

Automation Service News

The Newsletter of Delta Automation Inc.

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Delta Automation Contact Info

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Tech Tip!

Grounding Schemes on different Modbus Plus Connector Types

There has been a great deal of conversation and resulting confusion with regard to the grounding schemes involved with the different types of Modbus Plus connectors.

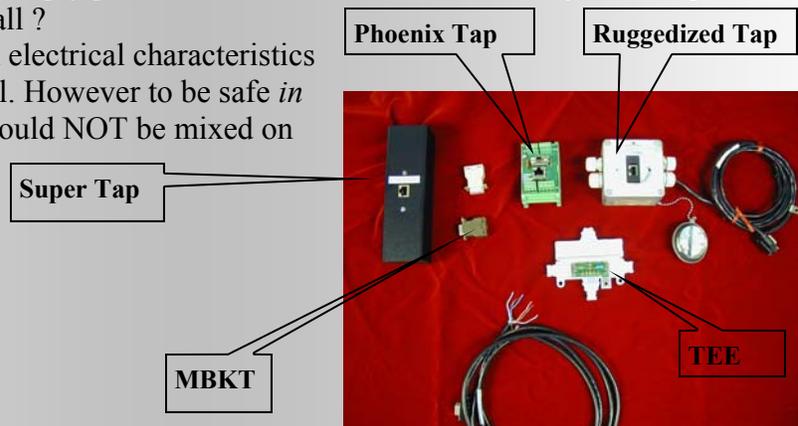
As we all know from “Electricity 101” , there should only be one single point ground on any given system to reduce the possibility of ground loops or ground currents. In real world applications even this rule is occasionally bent.

On the Modicon MBKT style connectors, the first generation of connectors placed in service, the grounding system is simply the cable shield and drain conductors daisy chained through all of the available connectors on the system. There is no consideration given to ground loops.

On **ALL** of the subsequent connectors that have been placed in service since, the grounding system is DC isolated at each node. In these types of connectors (taps, Super Taps, ruggedized taps, and Phoenix brand taps) the ground path is provided by the electrical connection to each node. All of these types of devices are easily identified by their utilization of the pre-made molded drop cables. This ground connection then provides a ground to the incoming cable side of the tap device. The outgoing cable’s ground is isolated by a small capacitor. Therefore, each node provides a ground path for the previous section of trunk cable (as seen from left to right). This requires the taps to all be installed or oriented the same way. Otherwise a section of trunk cable could become completely isolated from ground and in effect become an antenna for electrical noise.

By mixing these two types of grounding schemes (daisy chaining and isolated) you *negate* the advantage of the isolation in a specific section of trunk cable. This arrangement could under some circumstances cause ground loops, ground currents and a disruption of communications. Although the manufacturer states that mixing the two types together has no ramifications; Delta Automation Engineers disagree. Simply put, if there is no difference, then why the design change in grounding schemes at all ?

Since no two systems are alike in electrical characteristics or noise levels, no one size fits all. However to be safe *in every case*, the different styles should NOT be mixed on the same electrical segment.



Why Remote I/O Systems should be Upgraded during PIP's

Your Remote I/O System may not be able handle the new Equipment

A typical Modicon remote I/O system consists of trunk cables, taps, splitter, drop cables, head-end device and remote devices. Some or all of these devices may date back to the early 1980's. Literally all of these items have evolved through numerous changes and revisions. The cable itself, has been re-designated to utilize only quad shielded product. The taps and splitters have had several changes to increase their efficiency. Of course the devices themselves have gone through radical changes from the 200 series through 800 to the Quantum line.

When performing an upgrade or PIP (product improvement program) usually the hardware is replaced. The application program is converted and or modified to function on the newer platform. However, the remote I/O system is, for the most part, overlooked by the individual quoting the project. There are many reasons to include these systems in with the project. Most obvious is revenue generation. Aside from that are the very real technical pitfalls that lie in wait for the end user and ultimately the personnel whom have to make it work. Delta Automation Engineers have been called in on emergency basis, after the fact, to get newly updated systems up and running dozens of times. In all cases, the problems could and should have been addressed during the upgrade itself. Typically in these emergency situations, there is not enough available downtime to properly rectify the situation. The system is patched until sufficient downtime is available and at that time all of the proper changes are made. In some cases, all of the remote I/O systems components must be replaced. Old single shielded cable must be replaced with Quad shielded. Along with the cable, the connectors are replaced. The old taps usually must be upgraded. In some instances, conduit routing is moved to better the physical layout. The electrical characteristics of the devices and the taps are quite different from the very old through to the very new. For example, the voltage level from the old J200, used on the 584 systems, is about half of what the level is on a modern Quantum system. On the surface, this appears to have little or no impact. However, on transmission lines, such as the remote I/O system, twice the voltage level means that any discontinuity along the line will cause twice the reflection of energy back to the source. This may prevent the system from functioning at all. At the very least it will cause errors. Discontinuities are caused by any deviation from the normal impedance level of 75 Ohms. The older taps (round in shape) have a typical impedance of 200 Ohms! The Modicon revision "A" taps are nearly as high. A Quantum system will *not*



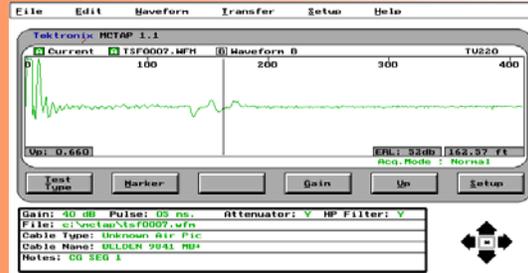
function with these taps if placed close enough to the source of energy (head-end).

These are some of the reasons that Delta Automation, Inc. Engineers should be consulted to examine these types of systems before any PIP quote is completed.

Free dinner Earned by Paying Attention to Detail

In our Summer issue, it was brought to our attention that there was an error in the article about the Operation of a TDR. The speed of light was listed both in Meters per second and in Miles per hour. It should have been both Meters per second and Miles per Second. Jim Wade in Albany, Georgia will receive a certificate for dinner for being so attentive to our publication.

Thanks, Jim, for pointing out our mistake! ;)))



Trunk Splitter in HSBY systems

The Modicon trunk splitter, part number MA-0331-000, is the proper choice over the “regular” splitter, part number MA-0186-000, when utilized for splitting the trunk cable of a remote I/O system. The regular splitter inserts 6 dB of loss from any port to any other port, and the trunk splitter inserts only 3 dB of loss between any two ports. This is ideal for maintaining the signal level when used on a split trunk system, which by the way, split systems are not recommended. The regular splitter should only be utilized in a HSBY system as a signal *combiner*.

A combiner is basically a splitter installed in reverse. Rather than splitting a signal to go two directions, it is combining two signals into one trunk. On a HSBY system, the combiner allows one PLC to control the I/O while the standby PLC monitors those communications. Should a failure of the primary PLC occur, the standby PLC will take over the application and begin communicating through the combiner. The 6 dB insertion loss or isolation is required between the two PLC's to reduce the signal reflections between their respective I/O drivers.

Should a trunk splitter be installed by mistake, the CRA modules, part number 140CRA93100 will display an intermittent communications error. This will not cause any system or application malfunction, however it may cause needless trouble shooting of the remainder of the remote I/O system.

Important Info

Autem Analyzer Demo Locates months old Intermittent Problem

The controls Engineer for a major manufacturer of automobile components for GM and Chrysler, reports that, after installing the **PLC Analyzer pro 4** software, he was able to isolate the cause of a reoccurring automation problem that had been baffling the company for over three months. This after using **PLC Analyzer pro 4** for only a week. Another problem, apparently caused by an upgrade, was solved in only a couple of days. He calls **PLC Analyzer pro 4** “one of the greatest diagnostic tools I’ve ever seen”.

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For after hours

Emergency Service or Parts

Call our main number 888-723-3582

Extension 55

Leave a message and someone will respond within fifteen minutes to answer your call.

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