 kg) Shipping: 0.75 lb. (0.34 kg)

Configuring Pace4KRQ for Network Connection

Please be sure to visit [altronix.com](https://www.altronix.com) for latest firmware and installation instructions

Accessing Device Interface

LinQ-enabled devices are managed through the LinQ Dashboard, a server application currently available for Windows 10 and 11.

The latest installer for the LinQ Dashboard can be found on <https://www.altronix.com>.

Once installed, the user can access the Dashboard through the application interface or configure and run it as a server on the local network.

On the Dashboard, all devices are available under **Devices** tab.

Connecting to the Dashboard

Devices can connect to the Dashboard over Network or USB. If at any time you are having issues connecting over the network, we recommend connecting directly over USB and inspecting the network configuration of the device.

Device Discovery:

The latest generation of LinQ products, by default, use MDNS (Multicast Domain Name System) to auto discover and connect to a Dashboard running on the same network. As products default to DHCP mode, allow a couple of minutes for the product to be assigned an IP address on the network, and to find and link to the Dashboard.

Once the connection is established, you will see your device pop up under the **Devices** tab.

Keep in mind:

- It is possible your network manager has blocked Multicasting on your local routers, this may prevent MDNS from working
- DHCP will only work if a DHCP server is running on your network (typically part of any router).
Devices will not connect with a direct wired RJ45 connection from the device to the computer hosting the Dashboard (You can connect using USB).

Manual:

If DHCP or MDNS auto detect is not feasible on your network, the device network settings can be configured manually by connecting over USB.

1. Using a printer cable, connect the device to the computer hosting the Dashboard.
2. The device will appear in the **Devices** tab of the Dashboard.
3. Enter the device and navigate to the **Settings/Network** tab section TCP/IP.
4. Set the method to STATIC.
5. Fill in the desired IP address, subnet and gateway and click **Submit**.
6. Navigate to the **Cloud** section of **Settings/Network**.
7. Fill in the IP address and port of the Dashboard, disable TCPS and toggle **Enable** to switch on
 - a. The IP address and Port of the Dashboard can be found under the **Network** tab of the dashboard, use port TCP2.
 - b. For remote connections you will have to find the Dashboard public IP address (Google *My Public IP Address*) from the computer hosting the Dashboard) and port forward port TCP2 on your router.
8. Reboot the device.
9. While the USB is still connected, connect the device to your local network, once it discovers the Dashboard, it will show connected on the cloud page referenced above.

Keep in mind:

- Make sure the static IP you assign is on the same network as the Dashboard.
- Always confirm that an IP address is available before assigning it as multiple devices with a shared IP address will cause unexpected issues on your network.
- Always work with your Network Administrator when installing new services/devices on a network.

Reaching Out to Altronix Tech Support

For an expeditious resolution to your inquiry, when calling tech support please have the following information ready.

1. Product name and version (a screenshot of the product's **About** page is ideal)
2. An outline (in as much detail as possible) of your setup and the events leading up to the issue
3. A detailed description of the issue(s) reported.

VLAN (IEEE 802.1Q, 802.1P)

VLAN (Virtual Local Area Networks) are a group of subnetwork that are configured in the switch and allow for the grouping together of devices on each subnetwork for improved network traffic as well as providing higher security by allowing greater control over which devices have access to each other. It is important to plan how you will setup your devices for each VLAN.

Keep in mind:

- Due to the complexity of VLAN, it is always recommended that a Network Administrator with knowledge of VLAN handles configuration and installation of any VLAN enabled devices.
 - Modifying VLAN will alter the network, it is recommended whenever possible to configure VLAN over USB.
 - It is important to know when to configure a port as a Trunk or an Access port.
- Trunk ports connect to equipment that support VLAN, whereas Access does not – see section below.

Basic VLAN Overview:

VLAN can be confusing even for seasoned professionals, for that reason, we provide a quick overview of the basics.

The IEEE 802.1Q standard for VLAN allows the adding of an additional header to network packets with a number between 0 - 4094 in which 0 is a wild card, 1 is VLAN Native and the rest are available for assignment. A VLAN switch allows you to create multiple networks on a single switch that can be either logically separated (share no ports) or share 1 or more TRUNK ports.

Ports on a VLAN are either assigned as TRUNK or ACCESS and never both.

TRUNK ports keep VID (VLAN ID, i.e. subnetwork Identification) tags on egress (when leaving port) and on ingress (when entering a port). This makes them ideally suited for extending VLAN across multiple switches. TRUNK ports can be a member of multiple VLANs, allowing one port to serve as the gateway to multiple networks.

ACCESS ports drop VIDs on egress and assign the VID that the port is a member of on ingress. This makes ACCESS ports ideal for when you want to leave/join the VLAN (drop/add the VID header). An example would be when reaching an endpoint such as a camera, which may not handle VLAN packets. VLAN protocol data will be stripped (untagged) before it reaches the camera and data packets sent from the camera will be tagged as it enters the VLAN switch. An access port can ONLY be assigned to one VLAN

Configuring VLAN on the Altronix Pace4KRQ Switch:

1. Under the **Network** tab click on the **VLAN** section.
2. By default, VLAN is disabled, and the management interface will be available over all ports and USB via a LinQ Dashboard.
3. To configure the VLAN you must first enable it, configure the VLAN table and then submit the changes. Until submit button has been pressed, no changes to VLAN will take effect.
4. Once enabled, all ports will be assigned to the default VLAN (VLAN Native) with VID=1 as ACCESS ports. The management interface is always available on VLAN Native and cannot be deleted, however, Management can be added to other VLAN IDs and all ports can be removed from VLAN Native (typically to create a new VLAN).
 - a. **CAUTION:** if you are configuring VLAN over a network connection and you move your port off of a management VLAN or to a VID your computer isn't a member of, you will lose access to the management interface.
5. To add an entry to the VLAN Table, click **ADD VLAN**.
6. Enter a name for the VLAN.
7. Enter a VLAN ID, i.e. 10, 20, etc. Ensure this VLAN ID is associated with a VLAN setup on the main switch and that your Laptop or PC being used for programming is on this same ID.

Note: VLAN ID could be any value 2-4094.
8. Assign VLAN QOS (Quality of Service) priority. 0 = Lowest and 7 = Highest.
9. Pick a Trunk port (Tagged Ports). Trunk ports are typically the main connection for network traffic for each group. They are usually connected to a network switch, WAPs, etc.
10. Pick the Access port(s) (Untagged Ports) associated with the VLAN. Access Ports are typically used for Cameras, etc. If programming locally, ensure your laptop or PC is connected to one of these ports.
11. Save Configuration.
12. Repeat steps 5 - 11 to add another VLAN entry.
13. Double check your VLAN Table and when ready, click **Submit**.
14. If unit is accidentally programmed incorrectly and you cannot access the Pace4KRQ, physically moving ports of your PC connected to the main switch to a correct port (when being programmed remotely), or, simply connect the device to the computer hosting the Dashboard over USB to the VLAN table and try again.

Note: VLAN can be configured over USB while connected simultaneously over the network.

This is very useful for confirming your setup works as expected without having to worry about losing access to the management site.

Advanced Port Settings:

Advanced settings allow you to set specific configurations on individual ports (to change from default settings).

Default VLAN Settings:

When a port serves as a TRUNK port in multiple VLAN entries, this value determines which VID to assign to untagged ingress packets at this port.

Discard Tagged Packets:

If enabled, any network packet arriving at this port with a VID Tag will be dropped.

Discard Untagged Packets:

If enabled, any network packet arriving at this port without a VID Tag will be dropped.

Forward Unknown VID:

If enabled, packets with an unknown VID will be forwarded to this Port.

VID Replacement:

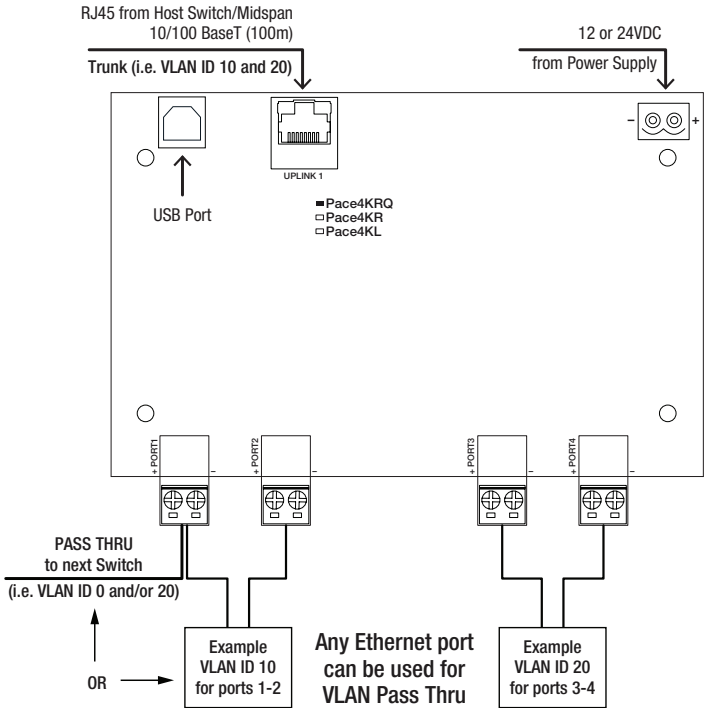
If enabled, replace any ingress packets VID with the port default VID.

Reaching Out to Altronix Tech Support:

For an expeditious resolution to your inquiry, when calling tech support regarding VLAN please have the following information ready.

- 1. Product name and version (a screenshot of the product's About page is ideal)
- 2. On the VLAN Page click **DOWNLOAD PORT MEMBERSHIP REPORT**. This will download a VLAN report file. Please have this ready to share with Tech Support.
- 3. On the VLAN Advanced Page click **DOWNLOAD ADVANCED PORT SETTING REPORT**. This will download an additional VLAN report file. Please have this ready to share with Tech Support even if you did not configure the advanced section.
- 4. An outline (in as much detail as possible) of your setup and the events leading up to the issue.
- 5. A detailed description of the issue(s) reported.

Fig. 4



Altronix is not responsible for any typographical errors.

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