

# User and Installation Manual

## Single Cable Host/RTU



## Single Cable Host/RTU Communication/Power Interface

Ag/MIS/UmGb-2883-06/23 Rev 1.2

116872



# Single Cable RTU

## User and Installation Manual

Rev 1.2, 2/2024

Software Version: N/A

This manual for use and maintenance is an integral part of the apparatus together with the attached technical documentation.

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# 1 Introduction

## 1.1 Disclaimer

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## 1.2 Introduction

Congratulations on your excellent choice of purchasing an Single Cable RTU unit!

In order to realize the full benefit from this product it is important that it is installed, commissioned and operated correctly. Before installation or using the device, this manual should be studied carefully. It is also recommended that it is kept safely for future reference. The manual is intended as a reference for installation, commissioning and day-to-day operation of the Munters equipment.

## 1.3 Notes

Date of release: May 2021

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# 2 Introduction to the Single Cable

The Single Cable RTU system is a system that is designed to interface to various controllers and enable remote I/O terminals. The Single Cable RTU system passes voltage and communication via a single 2-wire cable to a large number of Remote Terminal Units (RTUs) that can be widely spread throughout the field.

This manual describes in details all steps required to install and configure the Single Cable RTU 2-Wire System. Please read this manual fully before starting the installation.

## 2.1 2-Wire System Control Modes

The 2-wire system can be interfaced to one of four different types of controllers:

- NMC-PRO/Green Field Controller
- Parallel Controller (any controller that generates 24VAC or 12VDC outputs)
- PLC / Controller that supports Modbus driver (Modbus Secondary Mode).

The control mode is used to decide which of these controllers is the Primary controller and can set/read the state of system I/O's.

## 2.2 Components in the 2-Wire System

The 2-wire system consists of hardware and software.

The Single Cable RTU PC software is called PoleNet and is used to install and configure the Single Cable RTU 2-wire system as well as to analyze its behavior (see PoleNet Software Installation & Operation, page 21).

The hardware network consists of three main components (Figure 1):

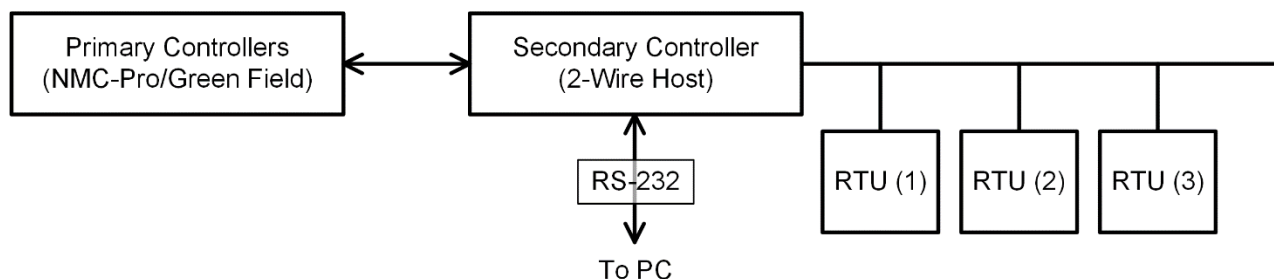


Figure 1: 2-Wire System Components

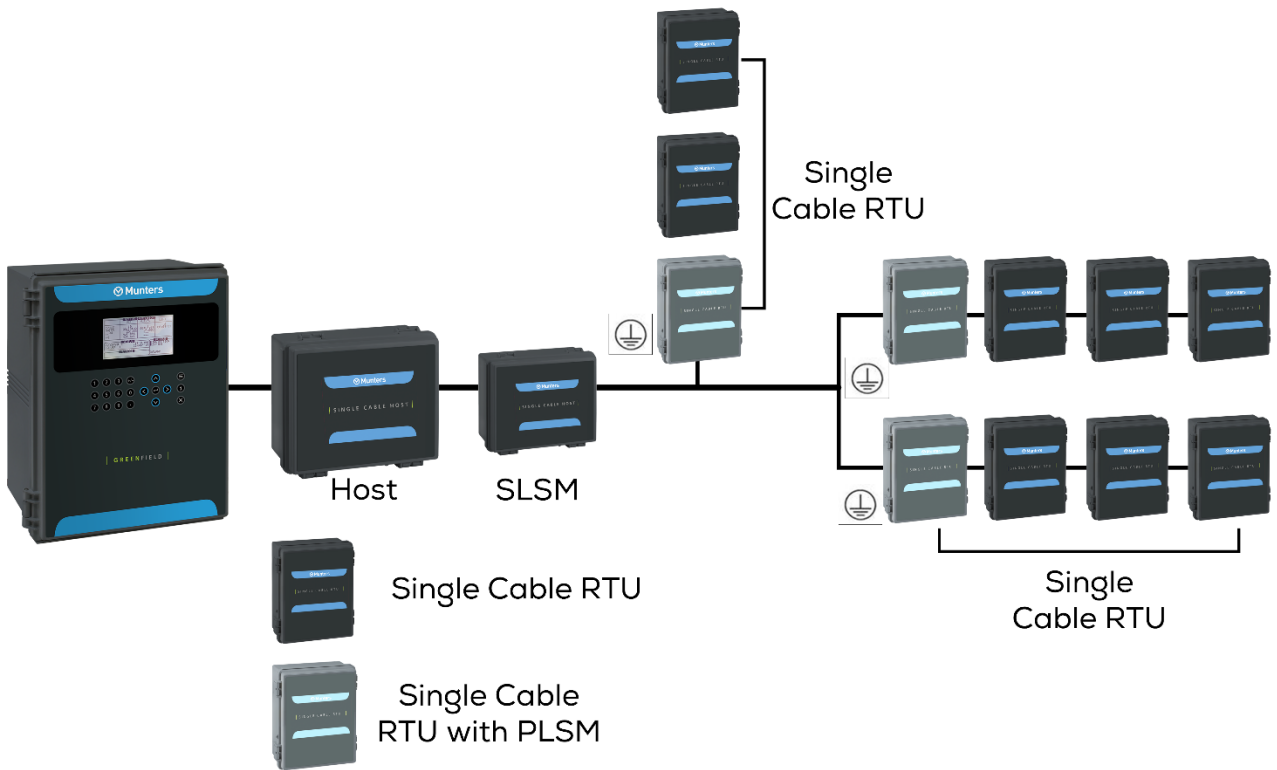


Figure 2: Block Diagram

Figure 3 illustrates how to ground the Single Cable RTU with PLSM units.

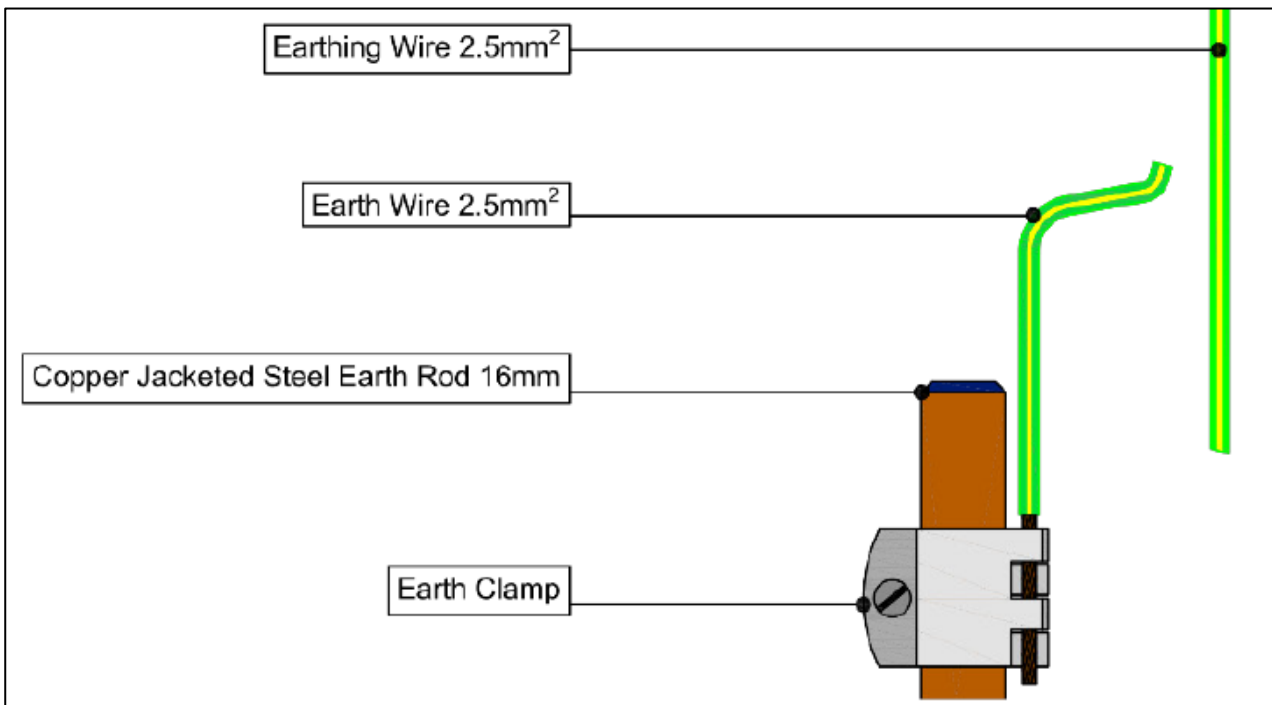


Figure 3: Grounding

## 2.2.1 PRIMARY CONTROLLER

The primary controller is the controller that “decides” the state of the I/O’s, type depends on the control mode of the system (see 2-Wire System Control Modes). Detailed descriptions of the different primary controllers can be found in sections Connecting 2-

Wire host to Primary controller (NMC Mode) and Appendix A - Connecting 2-Wire host to Primary controllers.

### 2.2.2 SECONDARY CONTROLLER (2-WIRE HOST)

The secondary controller (2-Wire host) allows the primary controller to access/control the Remote Terminal Units (RTUs). The 2-wire host module communicates with the primary via an RS-232 (where the primary is NMC- Pro/Green Field), RS 485 cable or a separate connector (where the primary is a parallel controller card).

The 2-Wire host can also be connected to a PC via a RS-232 cable for installation and testing purposes.

### 2.2.3 REMOTE TERMINAL UNITS (RTUS)

The RTUs are low powered devices each consisting of two digital inputs and two digital DC latch outputs. These units interface to the 2-Wire host module via a single 2-Wired cable.



## 2.2.4 OPTIONAL COMPONENTS

There are two other optional components that the system can consist of:

- A Serial Lightning Suppression Module (SLSM) and one or more Parallel Lightning Suppression Modules (PLSMs).
- The SLSM and the PLSMs provide improved suppression of high voltages generated by lightning strikes in the vicinity of the 2-wire host module and the RTUs, respectively.

P/N	Description
960-22-00012	SINGLE CABLE RTU 2 LATCH OUT&2 D.IN - MUR
960-22-00013	SINGLE CABLE RTU 2 LATCH OUT &2 D.IN+PLSM - MUR
960-22-00014	SINGLE CABLE RTU 4 LATCH OUT&4 D.IN - MUR
960-22-00015	SINGLE CABLE RTU 4 LATCH OUT &4 D.IN+PLSM - MUR
960-22-00016	SINGLE CABLE RTU 6 LATCH OUT&6 D.IN - MUR
960-22-00017	SINGLE CABLE RTU 6 LATCH OUT &6 D.IN+PLSM - MUR
960-22-00018	SINGLE CABLE HOST RS232/485 W/O POWER SUPPLY - MUR - 00035-001760
960-22-00019	SINGLE CABLE SLSM LINE SUPPRESSION MODULE - MUR - 00035-008300
960-22-00008	SINGLE CABLE SERIAL INTERFACE CARD TO NMC - 00035-008350
960-22-00011	SINGLE CABLE PLSM GROUND KIT

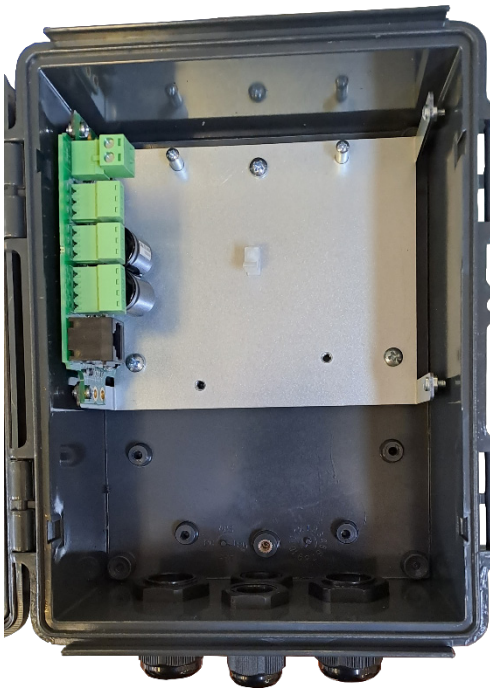


Figure 4: SINGLE CABLE RTU 2

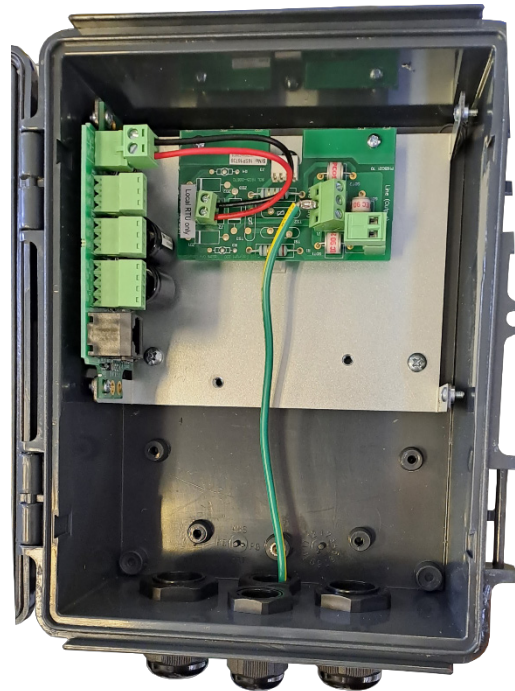


Figure 5: SINGLE CABLE RTU 2 & PLSM

# 3 Getting Started

This paragraph briefly explains how to get started with the Single Cable RTU system. For further explanations please see the detailed instructions per section.

- Start with the physical connections for initial setup of the system.
- Later steps might depend on earlier ones; therefore it is essential to go through all the steps. The following chart may be used for assistance:

Table description	Green
<b>Hardware &amp; Connections</b>	
2-Wire host	Follow the 2-Wire host sections for connecting the 2-Wire host: <ul style="list-style-type: none"> <li>• Connecting power to 2-Wire host</li> <li>• Connecting 2-Wire host to RTUs</li> <li>• Connecting 2-Wire host to Primary controller</li> <li>• Connecting 2-Wire host to PC</li> </ul>
SLSM	If existent connect the Serial Lighting Suppression Module.
RTUs	Connect the RTUs to the Single Cable RTU network and to the I/O devices.
PLSM	If existent connect the Parallel Lighting Suppression Modules.
<b>PoleNet Software Installation &amp; Operation</b>	
PoleNet software installation	Install the PoleNet software
PoleNet software configuration - Main Menu	Open the PoleNet software, the main menu will appear.
Selecting the System to Connect to	Set the device the PoleNet should connect to and define connection port.
Connecting to a System	Check that you are able to connect to the 2-Wire host.
Configuring 2-Wire hosts	Select the Primary Controller Mode and configure the connection between the Primary controller and the 2-Wire host.
<b>Testing the Systems Operation</b>	
Testing the system for proper operation	Follow the instructions to verify that the system (NMC and Single Cable RTU) is working properly.

### 3.1 Hardware & Connections

- 2-Wire Host Card
- Connecting power to 2-Wire host
- Connecting 2-Wire host to RTUs
- Connecting 2-Wire host to Primary controller (NMC PRO Mode)
- Physical Connection
- Connecting 2-Wire Host to PC
- Serial Lightning Suppression Module (SLSM)
- RTU – PLSM – PC Summary
- Remote Terminal Unit (RTU)
- Parallel Lightning Suppression Module (PLSM)

#### 3.1.1 2-WIRE HOST CARD

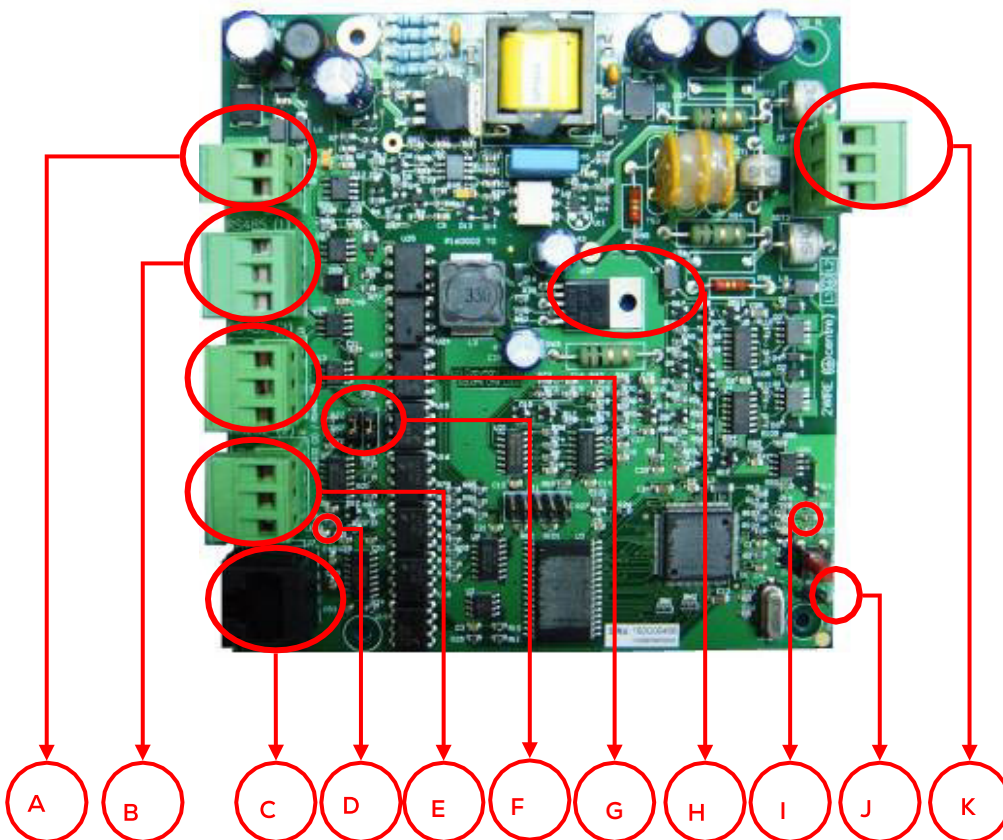


Figure 6: 2-Wire Host Card

The indicated components are:

- A. J3 connector provides power to the 2-wire host.
- B. J4 connector is an Auxiliary RS-485 socket (also for compatibility with old style RS-232 Primary controller connection mode).
- C. J7 connector is a RS-232 socket to plug in cable to connect a PC (Used for setup and diagnostics).

- D. LED 3: Red flashes when input power at J3 is present.
- E. J6 connector is a RS-232 socket to plug in Primary controller (note that software setting of this port should still be RS-485).
- F. LK1 & LK2 for switching host communications port 2 from RS-485 on J5 to RS-232 on J6 when both are down (RS-485 when links plugged between the top and centre pins, and RS-232 between bottom and centre pins).
- G. J5 connector is a RS-485 socket to plug in Primary controller.
- H. U27 regulator. Before inserting/removing the programming link (see J below) touch the tab on the right to discharge any personal static electricity to prevent permanent damage to the 2-Wire host!
- I. LED 1: Red flashes with error code during fault conditions. LED 2 – Green flashes slowly during normal operation.
- J. J1 Connector for attaching the programming link for firmware updates (see H above).
- K. J2 connector for attaching to the 2-wire network and to the protective earth.

**NOTE** 2-Wire Host shown in figure above includes battery backup (optional).

### 3.1.2 CONNECTING POWER TO 2-WIRE HOST

Power is supplied to the 2-Wire host by the connector labeled J3 (A).

**CAUTION** Remember to disconnect the power connector when the unit is not in use, in order to avoid damaging the battery.

### 3.1.3 CONNECTING 2-WIRE HOST TO RTUS

The 2-Wire host is connected to the RTUs by the connector labeled J2 (F). Figure 4 shows how the cable is to be connected:

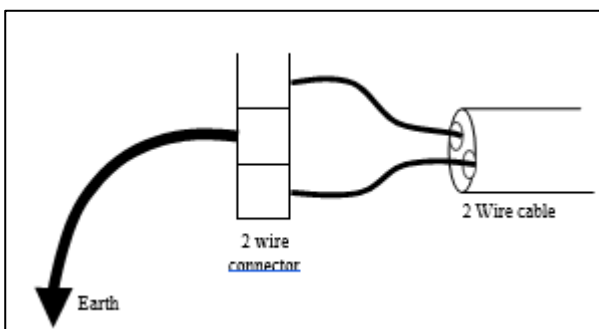


Figure 7: Connecting the 2-wire cable

### 3.1.4 CONNECTING 2-WIRE HOST TO PRIMARY CONTROLLER (NMC PRO MODE)

This paragraph explains how to connect the 2-Wire host to the NMC.

In case you are using a different Primary controller (e.g. Parallell or PoleNet) please refer to Appendix A - Connecting 2-Wire host to Primary controllers.

If non-linear mapping is enabled, it is possible to control multiple RTU outputs with each of the 64 outputs from the NMC controller, in effect providing up to 256 outputs.

The figure below (2-Wire host system in Green Field Controller mode) is a block diagram showing how the Green Field Controller interfaces to the 2-wire system:

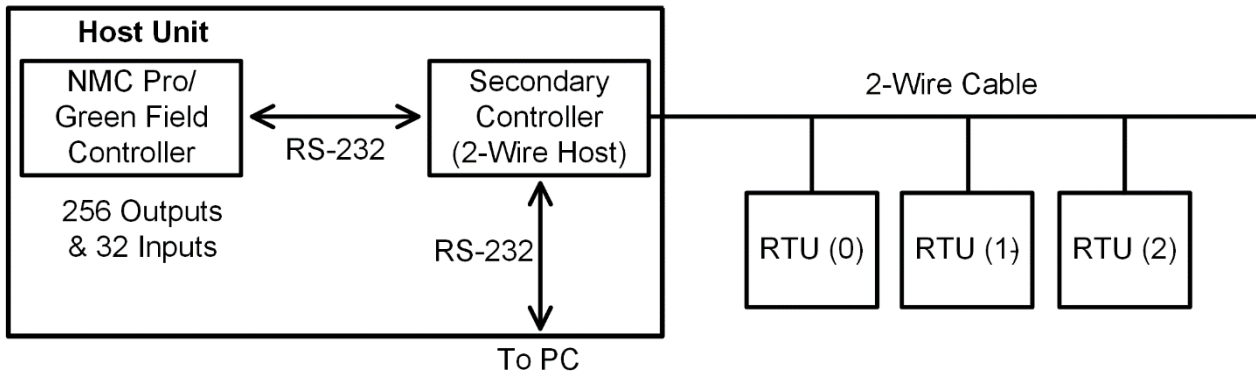


Figure 8: 2-Wire host system in Green Field Controller mode

### 3.1.5 PHYSICAL CONNECTION

The NMC-PRO/Green Field controller is physically connected, via RS-232 or RS-485, to the 2-Wire host as shown in paragraph 2-Wire host.

- RS-232 Connection
- RS-485 Connection

#### 3.1.5.1 RS-232 Connection

- Option A – RS-232 Connection Scheme with Old Type of 2-Wire Host
- Option B – RS-232 Connection Scheme with New Type of 2-Wire host

##### 3.1.5.1.1 Option A – RS-232 Connection Scheme with Old Type of 2-Wire Host

Use the prescribed special adapter cable to connect to connectors J4 (C) and J5 (D) as explained below:

2-Wire host	Green Field/Communication Card
Connector J4, pin B	Rx (High row)
Connector J5, pin B	Tx (High row)
Connector J5, GND	Com (High row)

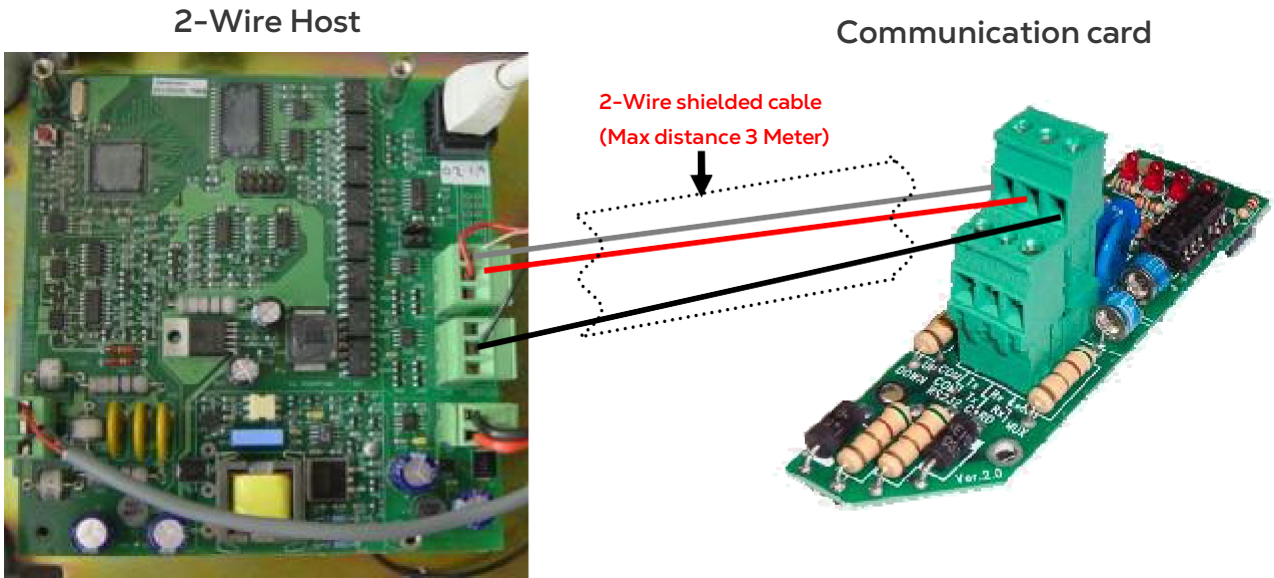


Figure 9: Option A RS-232 connections of 2-Wire host to RS-232 Wiring Diagram

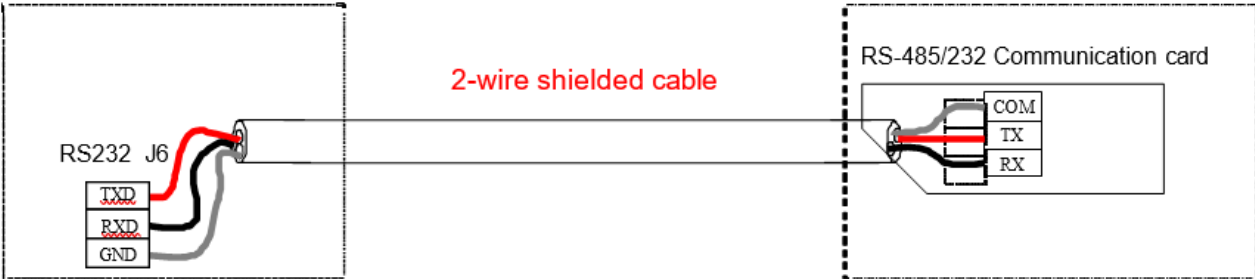


Figure 10: Option A Schematic

NOTE Make sure Jumpers of LK1 and LK2 at page 8 bullet F are located at RS-232 position

3.1.5.1.2 Option B – RS-232 Connection Scheme with New Type of 2-Wire Host

Use the prescribed special adapter cable to connect to connectors J6 as explained below:

2-Wire host	Green Field, communication card
Connector J6, pin TXD	Rx (High row)
Connector J6, pin RXD	Tx (High row)
Connector J6, GND	Com (High row)

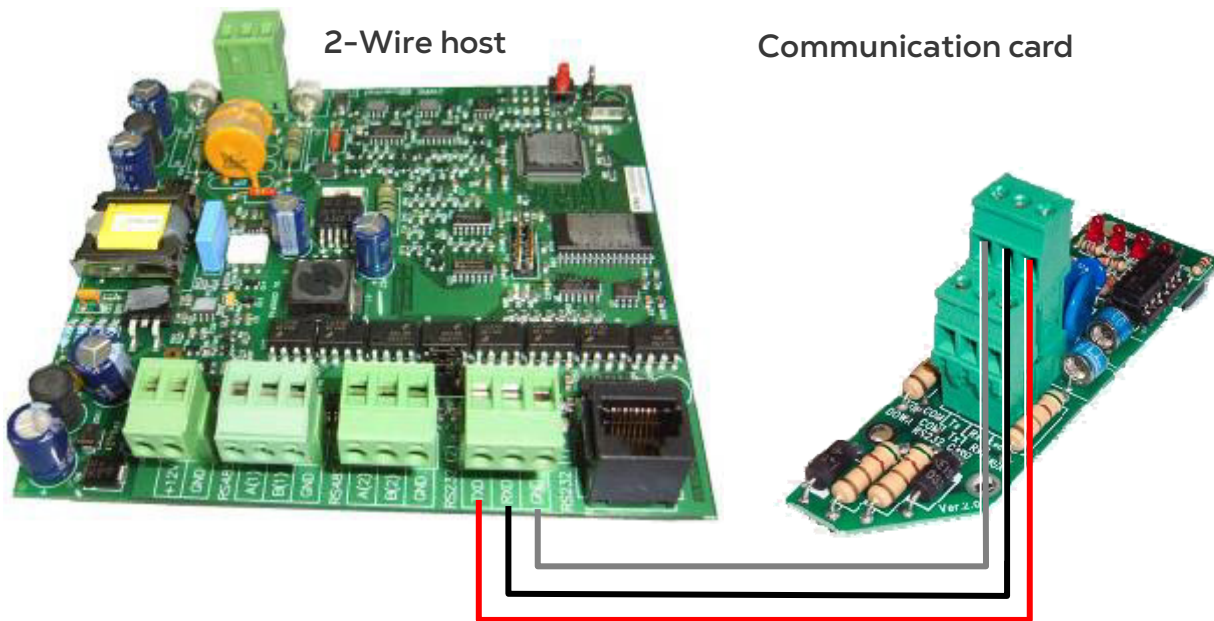


Figure 11: Option B RS-232 connections of 2-Wire host to RS-232 Wiring Diagram

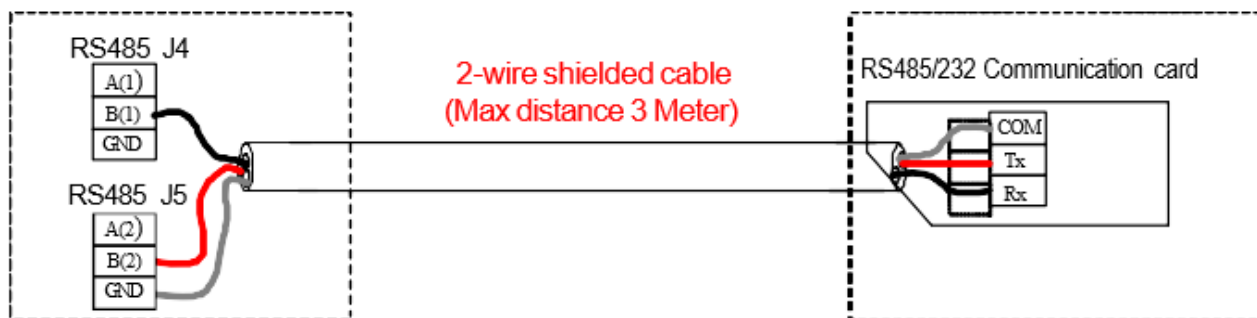


Figure 12: Option B Schematic

### 3.1.5.2 RS-485 Connection

**NOTE** The communication card must be RS-485x2

The NMC-PRO/Green Field controller is physically connected, via RS-485, to the 2-Wire host as shown in paragraph 2-Wire host.

RS-485 connection - use the prescribed special adapter cable to connect to connector J5 as explained below:

2-Wire host	NMC-PRO/Green Field, communication card
Connector J5, pin A	A2 (High row)
Connector J5, pin B	B2 (High row)
Connector J5, GND	GND (High row)

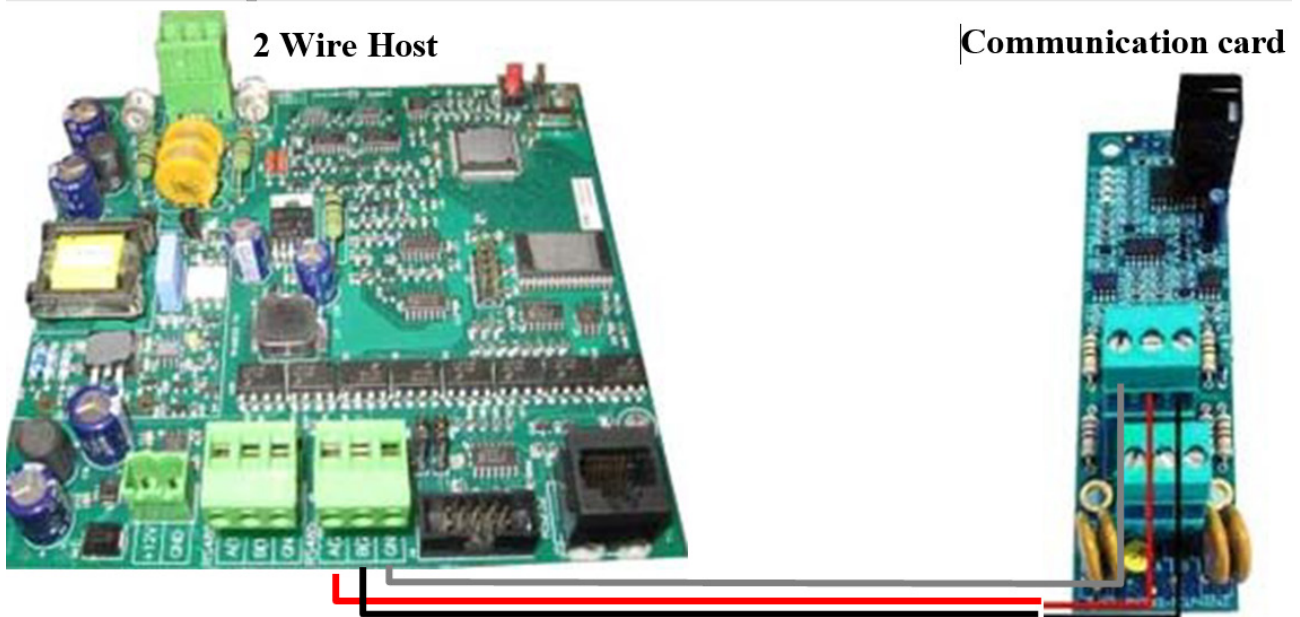


Figure 13: RS-485 Wiring

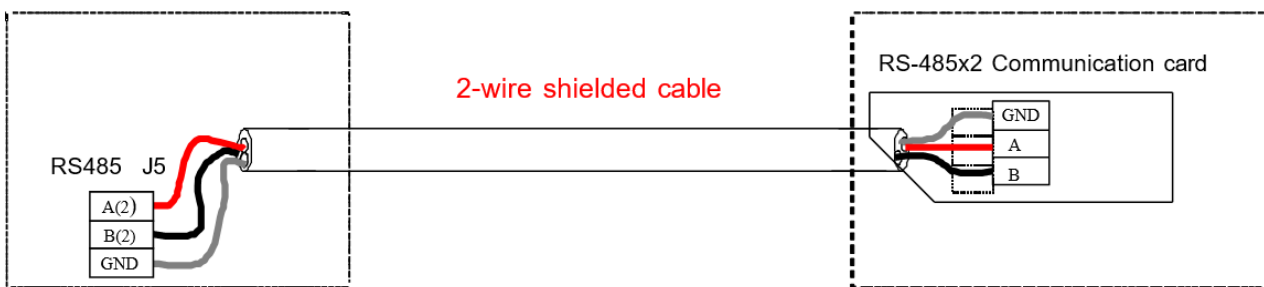


Figure 14: RS-485 Schematic

### 3.1.6 CONNECTING 2-WIRE HOST TO PC

The 2-Wire host module consists of a serial interface so it is possible to make configuration changes and to monitor activities of the 2-Wire host from a PC.

Using a RS-232 cable, plug one end of the RS-232 cable into a PC COM port and the other end into connector J7 (B) shown in paragraph 2-Wire host.

Configuring and Testing should be done using the dedicated PoleNet program.

### 3.1.7 SERIAL LIGHTNING SUPPRESSION MODULE (SLSM)

As mentioned earlier, the SLSM can be used to provide improved protection to the 2-Wire host module from high voltages generated by lightning strikes (see figure ).



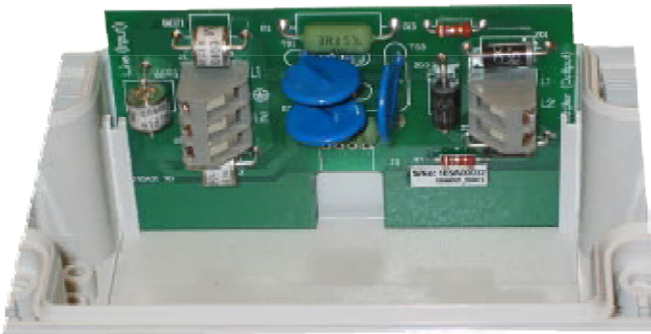


Figure 15: Serial Lightning Protection Module

The SLPM unit is fitted between the host unit and the two-wire network cable as illustrated in figure Connecting the SLPM.

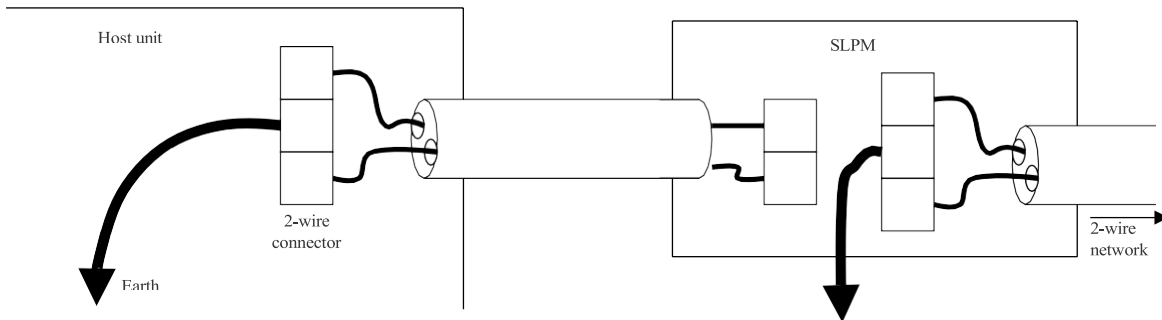


Figure 16: Connecting the SLPM

### 3.1.8 RTU – PLSM – PC SUMMARY

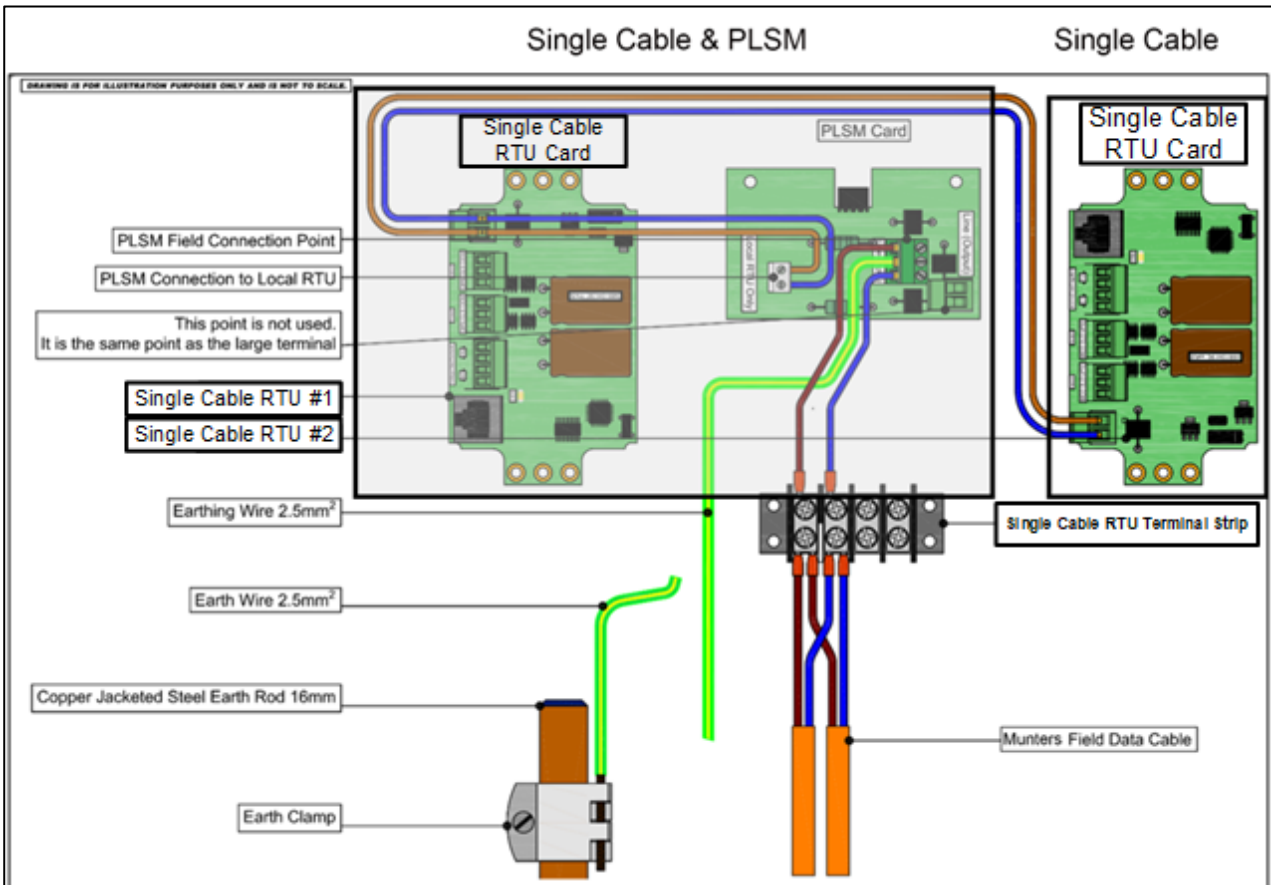


Figure 17: RTU – PLSM – PC Block Diagram

### 3.1.9 REMOTE TERMINAL UNIT (RTU)

The Remote Terminal Unit consists of two valve outputs and two digital inputs (e.g. to connect a water meter). The internal view of an RTU is shown in figure Remote Terminal Unit.

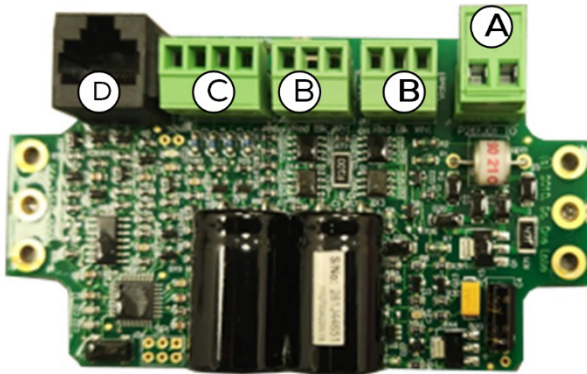


Figure 18: Remote Terminal Unit Card

The sections indicated are as follows:

- A. The 2-way connector is used to attach the RTU to the network (the 2-wire cable In & Out).
- B. Two 3-way connectors are used to attach either two or three wire solenoids. Two wire solenoids use only the red and black terminals (leave the white terminal empty) and three wire solenoids use all three terminals.
- C. Two voltage free contacts from water meters can be connected to this 4-way connector (Input1 and Input2 are marked on the PCB).
- D. This RS-232 connector allows the RTU to be connected to a PC for configuration changes and firmware upgrades.

**NOTE** When attaching valves and water meters (or any other input device) these devices and their cables must be completely isolated from earth.

Figure 16 shows how the 2-wire unit is attached to the 2-wire network.

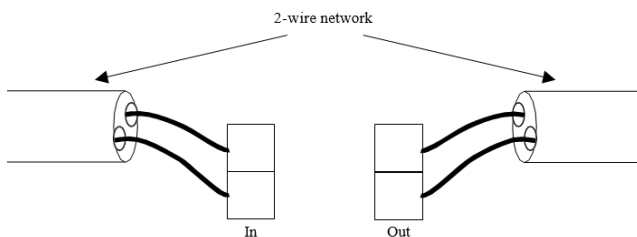


Figure 19: Attaching an RTU to the network

It is unimportant which wire in the cable is attached to which terminal, as the RTU is able to operate either way.

### 3.1.10 PARALLEL LIGHTNING SUPPRESSION MODULE (PLSM)

The PLSM is a module that is attached to the RTU as shown in Figure 17.

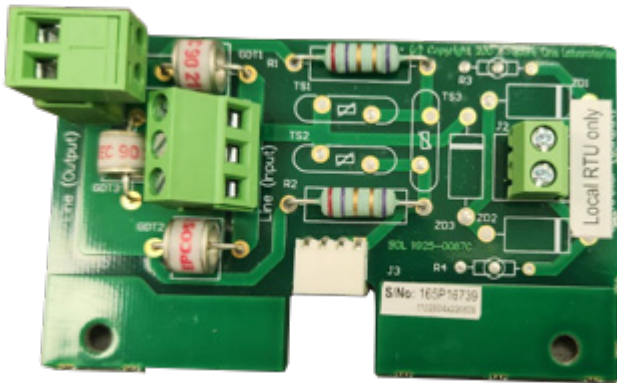


Figure 20: RTU with Parallel Lightning Suppression Module Card

The figure below illustrates how to attach an RTU with a PLSM to the network:

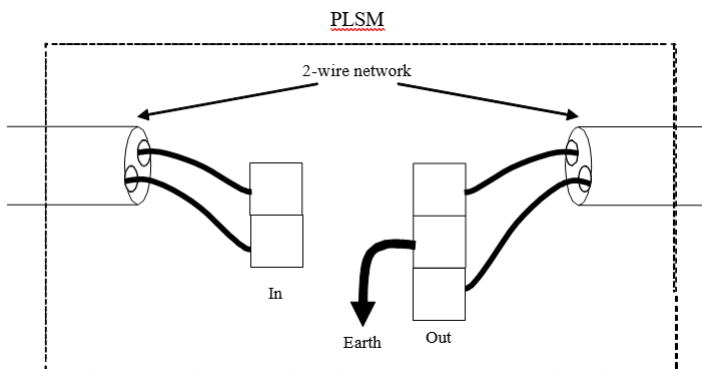


Figure 21: Attaching RTU with a PLSM to network

**CAUTION** It is important to note that if a PLSM is used, the 2-way connector of the RTU (labeled A in [Remote Terminal Unit \(RTU\)](#) section) itself must not be connected.

The number of these units (RTU+PLSM) that are required depends on how susceptible the area is to lightning. If the severity is low, PLSMs can be placed, for example, 10 units apart whereas if the area is more prone to lightning, every unit may have a PLSM attached (see Figure 19).

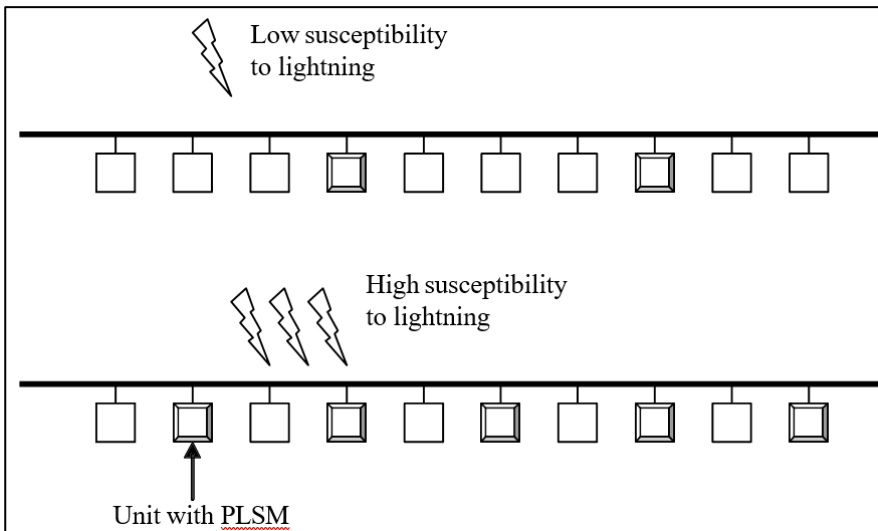


Figure 22: Example of placing units with PLSMs

## 3.2 PoleNet Software Installation & Operation

PoleNet software is the interface where the technician defines the Irrigation controller which communicates with the Single Cable RTU 2-Wire Host and operates the field valves via the Single Cable RTU RTUs. PoleNet software is used for Single Cable RTU system Configuration, Setup, Test and Monitor.

PoleNet software features:

- Test communication with field units
- Test outputs and inputs
- Program, load and backup your configuration files (online or offline)
- Communication diagnostics
- RTU ID programming

### 3.2.1 INSTALLATION

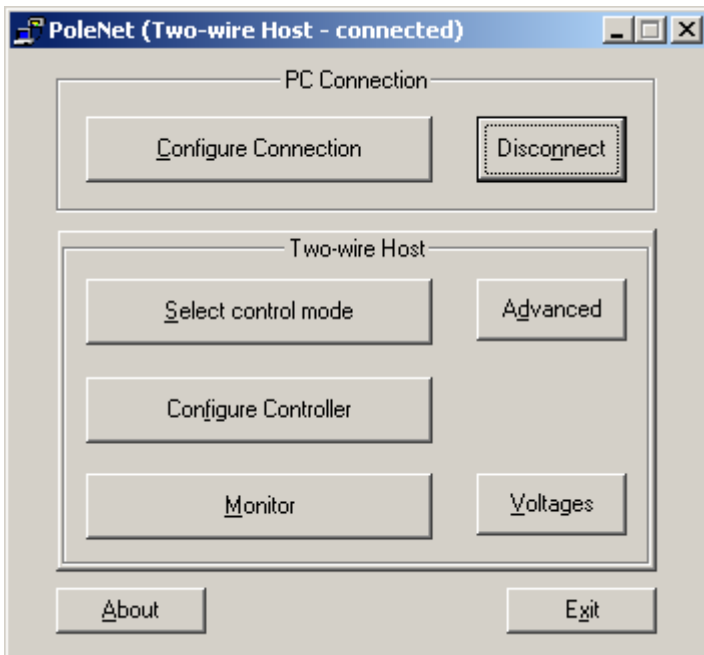
PoleNet software does not require installation; simply double click on the PoleNet.exe file and the software will open.

### 3.2.2 UNINSTALLING

To uninstall PoleNet simply erase the PoleNet.exe file.

### 3.2.3 POLENET SOFTWARE CONFIGURATION – MAIN MENU

When PoleNet software is started the main menu should appear:



The heading shows which system PoleNet is set up to interface to (Two-wire Host in the figure above).

Most buttons are disabled until PoleNet starts interfacing with a system. The functions of these buttons vary to suit the current application.

Click the Configuration Connection button to set communication settings (See section Selecting the System to Connect to).

After setting the correct COM port and system click the Connect button to start interfacing to the system (See section Connecting to a System).

After the system has connected successfully all relevant buttons will be enabled.

In case the system does not connect try checking you connections and COM port definitions.

### 3.2.4 SELECTING THE SYSTEM TO CONNECT TO

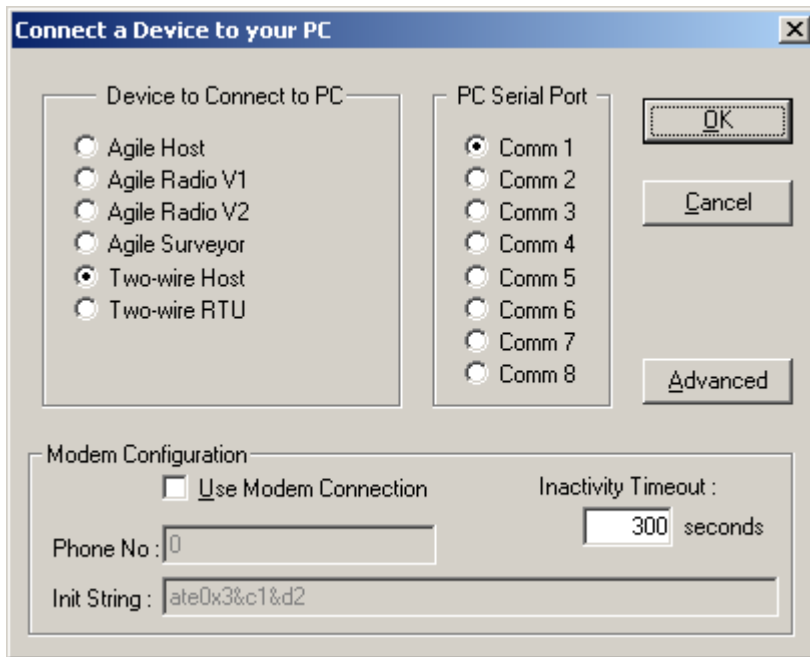
#### Configuration Connection button

PoleNet can connect to the following systems/devices via a PC serial (comms) port:

- Agile Host (Not relevant to Single Cable RTU system)
- Agile Radio (Not relevant to Single Cable RTU system)
- Agile Surveyor (Not relevant to Single Cable RTU system)
- Two-Wire Host
- Two-Wire RTU

Once the connection is established (using the Connect button from the main menu, see section Connecting to a System), PoleNet will provide an interface to the system/device and enable to access the system's settings and monitor the system's status.

To select the system to connect to, click the Configuration Connection button from the main menu. This will open the following screen:



- Device to Connect to PC - choose the system that PoleNet should interface to from the list of options.
- PC Serial Port - choose which serial RS-232 (Comm) Port you wish to use to connect to the system. Most PCs do not provide connections for more than two comm ports as standard.
- Modem Configuration – this section allows you to connect to an off-site target system using a modem. This option is only available if you mark the Use Modem Connection check box:
  - Phone No - type in the phone number of the off-site target system's modem.
  - Init String - if required enter an initialization string for your modem (It may be necessary to configure your modem to suit the target system's modem or to disable your call waiting).
  - Inactivity Timeout - specify an inactivity timeout (in seconds) to avoid tying up either phone line.

When you have finished entering your settings, return to the main menu and click the "Connect" button. This will check that your Comms settings work and will then allow you to start interfacing with the target system.

### 3.2.5 CONNECTING TO A SYSTEM

Before attempting to connect to a system, ensure that there is a serial cable connecting the system to the PC and that the system is turned on.

#### Connect / Disconnect button

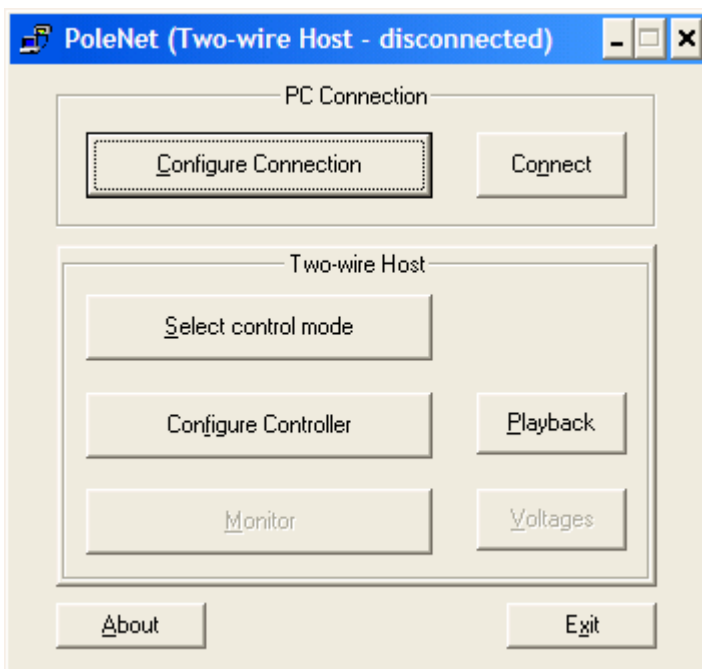
When you click on the Connect button, PoleNet will attempt to communicate with the current system using the current comm port (as specified in the Comms dialog, see section Comms button - Selecting the System to Connect to). The clock symbol will spin during this lengthy process.



If the Connect process is successful, PoleNet returns to the main menu, enables the main menu buttons, and the Connect button changes its function to Disconnect.

The Disconnect button should only be used if you want to use the current comm port for some other purpose without exiting the PoleNet program.

While you are disconnected from a system, some of the main menu buttons are disabled.



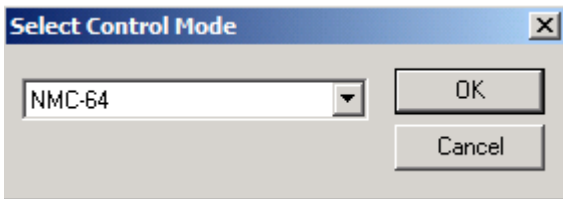
*NOTE If the Two-wire Host is not connected, off-line editing of the mapping is still supported, for those control modes that use mapping. Select the "Controller" type and the "Cfg" option will be available.*

### 3.2.6 CONFIGURING 2-WIRE HOSTS

- Select Control Mode
- Configure Controller Button (2-Wire host)

### 3.2.6.1 Select Control Mode

Click the Select control mode button from the main menu to access the Select Control Mode dialog box:

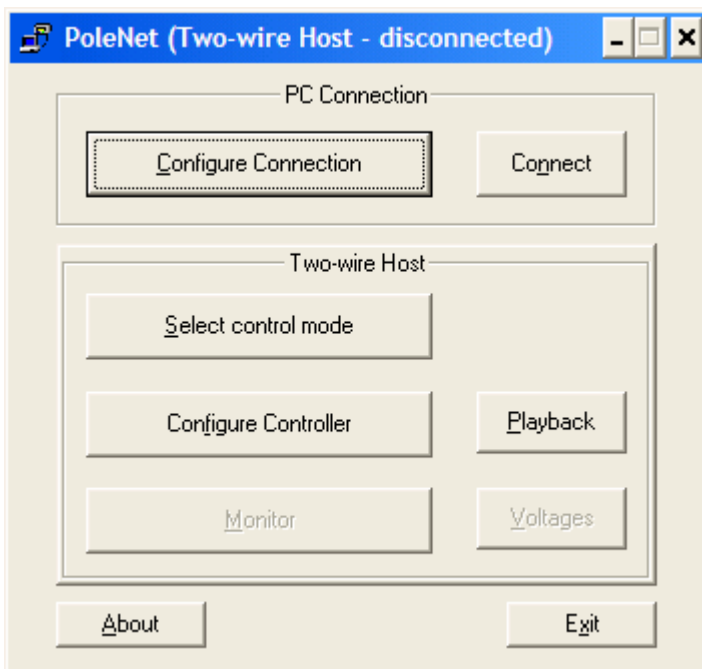


Select the mode that applies for the system. PoleNet queries the 2-Wire host to determine its current control mode and renames the Configure Controller button to suit the set mode.

The 2-Wire host can be interfaced to one of five different types of controllers:

1. NMC-64
2. PRO controller
3. Parallel Controller
4. Modbus – PLC / Controller with Modbus capability.

Click the Select Control Mode button if you wish to verify or change the 2-Wire host control mode.



### 3.2.6.2 Configure Controller Button (2-Wire Host)

The Configure controller button provides set-up options relevant to the current 2-Wire host control mode. If the 2-Wire host control mode is incorrect, first use the Select control mode button to adjust it.

Each control mode has its own Configuration dialog; the NMC-PRO/Green Field configuration is detailed in the following sections. For other control modes please refer to Appendix A - Connecting 2-Wire host to Primary controllers.



### 3.2.6.2.1 Controller Configuration

The screenshot shows the 'NMC-64 / NMC-PRO Interface Setup' dialog box. It is divided into several sections. At the top, there are two radio buttons for 'NMC Controller': 'NMC-64' and 'NMC-PRO', with 'NMC-PRO' selected. To the right of these are 'OK' and 'Cancel' buttons. Below this is a text box for 'NMC Id:' containing the value '1', with '(1-247)' in parentheses. The 'Comms Info' section contains three dropdown menus: 'Network' set to 'RS485', 'Speed' set to '9600', and 'Parity' set to 'None'. Below these is a text box for 'Tx Delay:' containing '6', with '(0-50 ms)' in parentheses. The 'Error Timeout:' section has a text box containing '10', with '(0-600 secs)' in parentheses. The 'Two-wire Addressing' section has two radio buttons: 'Use Simple Linear Mapping' and 'Use Non-Linear Mapping', with 'Use Non-Linear Mapping' selected. Below these are text boxes for 'Address' (containing '0') and 'Offset'. At the bottom of this section is a 'Setup' button.

The NMC-PRO/Green Field Controller sends commands to one or more various devices to monitor their inputs and to control their outputs. All devices need a unique NMC-PRO/Green Field ID, (we recommend you use the default 1 for the Two-wire Host), although the value is only important if there are multiple devices connected to the NMC-PRO/Green Field on a serial RS-485 Network.

The Comms Info must be set to suit the connection to the current NMC-PRO/Green Field system. Ideally specify the highest Speed, if you have a choice.

The Tx Delay is provided to cater for the NMC-PRO/Green Field controller and other devices which may hold onto the RS- 485 lines after sending commands, or which may take some time to be ready for a response: two-wire host will wait for this brief time before responding to NMC-PRO/Green Field commands.

**NOTE** *The Tx delay should generally be left on 6 mS. Only if it appears that the Two-wire Host does not respond to the controller (or the Host seems to send garbage, or other controlled devices stop working when the Two-wire Host is connected) and the comms speed and parity are correct, experiment with this parameter until the system works properly.*

Many errors are brief and transient by nature. The 2-Wire host extends the life of errors so the NMC-PRO/Green Field has sufficient time to observe the errors. The Error Timeout determines how long errors are remembered (remain active) after the error condition ceases.

### 3.2.6.2.2 NMC-PRO/Green Field Two-Wire Addressing

Two-wire RTUs have 2 outputs and 2 inputs, so the Two-wire Host supports up to 256 inputs and 256 outputs if all 128 two-wire RTUs are connected.

The NMC-PRO/Green Field supports 256 outputs (e.g. valves) and 32 digital inputs (e.g. water meters)

The two-wire Addressing section selects the mapping technique to be used. (Mapping determines which two-wire inputs and outputs are controlled by each of the NMC outputs and inputs).

#### NMC-PRO/Green Field Simple Linear Mapping

Simple Linear Mapping is very straight forward; it simply allocates a continuous block of 64 2-Wire outputs (and corresponding inputs) so there is a 1:1 correlation to the NMC outputs and inputs.

Eg. If you are using the first 32 RTUs (Address Offset = 0), then: NMC-PRO/Green Field address 1 = two-wire Unit 1, port 1,

- NMC-PRO/Green Field address 2 = two-wire Unit 1, port 2,
- NMC-PRO/Green Field address 3 = two-wire Unit 2, port 1,
- NMC-PRO/Green Field address 4 = two-wire Unit 2, port 2, NMC-PRO/Green Field address 5 = two-wire Unit 3, port 1, etc.

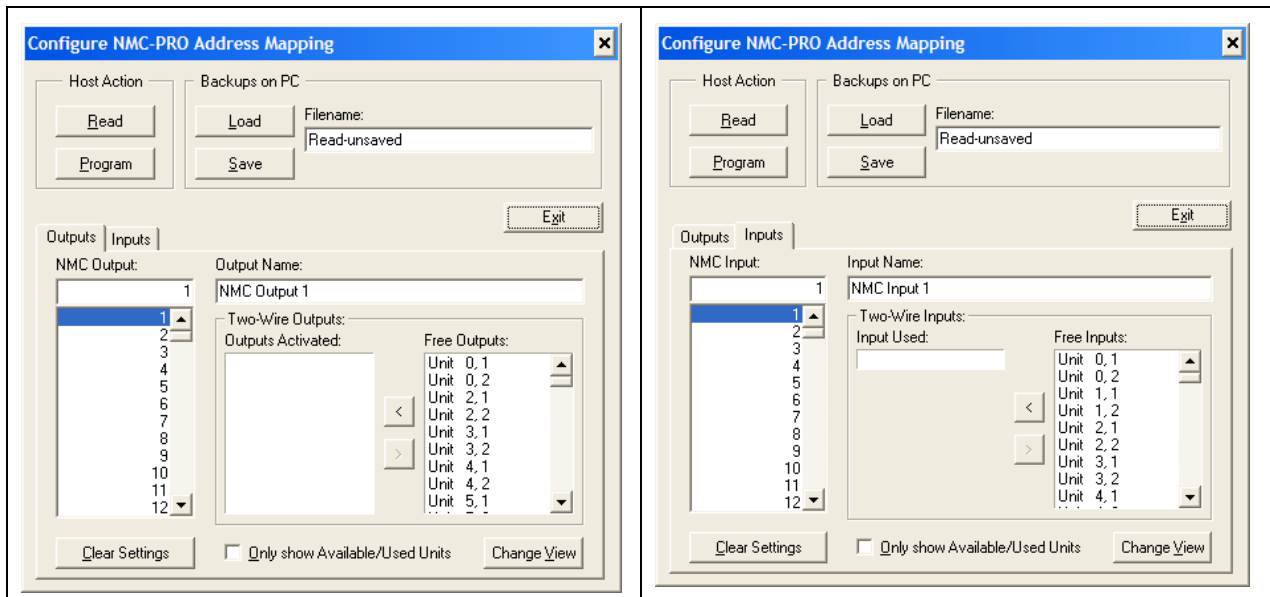
You can map to a different set of two-wire RTUs by using the Address Offset: a value of 2 moves the NMC-PRO map up by 1 RTU (2 outputs), (ie. NMC-PRO/Green Field #1 = Unit 2, port 1). Use Address Offset = 0 for the NMC-PRO/Green Field otherwise you will not be able to use all the NMC outputs.

There is also merit in setting the Address Offset = (ID of first two-wire Unit - 1) \* 2 because NMC address 1 will then correspond with the first two-wire port, however if you later add two-wire units with lower IDs you will have to change the Address Offset which will then require reprogramming the Host.

### 3.2.6.2.3 NMC-PRO/Green Field Non-Linear Address Mapping

Use Non-Linear Mapping is used to enable more flexibility or if you would like NMC-PRO/Green Field outputs to be able to control more than one two-wire output each. This is also a very useful system because you can change the mapping of one NMC-PRO/Green Field address without affecting the mapping of any other NMC addresses - this lets you use the NMC-PRO/Green Field to control & monitor different crops or fields at different times, without interrupting or changing the setup for the main part of your system.

Click the Setup button to configure the non-linear mapping.



Each NMC-PRO/Green Field output can be mapped to any number of outputs from 2-Wire RTUs, but each 2-Wire RTU output must be controlled by only one NMC-PRO/Green Field output.

The top section of the dialog allows you to read the NMC-PRO/Green Field mapping from the Host and to program them into the controller after editing. You can also load pre-existing NMC-PRO/Green Field configurations from computer or save them for later use. The lower half allows you to examine and modify the mapping of the NMC-PRO/Green Field outputs and inputs.

There are two ways to configure NMC-PRO/Green Field outputs/Inputs to RTU outputs/Inputs: Use the middle section - NMC-PRO/Green Field Outputs/Inputs:

Select an NMC-PRO/Green Field output/Input (you can also give it a name if desired) and map it to a RTU output/input from the Free Outputs/Inputs list on the right (see section NMC-PRO/Green Field Outputs and Inputs).

Use the bottom section - Two-Wire Outputs/Inputs:

Select the unit number (RTU no.) and configure a NMC-PRO/Green Field output/input to each (or one) of its outputs/inputs (see section Two-Wire Outputs and Inputs)

### Updating the 2-Wire Host NMC-PRO/Green Field Mapping Configuration

- **Read** - fetches all the NMC-PRO/Green Field mapping settings directly from the 2-Wire host. You then edit the settings and save them or program them back into the 2-Wire host.

**NOTE** The two-wire host does not keep track of the Names for NMC outputs/inputs.

- **Program** - programs the current NMC-PRO/Green Field mapping settings into the two-wire host. This takes several seconds, so a Programming progress window is shown

### Configuration File

- **Clear Settings** - clear all mapping between the NMC-PRO/Green Field addresses and two-wire RTUs, but it retains the Name settings for the NMC-PRO/Green Field outputs and inputs.

- **Load** - lets you fetch a previously Saved NMC-PRO/Green Field configuration from the PC.
- **Save** - stores a copy of the NMC-PRO/Green Field map configuration on the PC, including the mapping of NMC addresses to RTUs ports and Names for NMC-PRO/Green Field outputs & inputs.

2-Wire host supports 128 RTUs, so the Free Units and Unit Number lists are very long. To view only available units simply select Only Show Available/Used Units, PoleNet monitors the 2-Wire network (to see which RTUs it detects) and then only lists known RTUs. This makes setup quicker, easier and less prone to error, but it requires the 2-Wire system and 2-Wire RTUs to be largely operational.

If you are setting up the NMC mapping before starting the system then you will not be able to use this option

If a Unit is shown with brackets around it, then that RTU cannot be found on the system at the moment, but it has been mapped to the NMC-PRO/Green Field. This may help you find invalid settings, although the RTU may have simply “dropped out” temporarily.

#### 3.2.6.2.4 NMC-PRO/Green Field Outputs and Inputs

This section lets you view and setup the mapping from the NMC-PRO/Green Field’s point of view. You can Name each NMC Output (or Input), which should make it easier to verify, test and maintain the configuration. Then you setup how each NMC-PRO/Green Field output (input) maps to the 2-Wire system. Each NMC-PRO/Green Field output can control any number of outputs from 2-Wire RTUs.

Inputs can only be configured direct - one-to-one.

For each NMC-PRO/Green Field output (or Input):

1. Select the NMC-PRO/Green Field Output (or Input) number that you wish to configure. If you wish, give it a suitable Name, describing its purpose and/or location, etc. PoleNet shows the RTU ports Activated/Used by the NMC output/input.

PoleNet displays a list of Free RTU ports – ones not allocated to the NMC-PRO/Green Field.

To allocate an RTU port to the NMC output /input, locate the desired RTU port in the Free list, then either highlight it and click the Left arrow button or just double-click it. It then moves to the Activated/Used list. (For inputs, you must first remove the mapping to an RTU input before you can replace it with another).

To remove an RTU output from the list of Outputs Activated by the NMC-PRO/Green Field output locate the unwanted output, then either highlight it and click the Right arrow button or just double-click it. It will move to the Free Outputs list.

**NOTE** *If you cannot find a particular RTU output/input in the relevant Free list then its RTU may not be detected at the moment - turn off the Only Show Available/Used Units option and see if the desired output/input is now in the list.*  
*If the RTU output/input is still not in the Free list then it must already be allocated to a NMC-PRO/Green Field address - use the bottom [Two-Wire Outputs/Inputs](#) section to see how it is allocated.*

### 3.2.7 TWO-WIRE OUTPUTS AND INPUTS

This section lets you view and setup the mapping from the 2-Wire Host's point of view, as an alternative to the NMC-PRO/Green Field-based section above.

For each 2-Wire Unit:

- Select the 2-Wire RTU that you wish to configure from the Unit Number list.
- If a desired RTU is not in the Unit Number list then the RTU cannot be detected at the moment - turn off Only Show Available/Used Units to access it.
- PoleNet shows which NMC-PRO/Green Field output is used for Out 1 and Out 2.
- To change, choose the desired NMC-PRO/Green Field port from the Out 1 or Out 2 lists.
- To free up an RTU output/input, change its setting to <Not Used>.

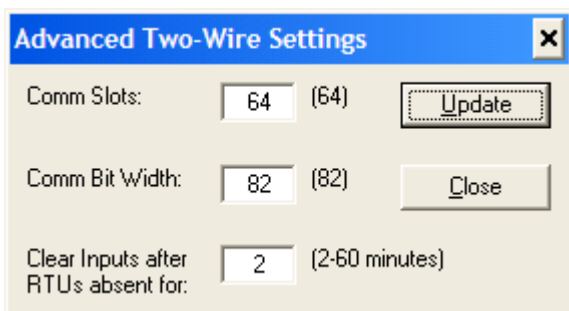
**NOTE** The <Not Used> setting is the first item in the Out 1 and Out 2 (In1 and In2) lists.

### 3.2.8 ADVANCED BUTTON (2-WIRE HOST)

These advanced settings are critical settings and should not be changed by anyone not intimately acquainted with their effects. These settings determine how the two-wire host communicates with the two-wire RTUs and also affect the amount of power that is available to the RTUs.

**CAUTION** *Danger! Incorrect settings can have extremely serious negative consequences:*

- Complete loss of communication with some or all RTUs
- Intermittent breakdowns of communication
- Intermittent operation of distant RTUs (power failure, inability to drive outputs).



The 2-wire system provides power and serial communications on the same two wires. RTUs extract power from the 2-Wire network and wait for communications targeted at them and communicate with the Host only when asked.

The power available to RTUs is decreased:

- By the number of other RTUs sharing the same two wires,
- By distance from the host (due to losses in the wires and from closer RTUs),
- While there is communication on the 2-Wire network.

There is usually little that can be done to change the location (and hence the distance) of RTUs, but you may be able to site the 2-Wire host in a central location and have multiple two-wire runs radiating out in a star pattern from the host. Once all RTUs are installed, the communication parameters must be set to ensure they all receive adequate power and have reliable communications to and from the host.

**Comm Slots** is simply the number of communications slots per second. Increasing this number speeds up the rate of communications, reducing the average response time of the system, but it may make the communications unreliable and it reduces the amount of power available for distant RTUs. The bracketed value (64) is the standard setting.

**Comm Bit Width** is the duration in microseconds of each serial bit. The bracketed value (82) is the standard setting. It must be set to ensure reliable communications are possible at all times with all RTUs. The unique characteristics of each installation imposes a lower limit on the bit width and this in turn sets an upper limit on the Comms Slots value.

**Clear Inputs after RTUs absent for a number of minutes** (PoleNet V1.21 onwards). This setting is also only available for two-wire hosts from version 1.28 onwards, so it is greyed-out if earlier version two-wire hosts are used. Old versions of the two-wire host (prior to version 1.28), always report the last-known state of the inputs from RTUs, even if any RTUs become lost or are out of communication for a very long time. This new setting will clear the two-wire host's copy of the inputs from any RTU after the RTU has been absent, unable to be contacted, for long periods of time, (up to 1 hour). This is generally preferable and safer than assuming that the inputs are still active.

### 3.3 Monitoring 2-Wire Systems

If you have not already done so:

1. Set Connect To Two-wire Host in the Configure Connection dialog (see section Selecting the System to Connect to).
2. Connect to the Two-wire Host.
3. Click on Monitor Button.

#### 3.3.1 MONITOR BUTTON (2-WIRE HOST)

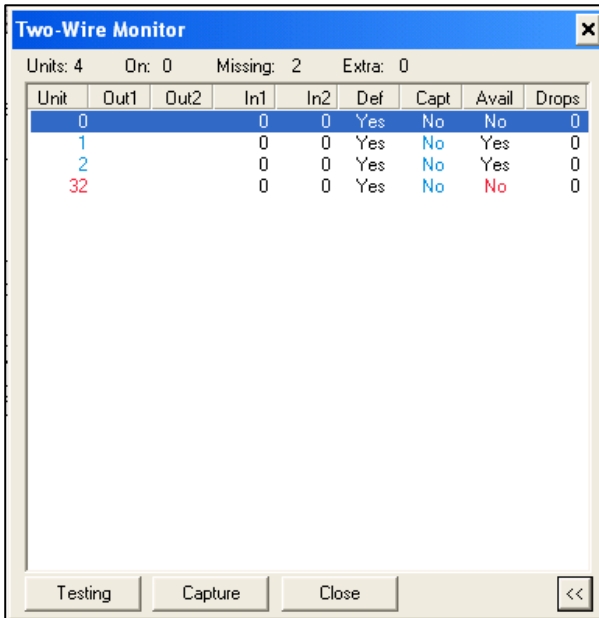
The Monitor button in the main menu opens the Two-Wire Monitor window and starts displaying information about all connected RTUs. All RTUs that are communicating with the host are displayed and sorted by their Unit ID. The monitor window shows any RTU outputs that may be On (Out1 and Out2), and it also displays the number of transitions (changes) of each of the RTU inputs (In1 and In2).

The screenshot shows a window titled "Two-Wire Monitor" with a status bar at the top indicating "Units: 5 On: 3 Missing: 2 Extra: 1". Below this is a table with the following columns: Unit, Out1, Out2, In1, In2, Def, Capt, and Avail. The data rows are as follows:

Unit	Out1	Out2	In1	In2	Def	Capt	Avail
30			0	0	Yes	No	No
58			0	0	Yes	Yes	Lost
61	On		0	0	No	No	Yes
64	On	On	0	0	Yes	Yes	Yes
67	On	Off	0	0	Yes	Yes	Yes

At the bottom of the window are buttons for "Test", "Capture", "Close", and a right-pointing arrow button.

If the host loses contact with an RTU, it is removed from the monitor window until it is communicating again. PoleNet keeps track of these drop-outs and displays them in an extra column (Drops) of the monitor window. This column is normally hidden from view: to view it click the >> button in the bottom right corner. Click the << button to return to normal view.



### 3.3.2 ENHANCED TWO-WIRE UNIT MONITORING

PoleNet now has support for the Two-Wire Host's new System Capture feature.

To use this, wait until the Monitor window shows that all the connected RTUs are available, then click the Capture

button.

Captured units are always listed and are considered as essential parts of the system. Monitor window now has Totals at the top of the window showing, from left to right:

- The number of Units displayed in the window,
- The number of units with any outputs On,
- The number of units Missing (Lost or not yet found),
- The number of Extra units (available but not captured or not defined).

Colour-coding has been added to highlight active outputs and any "faults".

**Green** is used to show any active (On) outputs, (unless there is an error on the output, in which case it will show the last known state in Red).

**Red** is used to show any faults, such as the unit being lost (or not yet found), or an output being in the wrong state.

**Blue** is used to show any units which are not yet Captured or not yet Defined and helps locate problems with the system set-up. It identifies units which are connected (Captured) but whose IOs are not used (Defined), and units which are Defined (expected) but don't exist or are faulty.

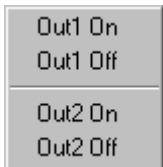
Black is used for normal operation.

### 3.3.3 TEST MODE

Test mode allows you to temporarily turn individual outputs on or off, overriding the system controller. It should only be used in the installation and testing process.

**NOTE** *Normal operation is suspended while in Test mode! 2-Wire host ignores all controller requests to change outputs state!*

1. Click the Test button to enter Test mode – the button changes to display Testing to confirm and to remind you that you are in Test mode.
2. While in Test mode, right-click on any RTU to see a pop-up menu.

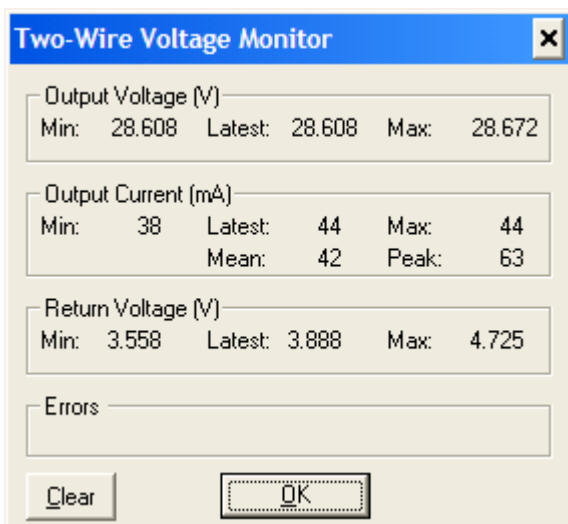


3. Click on the desired action (e.g. Out1 On, Out1 Off, etc.).
4. Wait for the command to be sent to the desired RTU, for the RTU to turn the output on or off, and for the two-wire host to receive confirmation. This will usually take about 10 seconds, and will rarely require more than 30 seconds.
5. To exit Test mode, click the Testing button (or the Close button).
6. Two-wire host returns to normal operation 10 seconds later.

**CAUTION** *Do not stay in Test mode unnecessarily!*

#### 3.3.3.1 Voltages Button (2-Wire Host)

The Voltages button in the main menu opens the Two-Wire Voltage Monitor window and starts displaying Voltage and Current statistics for the 2-Wire network. It reports the most recent value as well as the minimum and maximum values.



- Output Voltage is the voltage provided by the Host to the two-wire network.
- Output Current indicates the drain/load imposed by the RTUs and the wiring.
- Return Voltage indicates the strength of communications returning from the RTUs.
- Error indicates the current error of the 2-wire system.

To restart the minimum and maximum statistics, simply click the Clear button.



**NOTE** PoleNet version V1.26 (onwards) has some additional system diagnostic features such as the “Errors” display in the Two-Wire Voltage Monitor screen (refer Figure below).

The Error display window will report major system errors as reported by the host unit. Please refer to Table below for a list of errors and their descriptions.

Fault ID	Error	Description
1	Over Current	Excessive two-wire current. Possible short circuit
2	Vin Low	Two-wire voltage is very low, in danger of failing.
3	Vin Fail	Two-wire voltage has failed.
4	Missing Unit	One (or more) Captured units are missing (not available)
5	(reserved)	
6	Unmapped IO	Tried to set an Output which is not mapped to any unit
7	Missing Output	Tried to set the Output of a unit which is not available
8	Faulty Output	Failed to change the Output of a unit. Possible short circuit

### 3.3.3.2 About Button

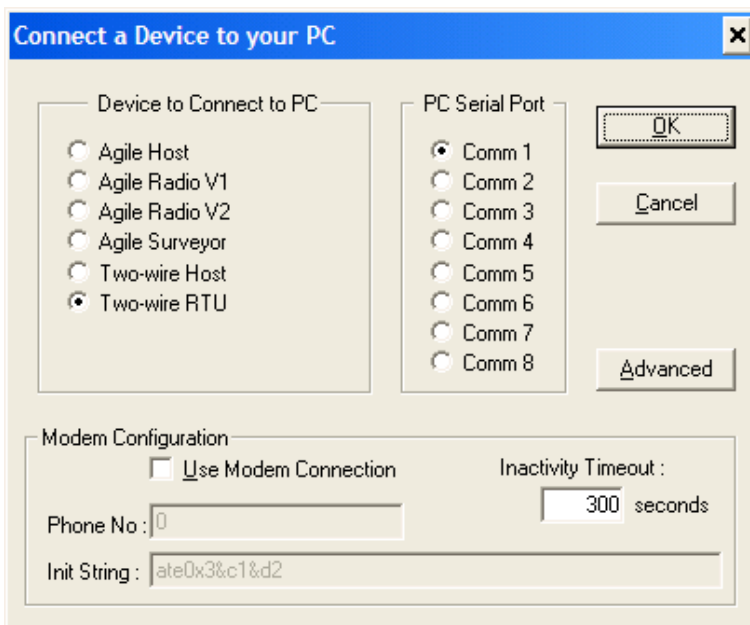
The About button reports the current version of the PoleNet software and the current software version of any connected Units (Two-wire Host in the figure below).



# 4 Configuring 2-Wire RTUs

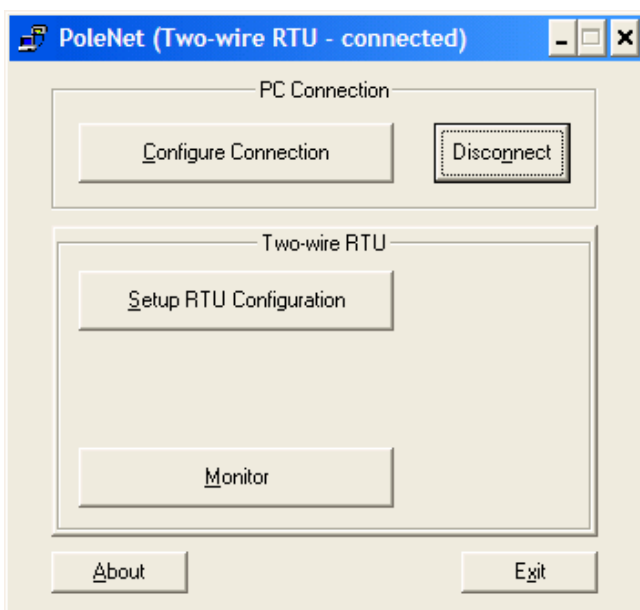
If you have not already done so:

1. Set Connect To to Two-wire RTU in the Comms dialog (see section Selecting the System to Connect to).
2. Connect to the Two-wire RTU (see section Connecting to a System).



**NOTE** Two-wire RTUs do not need an external power source during configuring.

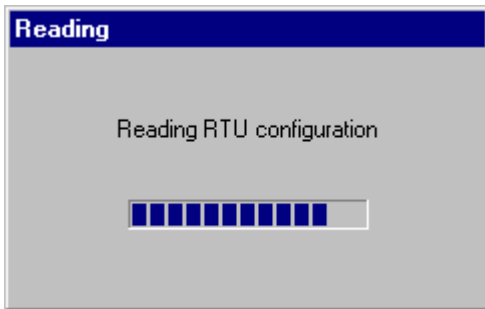
After you connect to a 2-Wire RTU the following main menu will appear:



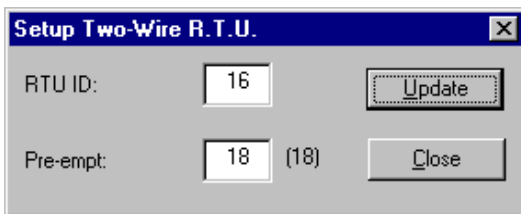
The heading shows that PoleNet is set up to interface to Two-wire RTU and only relevant buttons are enabled.

## 4.1 Setup 2-Wire RTU

When you click on the Setup button in the main menu, a progress window will be displayed while PoleNet reads the RTU configuration.



In a 2-Wire network, every unit must have a unique RTU ID from 0-127. They are pre-programmed with consecutive IDs during manufacture so this is seldom an issue.



Pre-empt fine-tunes the RTU's comms handler, it is set by default to 18.

**CAUTION** *It is highly recommended not to change the pre-empt value!*

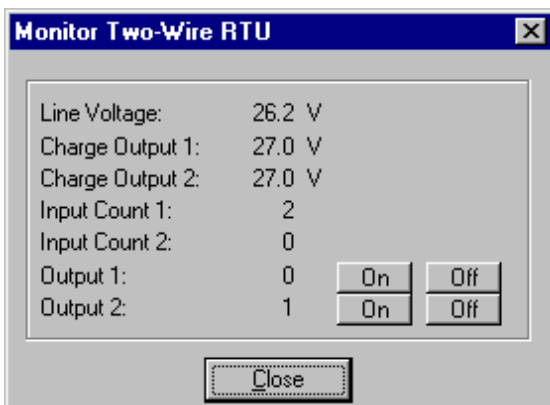
## 4.2 Monitoring 2-Wire RTUs

If you have not already done so:

1. Connect the 2-Wire RTU to the 2-Wire network.
2. Set Connect To to Two-wire RTU in the Comms dialog (see section Selecting the System to Connect to).
3. Connect to the Two-wire RTU (see section Connecting to a System).

## 4.3 Monitor Button (2-Wire RTU)

The Monitor button in the main menu opens the 2-Wire RTU Monitor window and starts displaying information about the connected RTU.



- Line Voltage is the voltage on the 2-Wire network.
- Charge Outputs are the voltages available for changing output state. The RTU has to build up a charge of at least 13V before it can change output state.
- For each input, the Input Count indicates the number of transitions (changes) of the relevant input.
- The state of both Outputs is also shown, 1 for On, 0 for Off. You can manually change (test) the outputs by clicking the relevant On or Off buttons.

After a period of inactivity, PoleNet may lose contact with the RTU, although this may not become evident until you attempt to change an output. If so, you will receive the following message:

Simply click the Connect button again to reconnect

# 5 Testing the System for Proper Operation

This section describes how to test the system (NMC-PRO/Green Field + Single Cable RTU system) for proper operation. This can only be done after installation is complete and all settings are believed to be correct.

1. Make sure that all units are connected and in operative mode.
2. If possible connect a PC to the 2-Wire host and open the PoleNet software (see sections Connecting 2- Wire host to PC, Selecting the System to Connect to and Connecting to a System).
3. Open the PoleNet Two-Wire Monitor screen.
4. Enter the NMC-PRO/Green Field Test menu (menu 5. Test)
5. Enter the NMC-PRO/Green Field Test Relays menu (menu 5.1 Relays)
6. Select an output (relay) configured to the Single Cable RTU system and set it to Man.
7. Wait between 10 to 30 seconds to see whether the RTU output is physically turned On and the output status changes to On in the PoleNet Two-Wire Monitor screen.

An installation is completed if everything works properly. If not you can try the following:

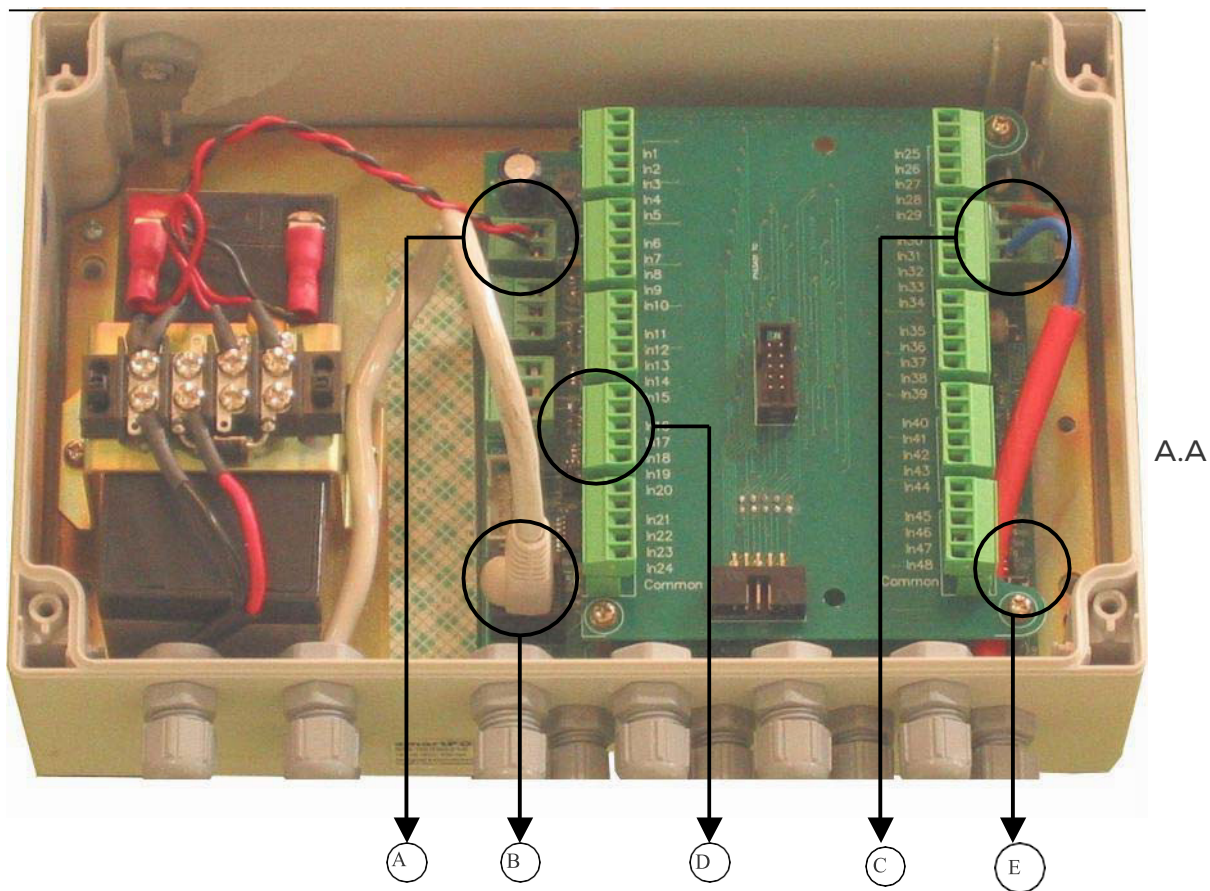
- Manually turning an output On through the PoleNet software (see section Monitoring 2-Wire Systems > Test mode). If the output is turned On through the PoleNet software try rechecking your configuration definitions in the PoleNet.
- Check valve connection, as mentioned above the output does not turn On if not connected to a valve.
- Verify software versions (see section Software versions).

**NOTE** *If you are not able to operate the system contact an authorized Munters dealer!*

# 6 Appendix A: Connecting 2-Wire Host to Primary Controllers

This section describes how to use the Parallel Controller card as the controlling device of 2-Wire host (see the figure below).

In this mode, it is possible to control one or more outputs of the 2-wire network using a single 24V AC or 12V DC digital input. There are 48 inputs available in the controller.



The Indicated sections are:

- A. Connector providing power to the 2-Wire host.
- B. J7 connector is a RS-232 socket to plug in cable to connect a PC (Used for setup and diagnostics).
- C. J2 connector for connecting the 2-wire cable to the RTUs.
- D. Inputs of the Parallel Controller Board
- E. J1 programming Link.

**NOTE** Controller shown with optional battery backup.

Figure 20 is a block diagram of how the parallel controller interfaces to the 2-wire system:

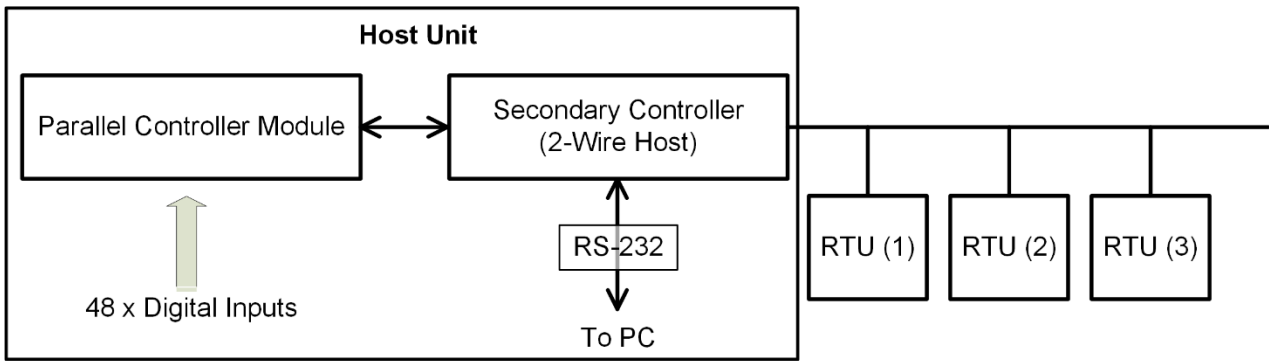


Figure 23: 2-Wire host system in Parallel Controller mode

## 6.1 Physical Connection

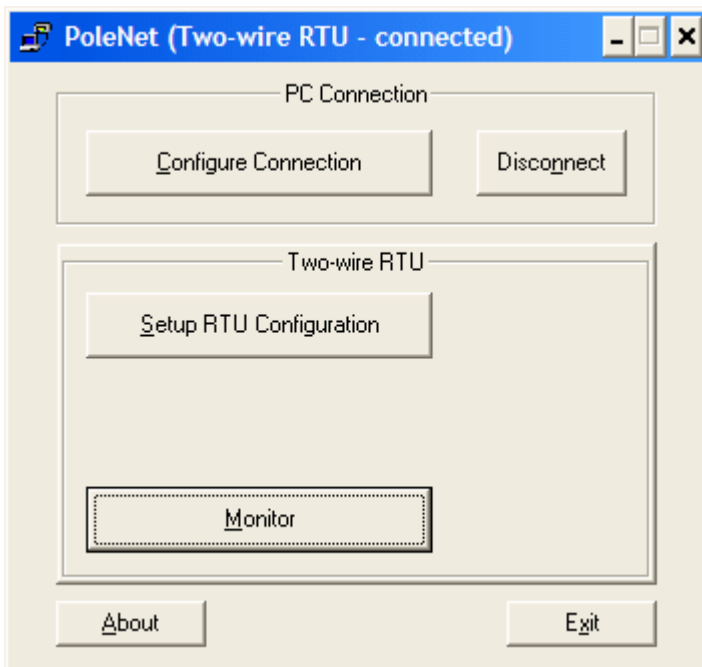
The system is generally shipped with the parallel controller board plugged in to the 2-Wire host module.

The Parallel Connector inputs are labeled D in paragraph Parallel Controller mode. Every 24 inputs have a common connector and should be connected to the outputs of the Primary controller.

## 6.2 Configuring Two-Wire Hosts

If you have not already done so:

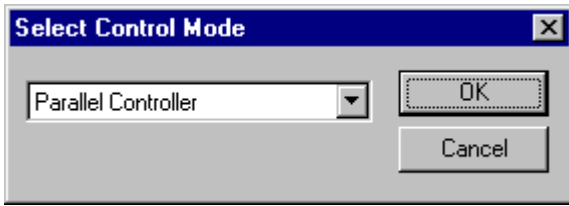
1. Set Connect To to Two-wire Host in the Comms dialog (see section 2.2.4)
2. Connect to the Two-wire Host (see section 2.2.5)



PoleNET queries the Two-wire host to determine its current control mode and renames the Config button to suit. Click the Controller button if you wish to verify or change the Two-wire host control mode.

**Controller button (Two-wire Host)**

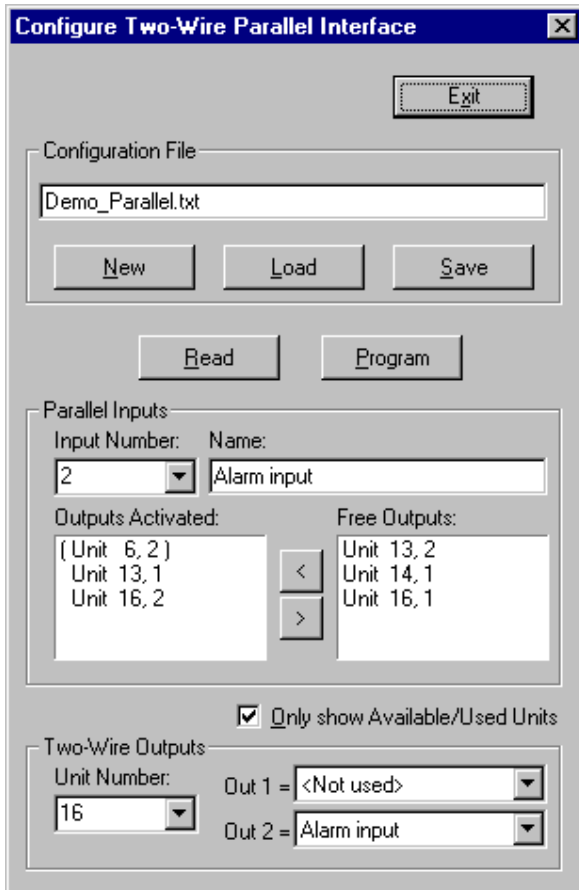
Click the Controller button from the main menu to access the Control Mode dialog.



Then select the mode that applies for the system. PoleNET will adjust the text on the Config button in the main menu to suit the control mode.

### 6.3 Parallel Controller Configuration

The top half of the dialog allows you to obtain pre-existing parallel configurations and to then program them into the controller or save them for later use. The lower half allows you to examine and modify the parallel configuration. You can either use the Parallel Inputs section to select the relevant outputs for each input, or you can use the Two-Wire Outputs section to select the relevant input for each output.



### 6.4 Configuration File

- New removes all links between inputs and outputs, although it retains the Name settings for the inputs.
- Load allows you to fetch a previously Saved parallel configuration from the computer.



- Save stores a copy of the parallel configuration onto the computer, including all connections between inputs and outputs and the Name settings for inputs.

**NOTE** *Updating the Two-wire Host Parallel Configuration*

*Read fetches all the parallel settings directly from the two-wire host. You can then edit the settings and then save them or program them back into the two-wire host. Note: the two-wire host does not keep track of the Name settings for inputs. Program causes the current parallel settings to be programmed into the two-wire host. This takes several seconds, so a Programming progress window is shown.*

**NOTE** *Two-wire host systems support up to 128 two-wire RTUs so the lists of Free Outputs and Unit Numbers are very long. If you use the Only Show*

*Available/Used Units option, then PoleNET monitors the two-wire network (to keep track of all the RTUs that it detects) and adjusts the outputs lists to only include known RTUs. This makes the setup quicker, easier and less prone to error, but it requires the two-wire system and all two-wire RTUs to be largely operational. If you are setting up the parallel interface before starting the system then you will not be able to use this option.*

*If an Outputs list includes a Unit with brackets around it, then that RTU cannot be found on the system, even though it has been allocated. This can help you find invalid settings, although the RTU may have simply “dropped out” temporarily.*

## 6.5 Parallel Inputs

The Parallel Inputs section allows you to view the outputs activated by each of the 48 available parallel inputs and to change their allocation. Each input can be connected to any number of outputs from two-wire RTUs. (Each two-wire RTU output must be controlled by only one parallel input.) PoleNET allows you to give each input a Name which should make it easier to verify, test and maintain the configuration.

For each parallel input:

1. Select the parallel Input Number that you wish to configure.
2. If you wish, give it a suitable Name, describing its purpose and/or location, etc.
3. PoleNET displays a list of the Outputs Activated when the input becomes active.
4. PoleNET displays a list of Free Outputs – outputs not yet allocated to any input.
5. To make the input activate another output, locate the desired output in the Free Outputs list, then either highlight it and click the Left arrow button or just double-click the desired output. It will move to the Outputs Activated list.
6. To remove an output from the list of Outputs Activated by the input, locate the unwanted output, then either highlight it and click the Right arrow button or just double-click the unwanted output. It will become a Free Output.

**NOTE** *If you cannot find a particular output in the list of Free Outputs then the output's RTU may not be detected at the moment - turn off the Only Show Available/Used Units option and see if the output is now in the list.*

*If the output is still not in the Free Outputs list then it must be allocated to another input - use the Two-Wire Outputs section to see which input it has been allocated to.*

## 6.6 Two-Wire Outputs

The Two-Wire Outputs section allows you to view which parallel input controls each of the outputs from two-wire RTUs and to change the allocations.

For outputs from each two-wire unit:

1. Select the Two-Wire RTU that you wish to configure from the Unit Number list.
2. If you cannot find a particular output in the Unit Number list then the RTU cannot be detected at the moment - turn off the Only Show Available/Used Units option and access the unit in the list.
3. PoleNET will show which parallel inputs are used for the Unit's Out 1 and Out 2.
4. To change, simply select a different parallel input from the Out 1 or Out 2 lists.
5. To free up an output, change its allocation to <Not Used>. (The <Not Used> setting is the first item in the Out 1 and Out 2 lists.)

# 7 Appendix B: Versions & Firmware Upgrades

This chapter details software and documentation versions.

## 7.1 Software Versions

Product Name	Version
PoleNET software	1.18 onwards
Two-Wire Host	1.38 onwards
Two-wire RTU	1.16 onwards
NMC-PRO/Green Field	V3.00.01 onwards

## 7.2 Related Documents

Document Name	Description
PoleNET User Manual	User Manual describing all operation of the PoleNET software.
PoleNET 2-wire system Modbus Spec	Specification of the 2-wire host modbus interface. Detailed discussion of addresses is found here.

## 7.3 Upgrading 2-Wire Host

Please refer to the picture in the Appendix relevant to your system when following these instructions:

Primary Controller	Relevant Appendix
NMC (NMC-PRO/Green Field secondary)	2-Wire host
Parallel Controller	Parallel Controller mode

**NOTE** PoleNET lists all possible RTU Units, whether or not they are connected to the two-wire host.

1. Disconnect power to the 2-Wire host module by removing the power connector J3 (A).

Connect the PC to the 2-Wire host module using a RS-232 cable connected to connector J7 (B).

Touch the aluminum tab of the regulator U27 with your finger to discharge any static electricity that may have built up on your body.

**CAUTION** This is a critical step; Failure to comply can render 2-Wire host inoperable!

Place the programming link on the programming jumper J1. LNK (see section 2-Wire host) as shown in figure Placing the programming link.

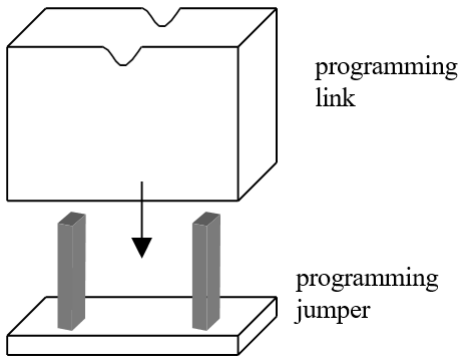


Figure 24: Placing the programming link

Reconnect power to the 2-Wire host module. Execute the upgrade program from the PC.

```
C:\>W2S127 -port com1 (127 is the version of the upgrade)
```

Disconnect power to the module.

Again, touch the aluminum tab of the regulator as in step 3. Remove programming link.

Reconnect power.

This completes the 2-Wire host firmware upgrade.

## 7.4 Upgrading RTUs

In order to upgrade the software, connect an RS-232 cable from your PC COM port to the RS-232 socket in the RTU (Connector D in figure Remote Terminal Unit).

Execute the provided upgrade program from your PC:

```
C:\>W2SRTU_v116 com1 (load version 1.16 from com1)
```

This completes the RTU firmware upgrade

# 8 Appendix C: Single Cable RTU Cable Guide Lines

Listed below are brief guidelines to assist you designing, selecting and testing Single Cable RTU Communication Cable. For more in-depth explanation, please refer to Single Cable RTU Diagnostic Guidelines.

## 8.1 Installation

### a. Cable recommendations.

- i. Maximum total cable length not to exceed 10,000 meters\*\*  
\*\* Please consult with Munters if a longer length required.
- ii. Tee's and Multi-branches are acceptable; ring or looping cables is not acceptable.
- iii. All cable joints must be above ground
- iv. Maximum cable capacitance should not exceed 100 pF/m.

### b. RTU sealing recommendations.

- i. All glands must be sealed
- ii. Only use mounting holes provided.
- iii. RTUs are not suitable for below ground installation's (RTU must be min. 300 mm above grade)

## 8.2 Continuity (Host Isolated)

- a. Maximum recommended cable resistance per unit distance. (recommended cable 26 ohms/km return or round trip resistance)
- b. Cable end-to-end continuity (when far end is joined). (less than 270 ohms)

## 8.3 Insulation (Host Isolated)

### a. Minimum isolation resistance between conductors.

(Greater than 800 K ohm typically but not less than 500 K ohm even with RTUs plugged in)

- b. Minimum isolation resistance between each conductor and earth. (Greater than 800 K ohm typically but not less than 500 K ohm)

## 8.4 Capacitance (Host Isolated)

- a. Maximum recommended cable capacitance per unit distance. (recommended cable 49 pF/m or 49 nF/km)
- b. Maximum total cable capacitance (Recommended maximum of 1.2 uF).
- c. How to Measure Cable Capacitance.
  - i. Multimeter must be capable of measuring Capacitance
  - ii. Connect multi-meter to infield wiring with the use of terminal connectors.  
N.B. Do not hold wires by hand and make sure the cable has passed insulation and continuity tests.

# 9 Appendix D: Single Cable RTU Advanced Diagnostic Procedures

The most common fault with Single Cable RTU is typically related to field wiring and cable joints. To assist you performing infield cable diagnostics, we have introduced another simple procedure to determine if there is excessive current draw coming from the field. The test is performed while the system is powered up and idle (not irrigating). We temporarily shut down the AC communication waveform and measure the DC current at which, each RTU should draw no more than 1mA during this test.

IE: If your system has 45 RTU's and the cable integrity is good, you should measure no more than 45mA (1mA per Single Cable RTU RTU). If you were to read 125 mA, then this signifies that you have cable or joint issues and requires further investigation.

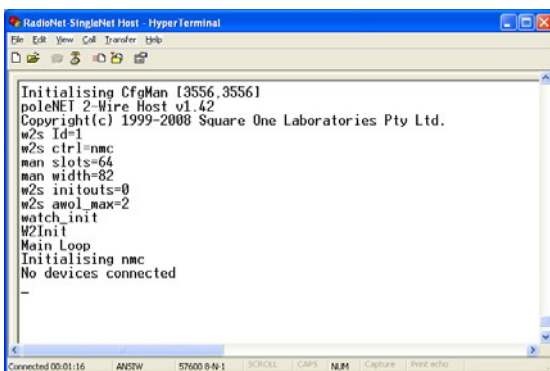
*NOTE Test procedure only compatible with Single Cable RTU Host version V1.41 or greater.*

Step 1 Power down Single Cable RTU Host Unit

Step 2 As we need to monitor current draw to from the field, connect a multimeter in series with the field wiring (DC mA).

Step 3 Connect PC to Single Cable RTU Host Unit and Start HyperTerminal (57600,8,None,1,None)

Step 4 Power up Single Cable RTU Host Unit You should see the Initializing screen appear.



```
Initialising CfgMan [3556.3556]
poleNET 2-Wire Host v1.42
Copyright(c) 1999-2000 Square One Laboratories Pty Ltd.
w2s Id=1
w2s ctrl=nmc
man slots=64
man width=82
w2s initouts=0
w2s awol_max=2
watch_init
W2Init
Main Loop
Initialising nmc
No devices connected
-
```

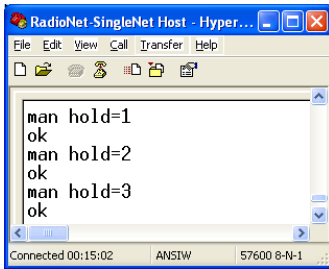
Step 5 Type in command “man hold=1”.

This stops all voltages being sent to the field for only 8 seconds. Record the current on your meter (we call this reference A)

Step 6 Type in command “man hold=2”.

This sends a positive 28.8 DC voltage to the field for only 8 seconds. Record the current on your meter (we call this reference B)

Step 7 Type in command “man hold=3”. This sends a negative 28.8 DC voltage to the field for only 8 seconds. Record the current on your meter (we call this reference C)



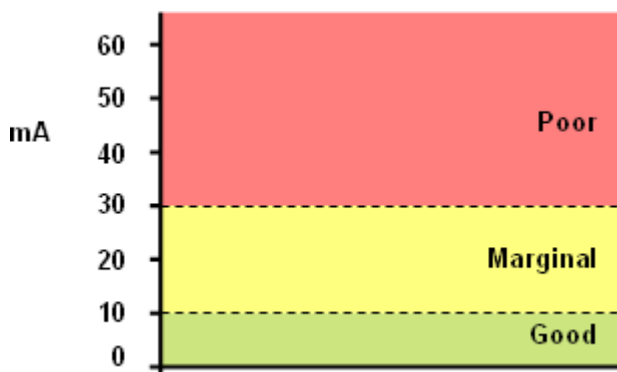
Step 8 Subtract reading A from reading B ( $B-A=D$ ).

Subtract reading A from reading C ( $C-A=E$ ) Calculation D and E should be similar.

Count up the amount of RTUs and multiply by 1mA. (we call this reference F).

Subtract calculation F from calculation D or E. ( $D-F=X$ ) ( $E-F=X$ ).

A good result should see a calculation of less than 10mA. A calculation between 10 mA to 30 mA suggests that there are some minor issues with the cable or cable joints. A calculation greater than 30mA suggests that you have a major issue with cable or cable joints and warrants immediate investigation.



**NOTE** If you perform the test (step 5,6,7) and you get 0 mA or a very small reading, check that your multimeter is reading DC current. If your meter is set to AC current, you will not see a result.



# 10 Warranty

## Warranty and technical assistance

Munters products are designed and built to provide reliable and satisfactory performance but cannot be guaranteed free of faults; although they are reliable products they can develop unforeseeable defects and the user must take this into account and arrange adequate emergency or alarm systems if failure to operate could cause damage to the articles for which the Munters plant was required: if this is not done, the user is fully responsible for the damage which they could suffer.

Munters extends this limited warranty to the first purchaser and guarantees its products to be free from defects originating in manufacture or materials for one year from the date of delivery, provided that suitable transport, storage, installation and maintenance terms are complied with. The warranty does not apply if the products have been repaired without express authorisation from Munters, or repaired in such a way that, in Munters' judgement, their performance and reliability have been impaired, or incorrectly installed, or subjected to improper use. The user accepts total responsibility for incorrect use of the products.

The warranty on products from outside suppliers fitted to Echo 2.0, (for example antennas, power supplies, cables, etc.) is limited to the conditions stated by the supplier: all claims must be made in writing within eight days of the discovery of the defect and within 12 months of the delivery of the defective product. Munters has thirty days from the date of receipt in which to take action, and has the right to examine the product at the customer's premises or at its own plant (carriage cost to be borne by the customer).

Munters at its sole discretion has the option of replacing or repairing, free of charge, products which it considers defective, and will arrange for their despatch back to the customer carriage paid. In the case of faulty parts of small commercial value which are widely available (such as bolts, etc.) for urgent despatch, where the cost of carriage would exceed the value of the parts, Munters may authorise the customer exclusively to purchase the replacement parts locally; Munters will reimburse the value of the product at its cost price.

Munters will not be liable for costs incurred in demounting the defective part, or the time required to travel to site and the associated travel costs. No agent, employee or dealer is authorised to give any further guarantees or to accept any other liability on Munters' behalf in connection with other Munters products, except in writing with the signature of one of the Company's Managers.

**WARNING:** In the interests of improving the quality of its products and services, Munters reserves the right at any time and without prior notice to alter the specifications in this manual.

The liability of the manufacturer Munters ceases in the event of:

- dismantling the safety devices;

- use of unauthorised materials;
- inadequate maintenance;
- use of non-original spare parts and accessories.

Barring specific contractual terms, the following are directly at the user's expense:

- preparing installation sites;
- providing an electricity supply (including the protective equipotential bonding (PE) conductor, in accordance with CEI EN 60204-1, paragraph 8.2), for correctly connecting the equipment to the mains electricity supply;
- providing ancillary services appropriate to the requirements of the plant on the basis of the information supplied with regard to installation;
- tools and consumables required for fitting and installation;
- lubricants necessary for commissioning and maintenance.

It is mandatory to purchase and use only original spare parts or those recommended by the manufacturer.

Dismantling and assembly must be performed by qualified technicians and according to the manufacturer's instructions.

The use of non-original spare parts or incorrect assembly exonerates the manufacturer from all liability.

Requests for technical assistance and spare parts can be made directly to the nearest [Munters office](#).

