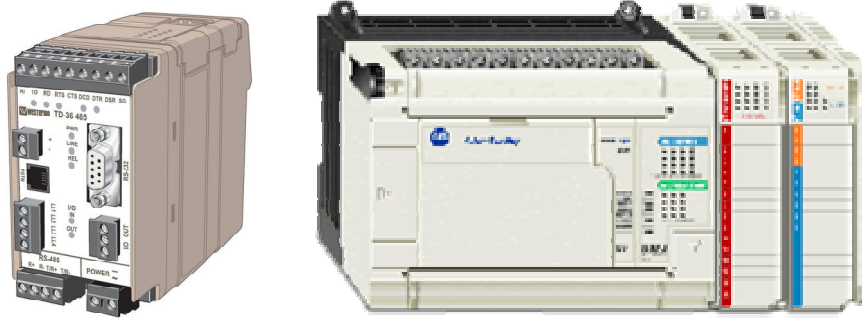


## Rockwell PLC's

### Remote Access with Westermo Modems



**Rockwell**  
Automation



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## Section 1 - Introduction

There are many PLC applications that require a Remote connection, from Monitoring data, SCADA control to PLC programming and register data adjustment. All of these applications require a reliable connection in a variety of industrial conditions. Westermo modems provide a reliable connection for these harsh industrial connections which can save an Engineer a costly trip to site or provide a communications link to a hazardous area.

This Application Note provides detailed information on connecting Westermo Modems and the range of PLC's available from Rockwell.

The equipment and versions required are as follows:

1x Laptop or Desktop PC with Modem and the following software pre-loaded

- RSLogix with RSLinx Driver
  - TDTTool2, GDTTool, Windows Hyperterminal or similar Terminal package
- Note: Pre-configured TDTTool2 and GDTTool Modem profiles are available for download from [www.westermo.co.uk](http://www.westermo.co.uk)

1x Modem to PC lead if external PC modem used

- For 9 pin D type on Modem use Westermo cable Article number 9450-0003

2x Analogue telephone lines

- or a Westermo Analogue Line simulator, Article number 9045-001

1x SLC, MicroLogix, FlexLogix, CompactLogix or ControlLogix Series PLC using Port 0 or a 17xx-Kxx DF1 module

1x PLC Programming Cable

1x Westermo Modem to Rockwell 70cm cable. Westermo Article number shown below

- 9450-0122 for TDW33, TD-35, TD-36, TD36/485 and GDW11 Modems  
(2m also available)

1x Westermo Modem e.g. TDW33 / TD36 / TD36-485 / GDW11 / TD-35  
or an older Westermo modem such as TD32B

## Section 1 - Setup of RS232 Ports on SLC and MicroLogix PLCs

To ensure reliable and efficient communications we recommend using the default settings of the PLC's which are as follows:

19200, 8 Data bits , No parity and 1 Stop bit using the DF1 Protocol

These settings ensure the best compatibility with a wide range of Modems such as built in PC modems which are normally setup for basic Internet access rather than PLC protocols.

The RS232 port that will be used for the Modem connection will need to be setup prior to the Modem setup and testing. This requires that the PLC is placed in program mode and the new port settings will have to be Transferred to the PLC.

ALWAYS ENSURE THAT THE PLANT BEING CONTROLLED IS SAFE BEFORE CHANGING THE PLC PROGRAM STATE.

### SLC and MicroLogix Channel 0 Configuration

The screenshot shows the 'Channel Configuration' dialog box in RSLogix 500 Pro. The 'General' tab is selected, showing the following settings:

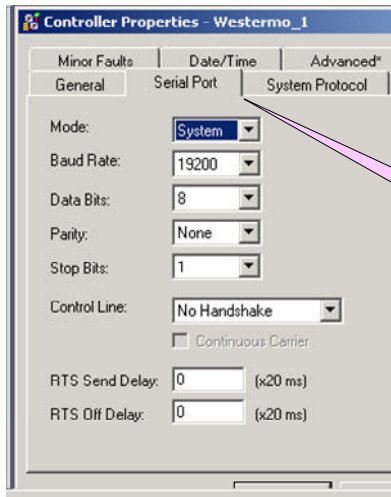
- Driver: DF1 Full Duplex
- Baud: 19200
- Parity: NONE
- Stop Bits: 1
- Control Line: No Handshaking
- Error Detection: CRC
- Embedded Responses: Enabled
- ACK Timeout (x20 ms): 50
- NAK Retries: 3
- ENQ Retries: 3

Two callout boxes provide instructions:

- A pink callout box points to the Baud rate field, stating: "Change Change Baud rate to 19200".
- A pink callout box points to the Control Line dropdown menu, stating: "Ensure that Control Line is set to 'No Handshaking'".

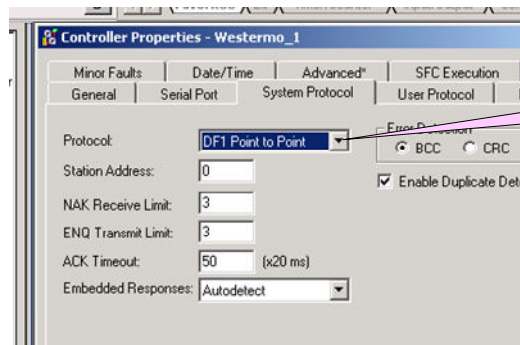
## Section 1 - Setup of RS232 Ports on Contrologix PLCs

### RSLogixs 5000 configuration



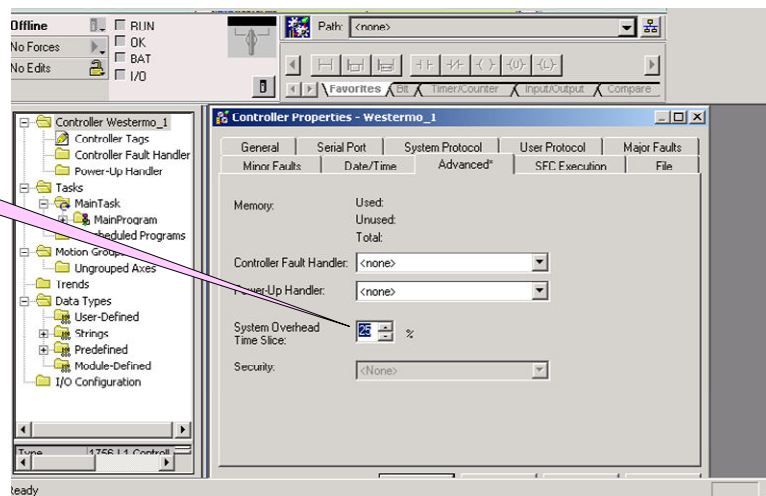
**NOTE:**  
Ensure that the Serial Port and System Protocols settings are the same as the RSLinx driver

Check Baud Rate is 19200

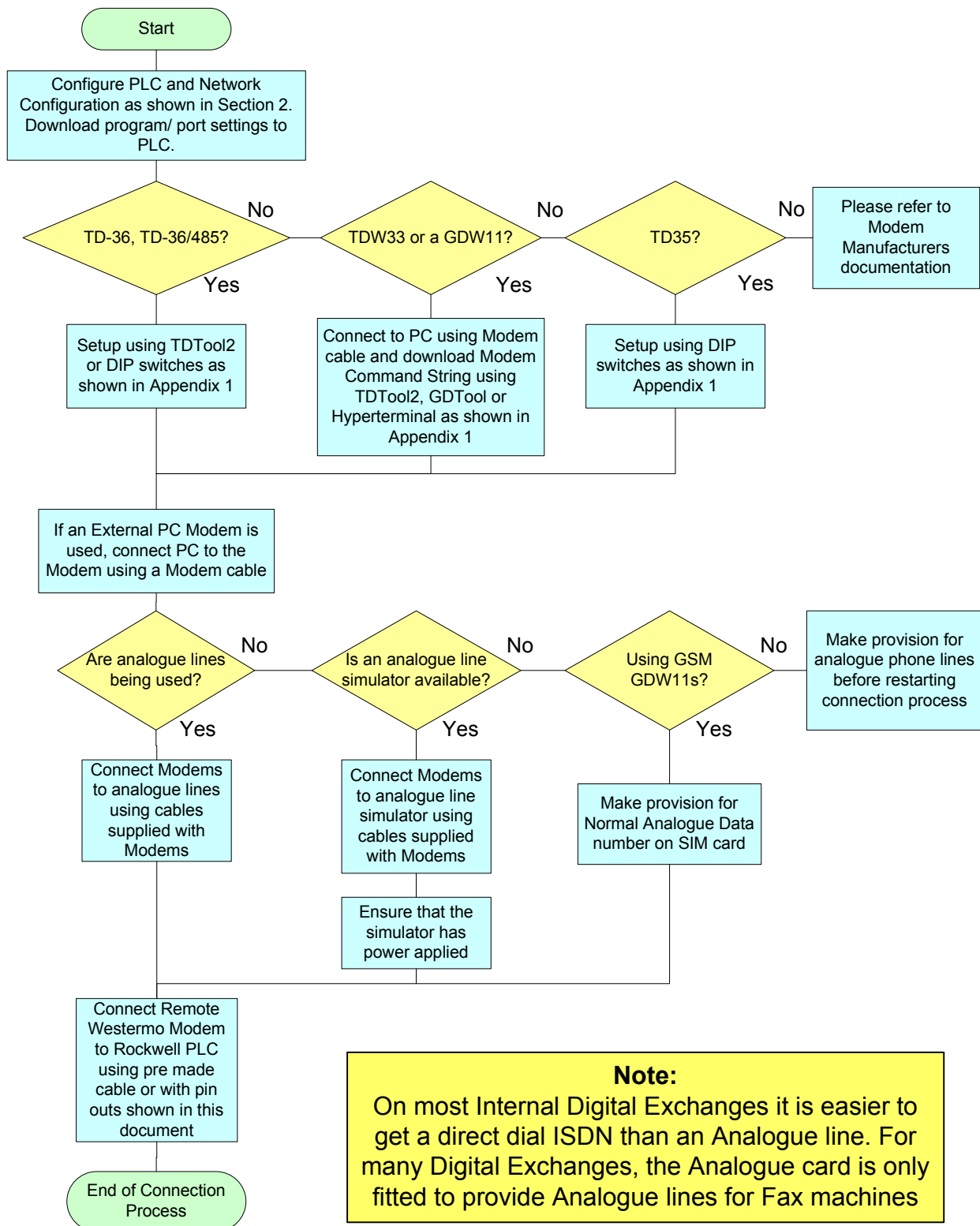


The protocol should be set to DF1 Point to Point

The System Overhead Time Slice will need to be increased to 25% on some slower CPU's

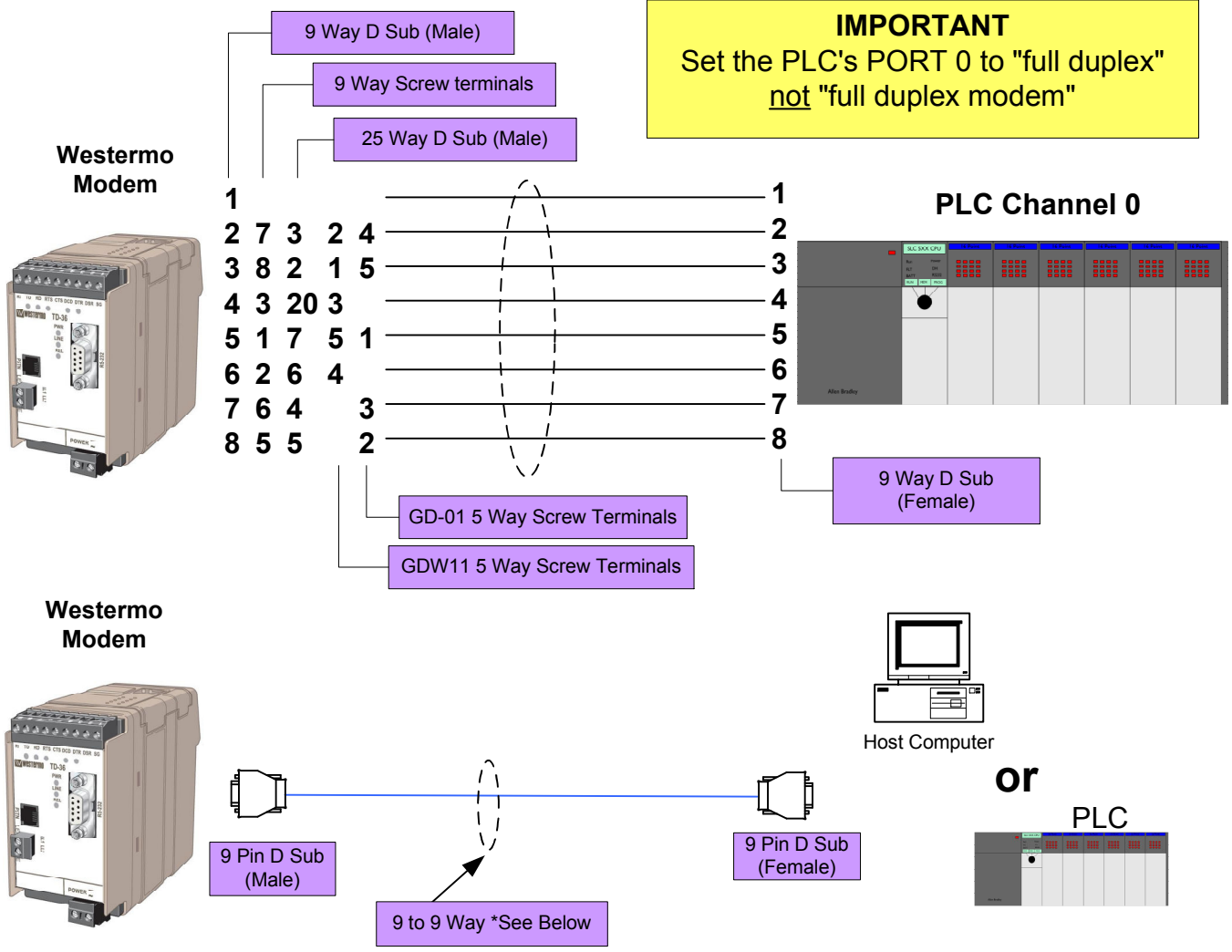


## Section 1 - Connecting the Westermo Modems to the Rockwell PLC





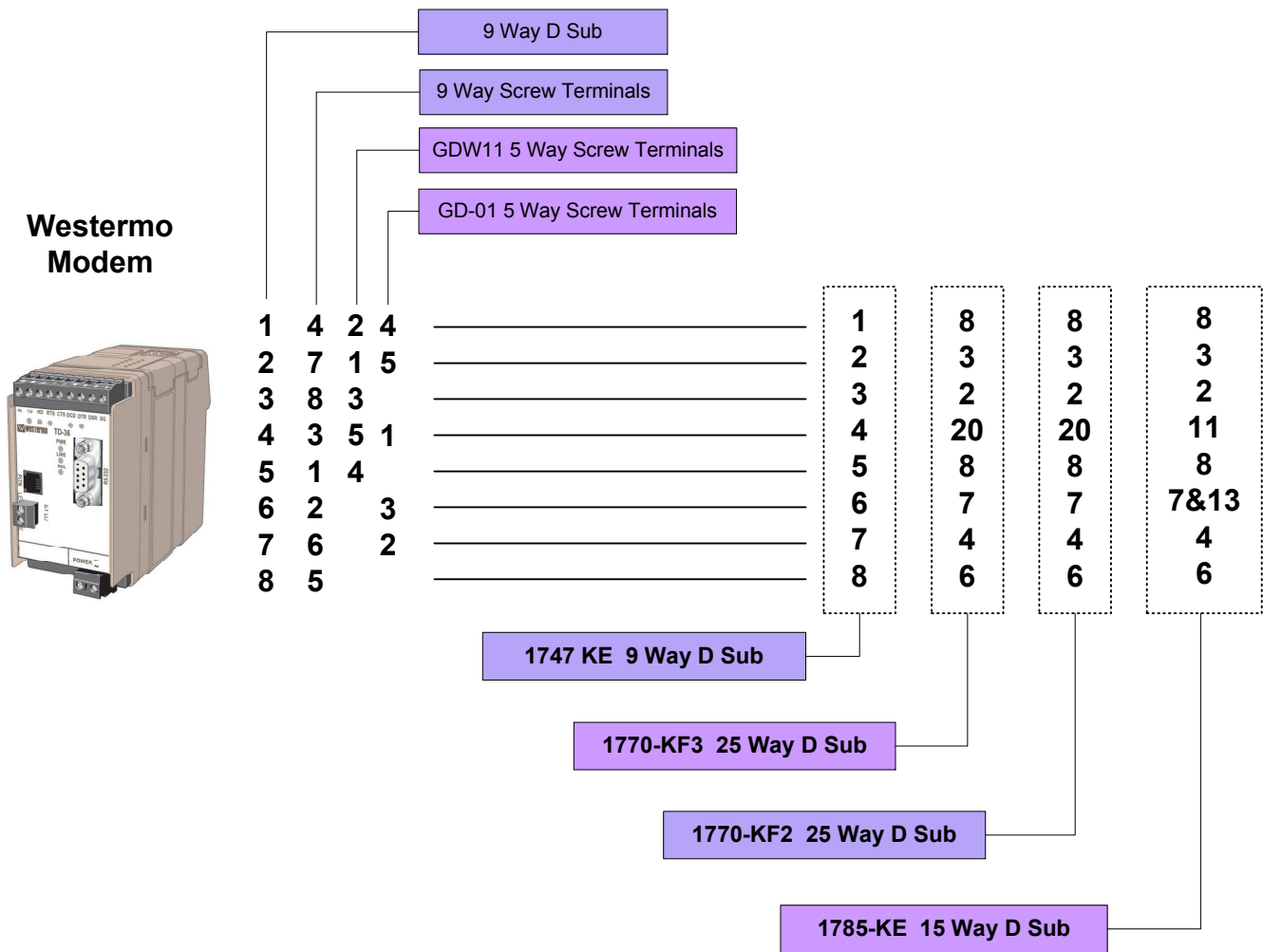
## Section 2 - PLC Cable Pin Out Connections



**Please Note:**  
Ready made cables are available from Westermo with low profile angled connectors for the PLC. The Article numbers for 70 cm long cables are as follows:

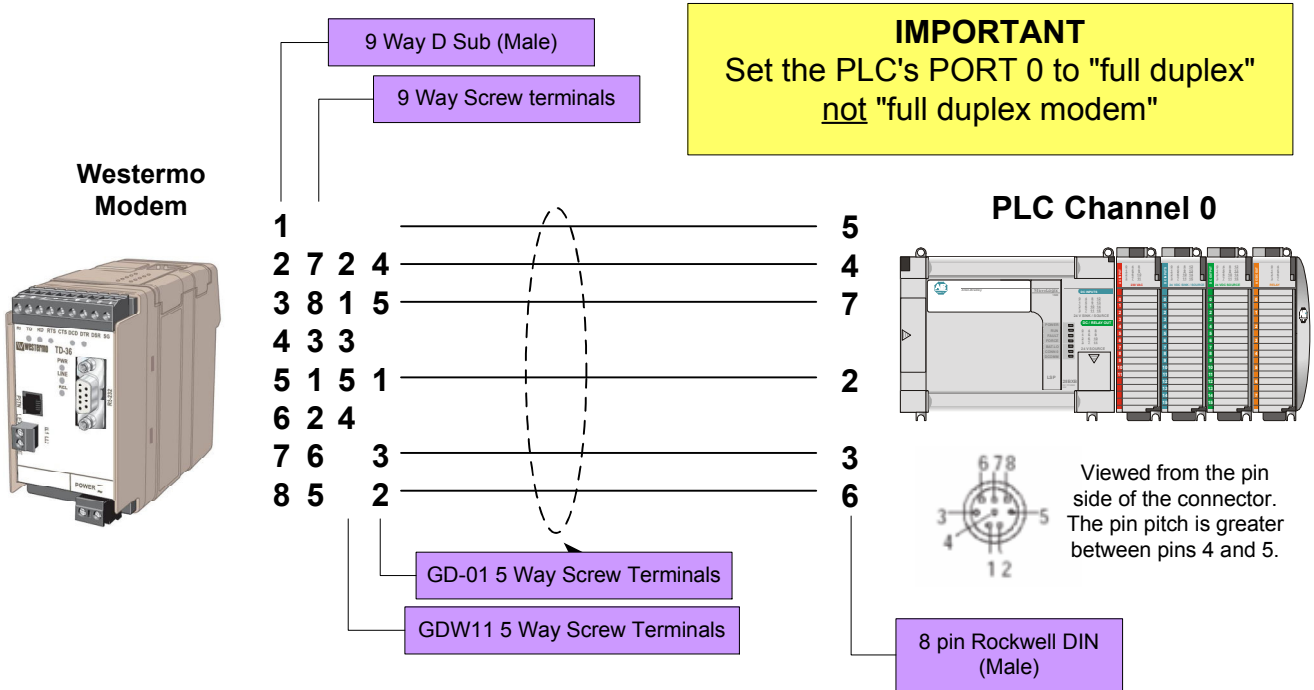
- 9450-0122 for TD-36, TD-36/485, TD-35, TDW33 and GDW11 Modems and other older model Westermo Modems (2m also available)

## Section 2 - 17xx Kxx DF1 Module Cable Pin Out Connections

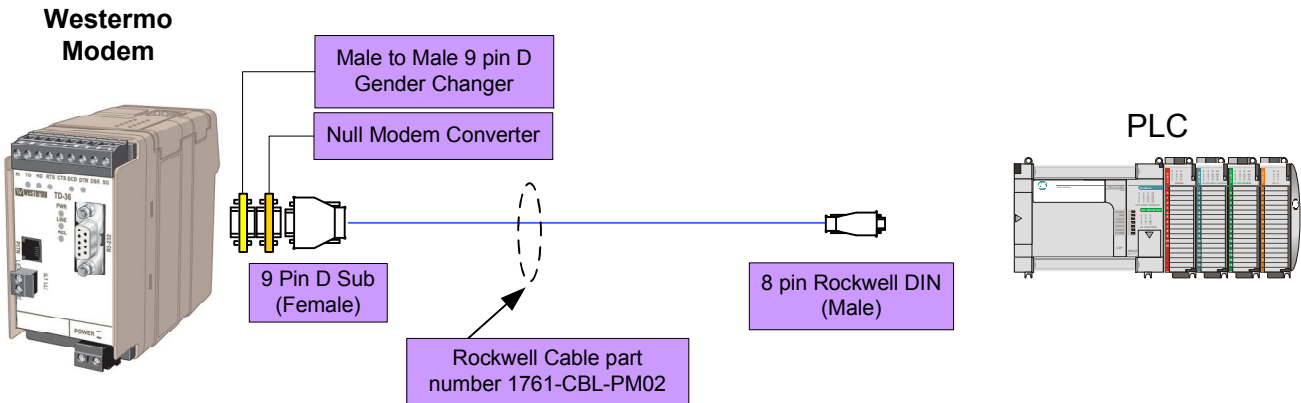




## Section 2 - MicroLogix PLC Only Cable Pin Out Connections

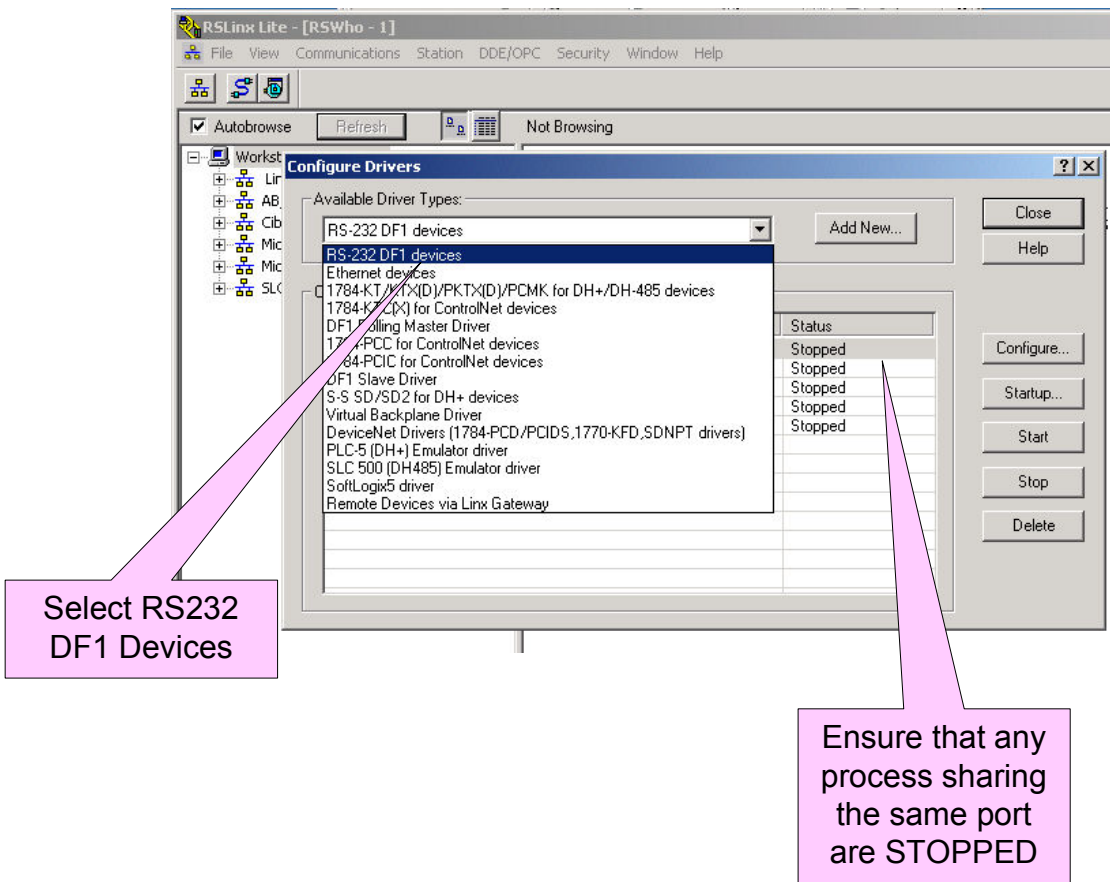
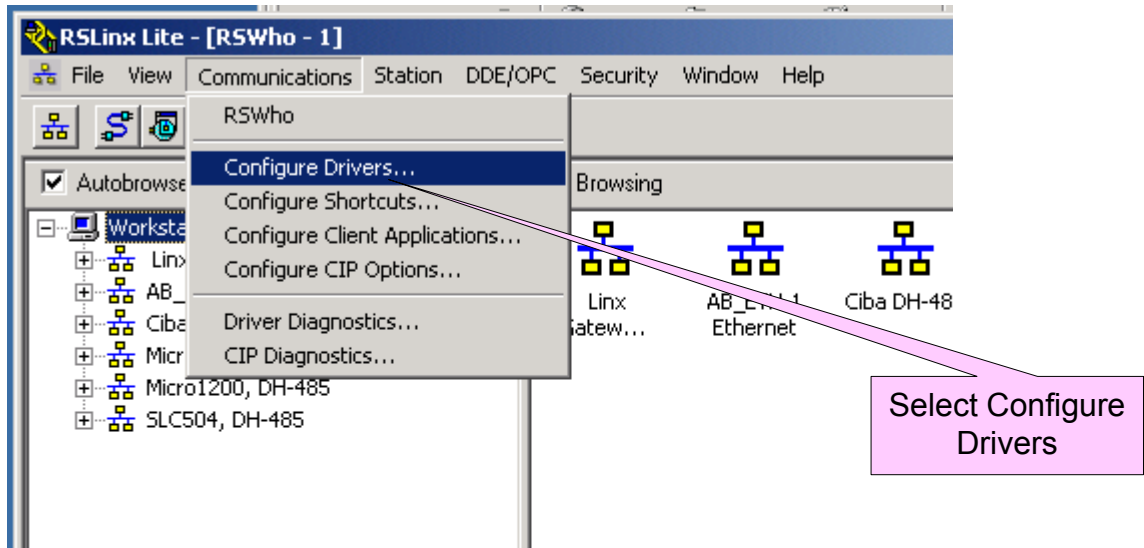


Or use the Rockwell MicroLogix programming cable with a Null Modem Converter



**Please Note:**  
Low profile gender changer and null modem converters are available from Westermo  
- 9450-0016 for the Male to Male 9 pin D type Gender Changer  
- 9450-0020 for the Null Modem Converter

## Section 2 - Set up of RSLinx Communications Driver



## Section 2 - Set up of RSLinx Communications Driver

Select the Modem Comm port to be used

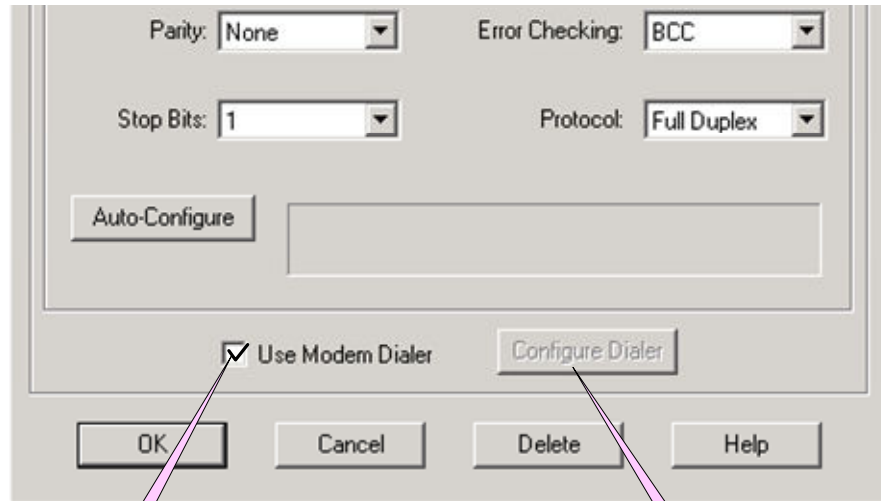
Select PLC-CH0

Error correction can be either BCC or CRC but MUST be the same as the PLC

### **Note**

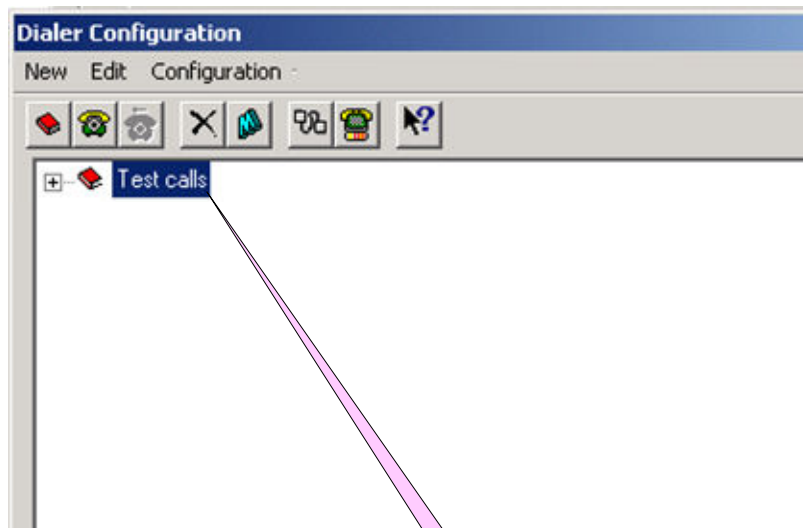
Before attempting to use the modem connection, it is advisable connect the PLC directly to the host computer com port and select Auto-Configure. This will ensure that the PLC setting and the host setting are the same.

## Section 2 - Set up of RSLinx Communications Driver



Select Use Modem Driver

Then Select Configure Dialer

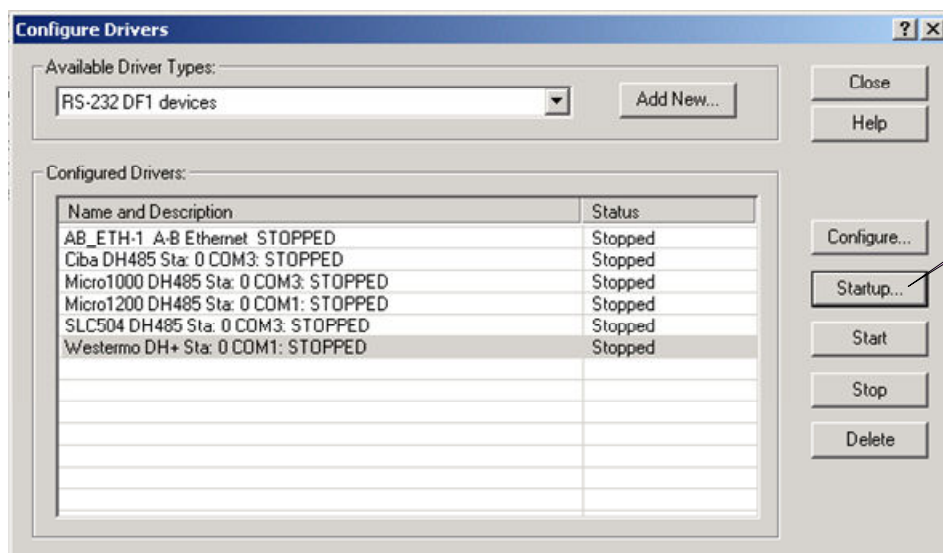


Enter the required telephone numbers for the remote sites

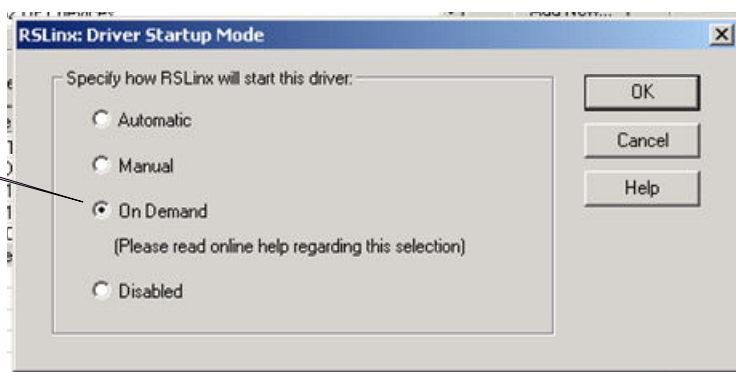
## Section 2 - Set up of RSLinx Communications Driver

### Note

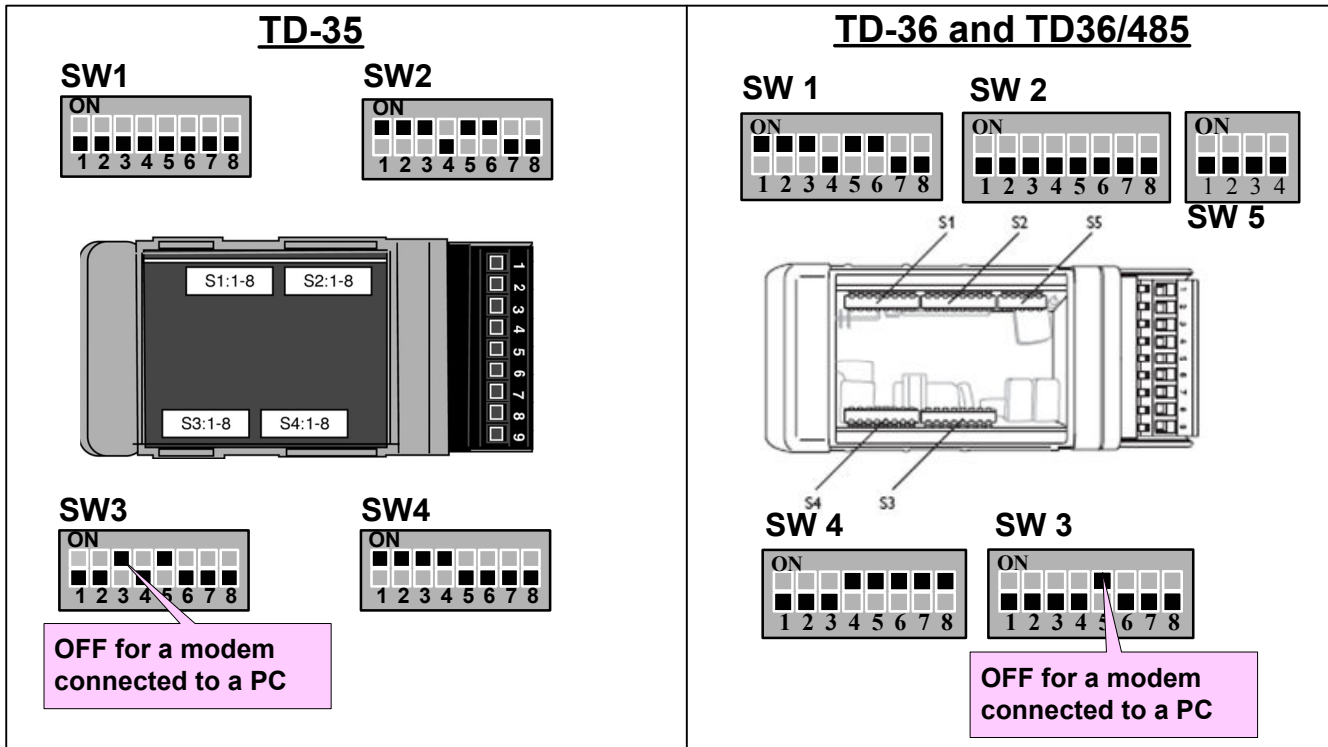
To prevent RSLinx trying to make a dial connection each time it is run, select the following options. This will ensure that the dial-up connections are only established when required.



Select On Demand



## Appendix 1 - Westermo Telephone Modem Settings for 19200,8,N,1



### TDW33

The TDW33 is configured using TDTTool 2 which is delivered with the modem. The Windows based tool allows for simple configuration of the modem using pulldown options for the AT command strings. TDTTool 2 can also be used to configure the TD36 and TD36/485 modems. Once the configuration has been entered on each screen select **WRITE** to store the new profile in the modem.

1) Connect Using Auto baud and a MC9/9 cable from PC

3) On Serial Tab, Set to 19200, 8, N, 1 and also set the commands Q1E0&C1&K0&D0 for the PLC modem and Q0E1&C1&K0&D2 for a PC modem

2) On Basic Tab, Set the command %E0

4) On Dial Options, Set the command &A1

**All Modems require the following Command String when using 1785KE, 1747KE, 1770KF2 or 1770KF3 DF1 modules**  
**AT&D2&S1S30=12&W**

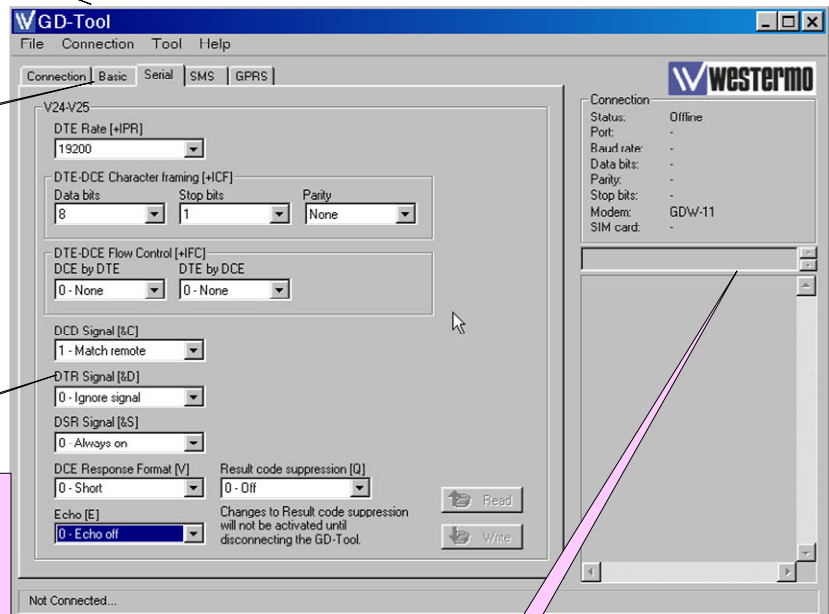


## Appendix 1 - Using GDTool with the GDW11

1) Connect PC to Modem using a straight through MC9/9 Modem cable then Select Autoconnect and GDTool will search for the correct Serial rate and parity

2) On Basic Tab select no of rings to auto answer (S0) to be 1 and +WRST to be enabled, "35:35" for the Delay and then click the Write Button on that page to save to the modem

3) On Serial Tab set up as shown here to give the AT commands +IPR=19200; +ICF=3,4; +IFC=0,0; and E0V0Q1 for the PLC modem and E1V1Q0 for a PC modem then click the Write Button on that page to save to the modem. **Note: These settings can also be used on the GD-01 GSM modem**



Using the Terminal command box enter the following commands followed by ENTER:

```

AT+WOPEN=0
AT+CREG=0
AT+CGREG=0
AT+WIND=0
AT+CGEREP=0
AT+CRC=0
AT+CMEE=0
AT+CLIP=0
AT+WRIM=1
AT&W
    
```

These commands stop all of the unsolicited GSM and GPRS status messages

### NOTE 1:

All other settings are default

**All Modems require the following Command String when using 1785KE, 1747KE, 1770KF2 or 1770KF3 DF1 modules**

```

AT&D2&S1S30=12&W
    
```



## Appendix 2 - Increasing Connection Speeds

It is possible to increase the RS232 port speed on some of the Rockwell PLCs to increase the speed of connection, once the connection has first been tested at 19200 using the settings detailed in Sections 1 to 3 of this document. The Contrologix series of PLC's have successfully been used at 38400.

To increase the port speed, follow the steps shown in Section 1 to setup the PLC's RS232 port and see the Westermo Modem's installation manual for details of DIP switch settings for different DTE Serial port speeds.

### **NOTE:**

The Modem settings used throughout this document have had 19200 set on both the serial port and the Line Modulation between the Modems, with the exception of the TD-33 which uses its Autobaud setting as Default.

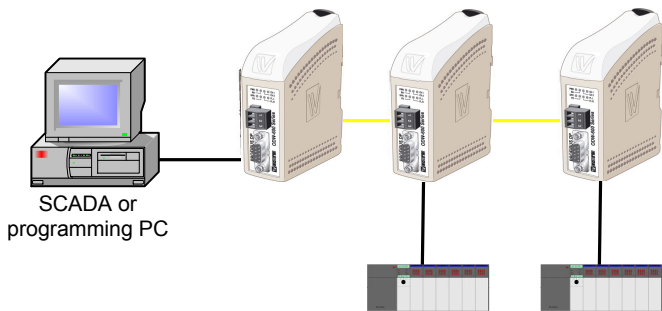
## Appendix 3 - Alternative Westermo to Rockwell Connections

There are many other ways of connecting Rockwell Automation Products using Westermo devices. There are some example applications shown below, but for any other connection method please contact Westermo.

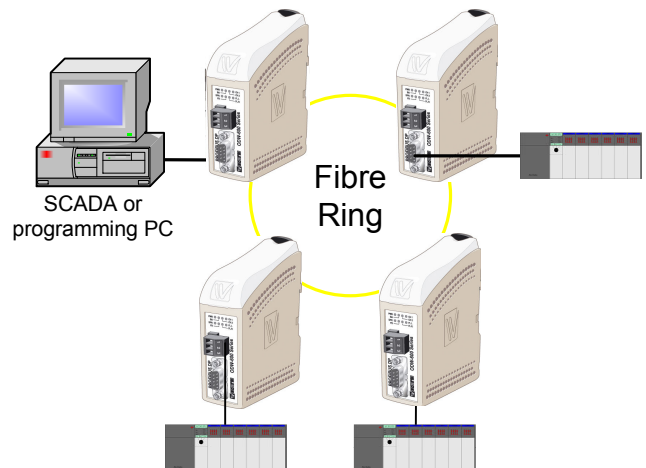
The first applications shown below use the RS232 Fibre Optic Line Sharing modems to create Linear and Redundant Ring configurations.

The first Ethernet example application shows the SDW541 Ethernet Switches connected by up to 2Km of Multi Mode or up to 40Km of Single Mode Fibre Optic Cable. The second Ethernet example application shows a Redundant Fibre Optic Ethernet ring using Switches that can recover from a breakdown of the ring within 30mS.

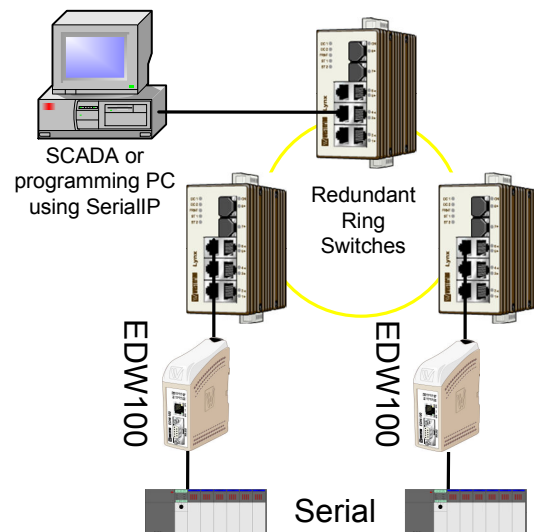
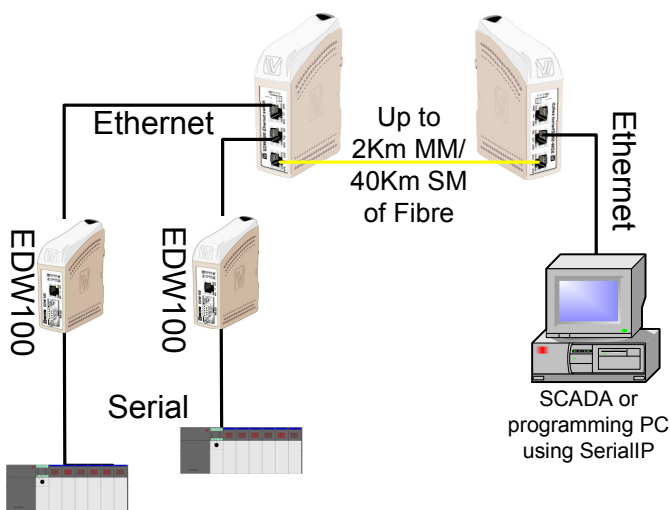
**ODW622 RS232 Linear Fibre Optic Network**



**ODW632 RS232 Fibre Optic Ring**



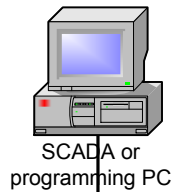
**Ethernet and Fibre Optic Networks**



## Appendix 4 - Westermo ED-210 to Ethernet Enabled PLC's

It is possible to use Westermo Modems with Westermo ED-210's to either link two Ethernet Networks or to connect to a PLC Ethernet Network using Microsoft Windows Dial Up Networking.

### Dial Up Networking



LAN

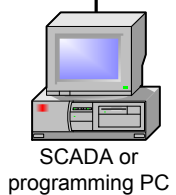


**Note:**  
The Modem Type used for the following Dial up Networking example was a TD-35 LV. The Article number for a Westermo Null Modem Cable, used to connect the Modem to an ED-20, is 9450-0210.

### Connecting Ethernet Networks



LAN



**Note2:**  
It is also possible to connect same subnet networks with a pair of DDW-100 SHDSL Ethernet Extenders using existing twisted pair cable e.g. DH+ cable, in the same manner as shown above with the DDW-100s being used in place of the ED-210's.

## Appendix 5 - EthernetIP Recommendations

When using EthernetIP it is important to be aware of the impact of using different methods of data transfer. When using Ethernet based I/O or using Producer/Consumer Tags, switches supporting IGMP Snooping and Querier (also known as Multicast) must be used. If non IGMP enabled switches are used to create the network, the Multicast data will be treated as Broadcast data and the network will quickly become congested. Switches such as the Westermo Lynx 400/1400 should be used in Multicast networks. Low bandwidth link into or between networks make it imperative that IGMP switches are used. Connections such as a Radio or Router using a PSTN or GSM/GPRS link will become congested and unusable without the correct choice of Multicast enabled switch.

Another method of EthernetIP communication that requires some caution is the use of PLC to PLC messaging. There is a “Connected Mode” used in PLC message blocks that use “keep alive” messages. This means that even though the required data transfer has occurred there are still regular messages being transmitted on the network link. This is fine on a LAN with plenty of bandwidth but on a Satellite, Radio or Router using a PSTN or GSM/GPRS link these messages can utilize far more bandwidth than necessary. There is an option for “Unconnected Mode” which does reduce the number of messages but it is also worthwhile using Firewall or Filtering features that can be found in Routers and Ethernet Radios to ensure on valid data is transmitted between known devices. The Filtering option can be very useful to stop unwanted broadcast messages that are sent by devices such as Windows based PC’s.

The Westermo Lynx and R208 switches have models that incorporate IGMP snooping and Query mode and are fully compatible with Rockwell Producer/Consumer tags and I/O. The Westermo ED-20 and ED-200 series Routers have built in Firewall and the Westermo Ethernet Radio modems have built in MAC and IP address filtering.

Westermo have extensive experience with different types of network protocols and can assist in various aspects of network design, implementation, commissioning and fault finding existing systems.



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