# How to let your traditional PLC and control panel in RS232 connection with IP network capability

In current industrial control environment we may have PLC and control panel via RS232 connection. Because RS232 connection may be used up to 50 feet only, so control panel can only be installed in equipment location. In this condition one engineer can handle limited number of equipment and efficiency is not good. If we could use IP network capability between PLC and control panel, then we can overcome distance limitation in RS232 connection. So we can let one engineer to handle more number of equipments and enhance the operation efficiency for engineer operation in better environment. But RS232 connection is point to point communication method. One PLC may have one RS232 serial port only for console to connect. Now we can only let such serial port to connect with current local RS232 control panel. Or we can let such serial port to connect with remote control panel via IP to serial port converter box. It means that you can only choose one control panel in local RS232 connection or remote IP network connection. When you need to use IP network connection for remote control panel, you need to remove your current local RS232 control panel connection. Because RS232 connection is simple and transparent transmission method, so it is very easy for us to check original data transmit in RS232 cable. When we have some problem happened in PLC and control panel, it is very easy for us to debug the hardware issue or software issue. Because we need to let original data to be converted as data packet in IP network and transmit in IP network, so it is not easy to confirm hardware issue or software issue upon problem happened. This condition the major reason for equipment manufacture to modify current RS232 connection method to IP network connection method is not smoothly.
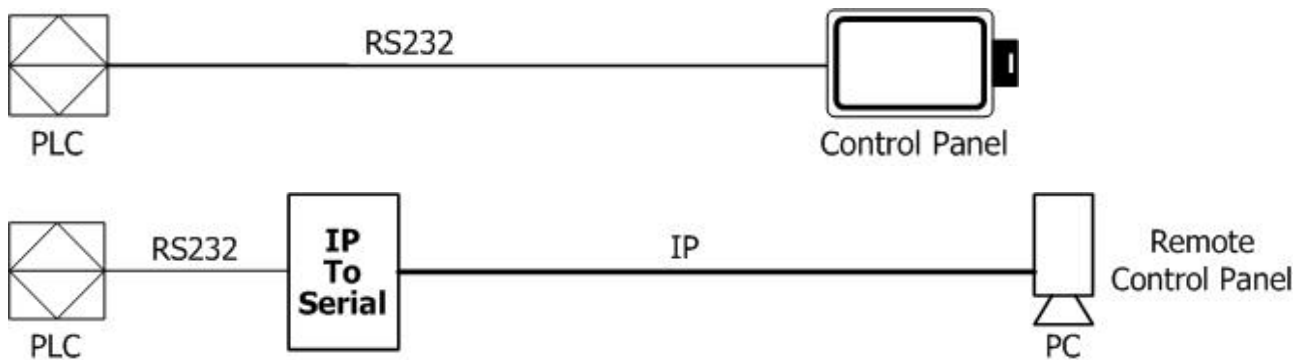

In this situation RAYON Technology offer one solution to solve. We can have one product to let local RS232 connected control panel and IP network connected remote control panel to connect with PLC simultaneously. Traditionally we can have RS232 serial port switch box to let PLC RS232 serial port to connect with two RS232 devices. So we can let local control panel and IP network connected remote control panel to connect with PLC. In economic model we may have one rotary switch to select one target control panel to connect with PLC manually. In smart model (for example RAYON's S400 series sharer box) we don't need to switch target control panel manually. We just need to confirm only one of local control panel and remote control panel will work. It means that you will not use local control panel and remote control panel in the same time period.
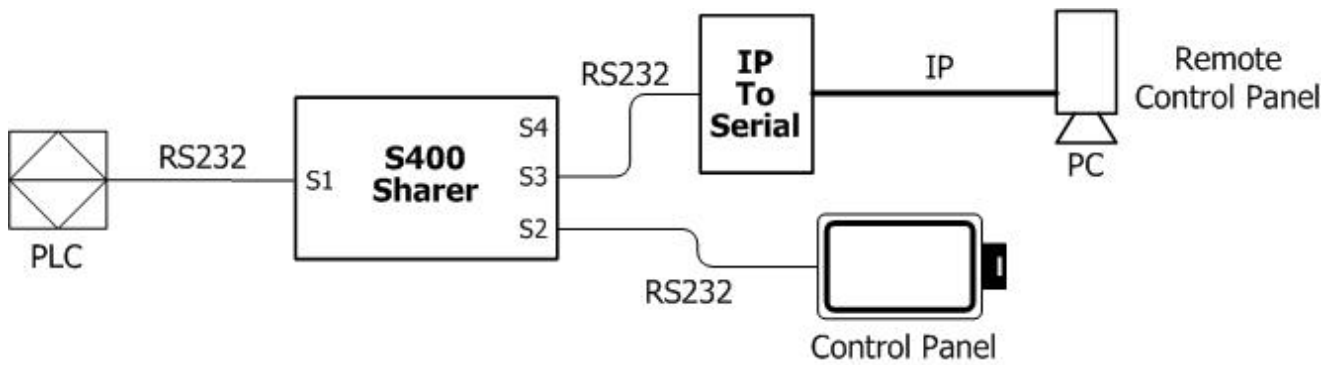
If we could not confirm local control panel and remote control panel may not work simultaneously, then we need to use intelligent serial port sharer box (for example RAYON's IS400 sharer box) to solve this condition. When local control panel and remote control panel may operate in same time period, we will let the first one received data from control panel to be sent to PLC and the other one received data save in buffer. After the first one control panel data transmission is finished, then the other one received data in buffer will start to transmit. In this rule we can solve the data confliction condition in local control panel and remote control panel to work simultaneously. In following information we will show you our consideration in application environment.

In your current application environment PLC to connect with local control panel via RS232 cable is run stable in long period. So we can confirm the hardware and software system with very good reliability. What you need is to add new IP network connected remote control panel capability. So we will use RAYON's IS400 intelligent serial sharer box to keep your current environment for PLC to connect with local control panel via RS232 cable. And we will add IP network connected remote control panel to current environment.
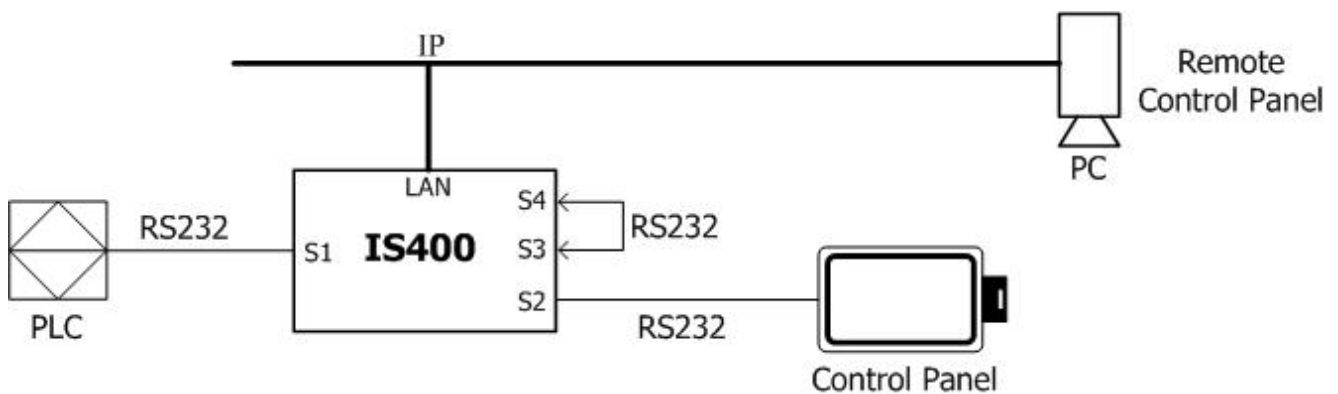
From hardware point of view PLC will connect to master serial port S1 in IS400 box and communicate with other device to connect with slave serial port S2, S3, S4 in IS400 box. When IS400 box receive data from PLC, such data will retransmit to all slave devices simultaneously. When IS400 box receive data from slave device, such data will retransmit to PLC. But we have multiple slave device connected and send data to IS400 box. We must have rule to handle the data confliction condition from multiple slave device and retransmit to PLC.

From software point of view we suggest that PLC and control panel communication is based on data packet interactive procedure. For example PLC may send status display data packet to control

panel to show in screen. And control panel may send operation command data packet to PLC. So we can suggest that the data transmitted between PLC and control is data packet and not continue data stream. Then we can use the time out period in transmission data to know end of one data packet. So we can change the user for other data packet pending to work. In this rule we can know the data transmission period for local control panel and remote control panel. One of control panel is working without interrupt and the other control panel will wait to work. There are no operation confliction for local control panel and remote control panel. IS400 box will use first-come-first-run rule to retransmit data from control panel to PLC.

IS400 box is one IP network to serial port converter with special serial port sharer function product. We can set each serial port S1, S2, S3, S4 in IS400 box with operation mode in "special" for serial port sharer function or other "TCP server", "TCP client", "UDP" mode for IP network to serial port function. So we can set four serial port in IS400 box to have different function mode independently. In our current application environment we will set serial port S1, S2, S3 in "special" mode to work as serial port sharer and serial port S4 will set in IP network to dedicated serial port converter function mode. For example we may need to let our remote Windows system PC to see our serial port S4 in IS400 box as standard COM1/COM2 port in PC. So we can set serial port S4 in IS400 box in "TCP server" mode. Now we just need to install TPORT virtual COM device driver in Windows system. Then we can have extra COM port in Windows to be used as standard COM1/COM2 port for application software (it may be control panel simulation software in Windows system) in serial port S4 of IS400 box.

In current application environment PLC will connect with master serial port S1 in IS400 box. Local control panel will connect to slave serial port S2 in IS400 box. Remote control panel will be run in serial port S4(just like standard COM1/COM2 port in Windows PC) via IP network and connect to slave serial port S3 in IS400 box. Now we can have local control panel and remote control panel to work with PLC.

Above application environment is only based on data packet and interactive procedure rule to run. In different application environment we may have other data packet process condition to check. So we may have different IS400 box firmware version to meet your dedicated application environment. Please send Email to rayon@ms1.hinet.net or info@rayontech.com.tw and we can work together to meet your application solution.

For example we may have different software protocol between PLC and PT (control panel), so we can have different solution to meet dedicated application environment. For example we may have OMRON CS/CJ series PLC to work with OMRON NT31 PT (control panel) and set in "1:N NT Link" mode. So one PLC can work with multiple PT(control panel) and each PT can have unique unit number to identify by PLC(it is very popular protocol to be used in RS485 half-duplex communication environment). So PLC can communicate with each PT and each PT know when to communicate with PLC without confliction condition to other PT. In this application environment we may not need to use IS400 box to support local control panel(ex, OMRON NT31) and IP network connected remote control panel (simulation software in Windows PC) to PLC. We can use more cost

effective solution APORT100P box in this application environment. In APORT100P box we will connect PLC to master serial port S1 in APORT100P box and local control panel (ex, NT31) to pass-through serial port S2 (similar as slave serial port in IS400 box). Now remote control panel can connect with PLC via IP network and work with original local control panel. What you need is to set operation mode in "1:N NT Link" protocol for PLC and PT. And set different unit number for local control panel and remote control panel.
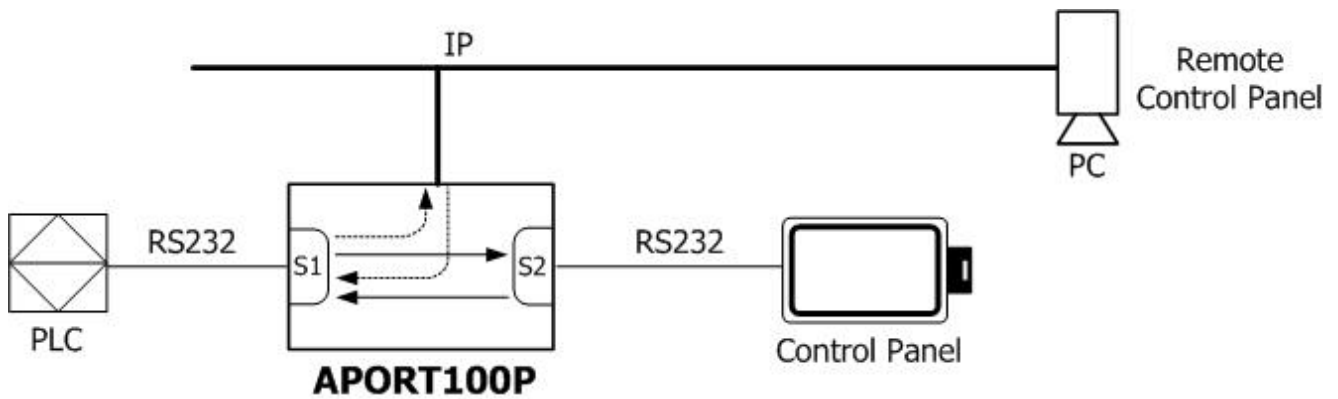
When you use APORT100P box in your application environment, we must confirm the software protocol can handle the data transmission period for each control panel. If we could not confirm this condition, then it is best to use IS400 box solution.