USER MANUAL

Teleterm

M2 Series RTU's

Models C236xB

User Manual

SCOPE

Products Covered by this Manual

This User Manual provides information on how to install, configure and use the Teleterm M2 Series RTU's.

This manual covers the following product Models:

Models	Description
C2360B-xx	Teleterm M2 'B' Series RTU's

Manual Revision History

Date	Revision	Comments
12 Jan 2009	1	Initial Issue
2 Mar 2009	2	Conet/r configuration details expanded
3 Jun 2009	3	DIT Table added
26 Aug 2009	4	Number of 0-30V channels corrected to 4
2 Feb 2011	5	Ethernet option moved to Model C2360C versions

Software Copy Available

This manual is available in Adobe Acrobat pdf format.

The pdf file is named UMC2360BR05.pdf

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1. GENERAL DESCRIPTION

1.1 Overview

The TELETERM M2 Series of RTU's is designed specifically for industrial telemetry and remote I/O applications, combining powerful industrial network communications features with ease of use.

1.1.1 Communications

The TELETERM M2 Series RTU is available with a wide range of communications network options to enable communication with a broad selection of devices and machines.

All I/O and configuration data variables are automatically accessible through Data Interchange Registers in a single "Data Interchange Table", allowing the implementation of Remote I/O systems "out of the box".

1.1.2 Programmable

Conventional remote I/O systems can be implemented without the need for any software programming, but the inclusion of two separate programming facilities within the M2 provides a powerful customisation capability.

The programming facility delivered in every M2 RTU is the EziForth programming language. This facility is suited for simple logic control, custom protocol implementation and similar tasks. The EziForth Workbench programming software is the development environment used for these applications.

1.1.3 Memory Card

The SD Card Slot provides the ability to store readings on a removable SD Card for remote logging applications. The data written to the SD Card is under control of the User Program, allowing flexibility of file structure and contents.

1.1.4 Versatile Configurable Inputs and Outputs

A Teleterm M2 Series RTU provides the ideal low cost remote interface to your assets or processes to provide the control and information that you need to optimise your operations.

The M2 RTU's are all equipped with 12 direct Binary and Analogue Inputs and Outputs. Each I/O can be uniquely configured as an input or output; analogue or digital.

1.1.5 Built-in Serial Port

An RS232/485 serial port supporting a number of protocols including Modbus and Conet/s allowing signals from a variety of sources to be monitored and controlled via the M2 RTU communications network of choice.

As a basic I/O outstation, the M2 RTU's are easily configurable using the free Omniset configuration software. Using Omniset PRO, the M2 Series can also be configured remotely over the installed network.

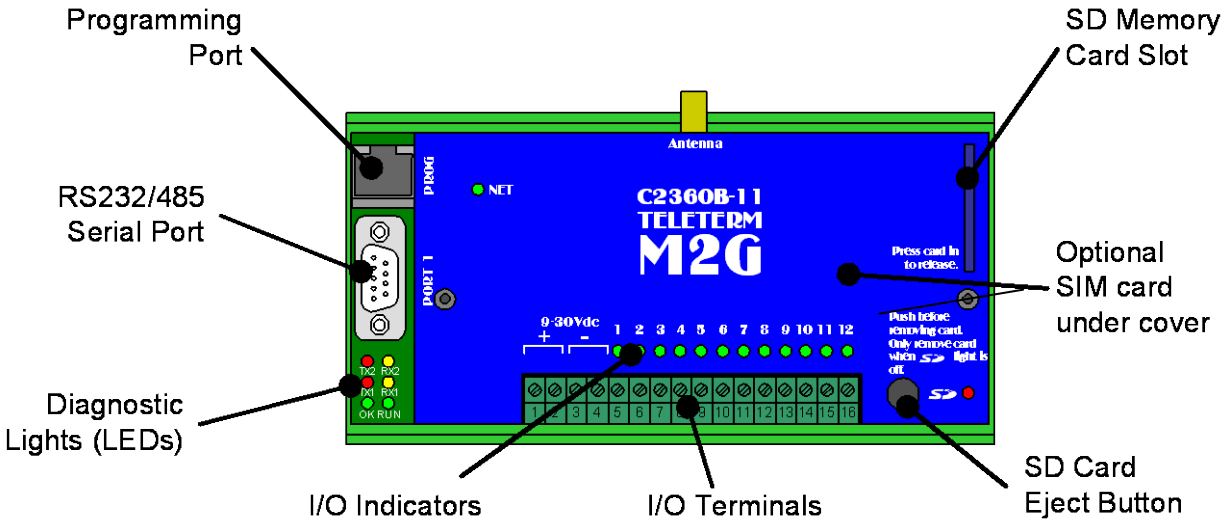


Figure 1.1: Front View of the Teleterm M2G with internal GSM modem

1.2 Product Feature Matrix

The following table identifies the features available on each of the products in the range:

Product Name	Order Code	Notes	12 I/O	RS232/ RS485 Port	GSM/ EGSM/ GPRS Port	3G UMTS Port	Conet Port	2.4GHz 63mW Radio Port	920MHz 100mW Radio Port	868MHz 315mW Radio Port	920MHz 1W Radio Port	1x RS232 1x RS232/ RS485
M2	C2360B-0		✓	✓								
M2G1	C2360B-11	1	✓	✓	✓							
M2G2	C2360B-12	2	✓	✓		✓						
M2C1	C2360B-21		✓	✓			✓					
M2R1	C2360B-31	3,4	✓	✓				✓				
M2R2	C2360B-32	3,5	✓	✓					✓			
M2R3	C2360B-33	3,6	✓	✓						✓		
M2R4	C2360B-34	3,7	✓	✓							✓	
M2S1	C2360B-41		✓	✓								✓

Table 1-1 – Product Feature Matrix

NOTES:

1. *The EGSM/GPRS port is a quad band device operating on 900/1800/850/1900MHz. This is suitable for use on most countries' GSM networks. Consult the factory for specific compatibility with your network.*
2. *The 3G UMTS port is a tri band device operating on 850/1900/2100MHz. This interface is specifically approved for use on the Australian Telstra NextG network.*

3. *The M2R version is available in a number radio band options to comply with different country regulations. Please ensure that the correct unit is specified for your application.*
4. *2.4GHz Band is suitable for use all countries.*
5. *920MHz Band is suitable for use in USA, Australia and New Zealand. The M2R3 version has fixed output power of 100mW. This version is not recommended for new installations. This model has been replaced with the M2R4.*
6. *868MHz Band is suitable for use in Europe, and Southern Africa.*
7. *920MHz Band is suitable for use in USA, Australia and New Zealand. The M2R4 version has presettable output power of 1mW to 1W. The M2R4 is NOT compatible with M2R3 installations.*

1.3 Feature Descriptions

1.3.1 I/O Terminals

The Teleterm M2 is equipped with 12 software configurable input/output points (IO points). Each IO point can be individually configured as digital or analogue, input or output selected from the options given in the following table:

I/O Point	Terminal No.	Digital Input	Analogue Input	Digital Output	Analogue Output
1	5	Yes	0-30Vdc	Yes	-
2	6	Yes	0-30Vdc	Yes	-
3	7	Yes	0-5Vdc	Yes	-
4	8	Yes	0-5Vdc	Yes	-
5	9	Yes	0-5Vdc	Yes	-
6	10	Yes	0-5Vdc	Yes	-
7	11	Yes	0-5Vdc	Yes	-
8	12	Yes	0-5Vdc	Yes	-
9	13	Yes	0-5Vdc	Yes	-
10	14	Yes	0-5Vdc	Yes	-
11	15	Yes	0-30Vdc	-	0/4-20mA
12	16	Yes	0-30Vdc	-	0/4-20mA

(See the specifications section for electrical specifications of each IO point option)

Table 1-2 – I/O Configuration Options

1.3.2 Programming Port (RS232)

The programming port is normally reserved for all programming functions in the unit. Although it is possible to reconfigure this port as an additional serial port, this option should be carefully considered, as it does make trouble shooting and field maintenance more difficult.

When using this port as a serial port, the serial port settings can be changed to suit the application. This will make this port incompatible with the programming tools. The SD pushbutton can be used to switch between programming mode and user mode.

1.3.3 Port 1 (RS232/RS485 Serial Port)

The Teleterm M2 RTU is equipped with a user serial port, labelled PORT 1, on the front of the unit. This serial port can be used as a communications port to third party equipment.

This serial port can be wired for RS232 or RS485 communications.

In normal mode, the serial port can be configured for a number of protocol sets:

a) Modbus protocol (Master or Slave device, ASCII or RTU protocol) is available on this port allowing easy connection to other third party products such as Alarm Annunciators, PLC's DCS or SCADA systems.

b) Conet/s protocol is available for integration into Conet networks and for programming the Teleterm M2.

c) User control which allows custom protocols to be implemented in the EziFORTH programming language in the M2 RTU.

1.3.4 Port 3 onwards (Network Port)

Each M2 RTU in the series is equipped with a different network port called PORT 3 (and onwards if there are more ports). The type of network port is dependent upon the Model of M2 RTU. The following table gives an overview of the available network port options and their applications:

Product	Order Code	Network Port	Description
M2	C236xB-0	None	The standard Teleterm M2 is equipped with only a programming port, and an RS232/485 serial port
M2G	C236xB-11 C236xB-12	GSM	The M2G is equipped with an internal GSM modem capable of communicating over standard GSM mobile phone networks using dial-up, SMS or GPRS data services. The M2G is ideally suited for communicating with remote assets over very large distances (even different countries). The -11 option unit is compatible with all GSM networks worldwide. The -12 option unit is compatible with the Telstra NextG network in Australia.
M2C	C236xB-21	Conet	The M2C is equipped with a Conet network port. Conet is the world's most rugged Industrial LAN, capable of running over existing plant cabling up to 10 kilometres. Up to 126 nodes may be connected to a Conet network in a token passing peer-to-peer architecture. The M2C is ideally suited for local in-plant communications where the cost of laying special networking cable is considered uneconomical for the application, but where existing cabling (of any sort) is already in place.

M2R	C236xB-31 C236xB-32	Radio	The M2R is equipped with an internal FHSS digital radio transceiver operating in the licence free radio bands. FHSS stands for Frequency Hopping Spread Spectrum and is an advanced technique for implementing secure error-free radio communications in the presence of high interference. The M2R is ideally suited for communications in areas where cable connections are impossible, and distances are relatively short (between 0.5km and 10km dependent upon the model and antenna selected) (See the selection guide for choosing the model appropriate for your country of use.)
M2S	C236xB-41	RS232 + RS232 /485	The M2S is equipped with two additional serial ports. Port 3 is an RS232/485 port with the same pin-out and functionality as Port 1 – the built in serial port. Port 4 is an RS232 port with full hand-shaking capabilities suitable for interfacing to external modems, or to any other equipment capable of supporting a RS232 connection. The M2S is ideally suited for interfacing to external modems or to other third party equipment using the RS232/RS485 standard.

Table 1-3 – Network Selection and Applications

2. Installing the Teleterm M2 RTU

2.1 Connecting the Internal Clock Battery

Before installing the Teleterm M2, the internal clock battery must be connected.

The Teleterm M2 is shipped from the factory with a “Battery Protector Tab” protruding from the left side of the unit. Pull on the tab to remove before use.

See section 5 for battery replacement details.

2.2 Mounting the Teleterm M2

The Teleterm Teleterm M2 is designed to be clipped to one of the following mounting rails:

Top Hat Section (DIN) Rail 35/7.5mm in accordance with EN 60715: 1981
Top Hat Section (DIN) Rail 35/15mm in accordance with EN 60715: 1981
G Section Rail 32mm in accordance with EN 60715: 1981

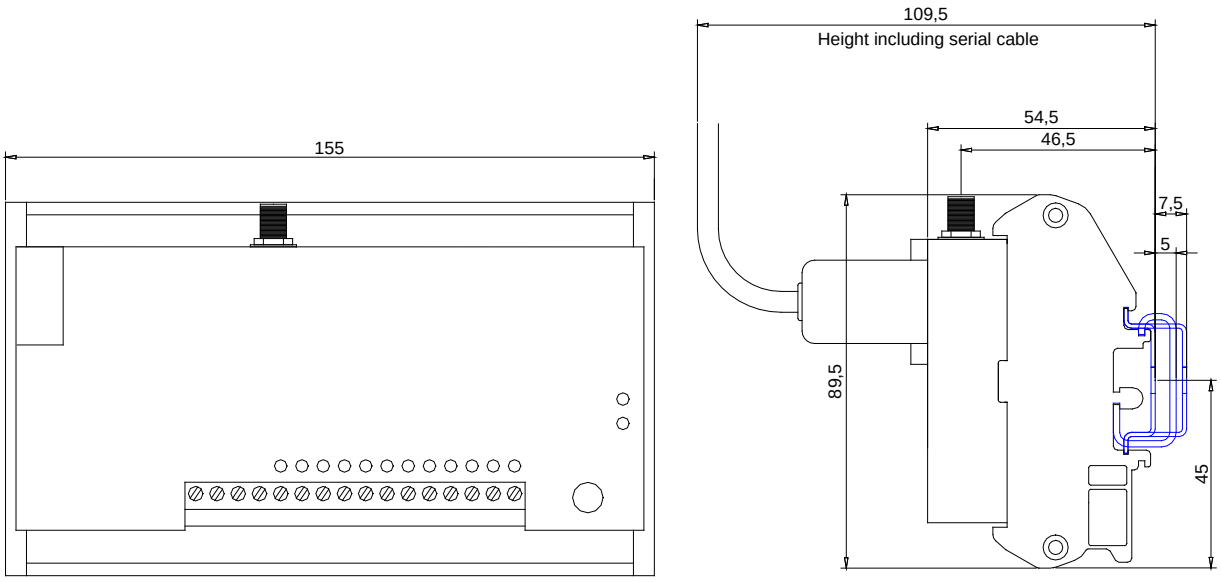


Figure 2.1: Mechanical Mounting Dimensions for the Teleterm M2

2.3 Connecting direct Inputs and Outputs

The Teleterm M2 has a unique feature of allowing each I/O point to be software configured as analogue or digital, input or output, for the best possible utilisation of I/O in any application.

Review your I/O requirements, and then make the optimum allocation of the I/O, taking into account the variations in specification of each I/O Point.

See Table 1-2 – I/O Configuration Options.

2.3.1 Connecting Digital Inputs

Digital Inputs must be connected in accordance with the following schematic:

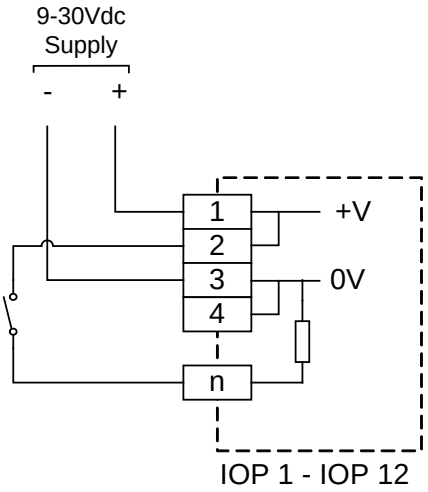


Figure 2.2 - Digital Input Connections

Digital Input Specifications:

Parameter	Condition	Value
LED Indication	Input On	Green LED On
Absolute Maximum Input Voltage		30Vdc
Minimum High Level Input Voltage		3Vdc
Maximum Low Level Input Voltage		2Vdc
Input Current	Vin = 5V	0.7mA
Input Current	Vin = 10V	1.7mA
Input Current	Vin = 12V	2.2mA
Input Current	Vin = 24V	4.7mA
Input Current	Vin = 30V	6.0mA

2.3.2 Connecting Digital Outputs

Digital Outputs must be connected in accordance with the following schematic:

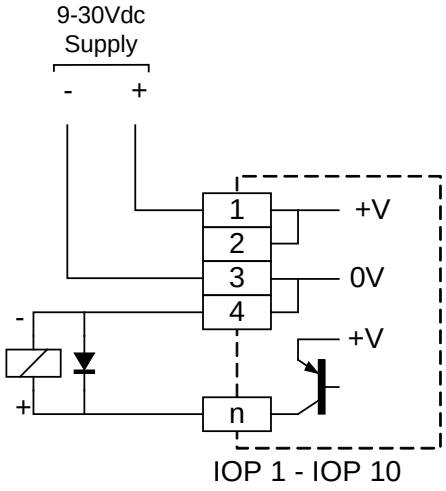


Figure 2.3 - Digital Output Connections

Digital Output Specifications:

Parameter	Condition	Value
LED Indication	Output On	Green LED On
Maximum Continuous Output Current	Output On	50mA
Maximum Peak Output Current	10ms max	200mA
Maximum current for ALL Digital Outputs	Outputs ON	500mA
Minimum High Level Output Voltage		$+V_{PSU}$ – 2.5V

2.3.3 Connecting Analogue Inputs

Analogue Inputs must be connected in accordance with the following schematic:

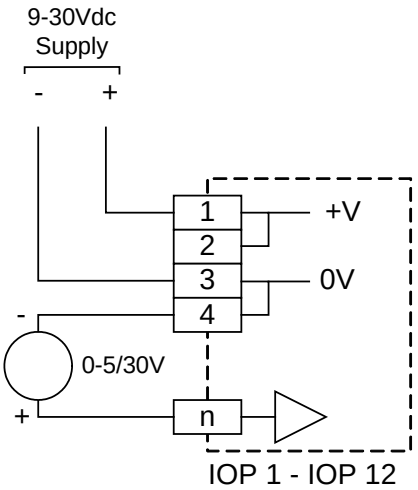


Figure 2.4 - Analogue Input Connections

Analogue Input Specifications:

I/O Points 1-2, 11 and 12

Parameter	Value
LED Indication	None
Absolute Maximum Input Voltage	30Vdc
Input Impedance Minimum	>500kΩ
Minimum Measurable Input Voltage	0V
Maximum measurable Input Voltage	30V
Resolution over 0-5.5V	6mV
Resolution over 5.5-30V	30mV
Accuracy over 0-5.5V	0.15% of reading + 6mV
Accuracy over 5.5-30V	0.15% of reading + 30mV

I/O Points 3 to 10

Parameter	Value
LED Indication	None
Absolute Maximum Input Voltage	30Vdc
Input Impedance Minimum	>1MΩ
Minimum Measurable Input Voltage	0V
Maximum measurable Input Voltage	5.5V
Resolution	6mV (10 bits)
Accuracy	0.15% of reading + 6mV

2.3.4 Connecting Analogue Outputs

Analogue Outputs must be connected in accordance with the following schematic:

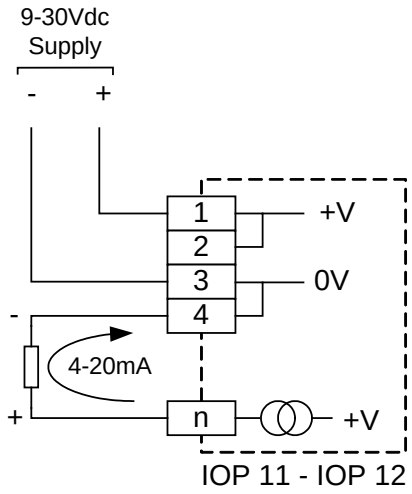


Figure 2.5 - Analogue Output Connections

Analogue Output Specifications:

Parameter	Value
LED Indication	None
Maximum Output Voltage Drive	$+V_{PSU}$ – 5.0V
Minimum Controllable Output Current	0mA maximum
Maximum Controllable Output Current	23mA minimum
Output Resolution	25µA
Output Accuracy	0.1% of reading + 25µA

2.4 Connecting the Programming Port

The programming port is normally reserved for the programming function, but can be used as an additional RS232 serial port if desired.

When connecting the programming port to a standard PC compatible serial port (DB9), the Omniflex programming cable Part Number M1831A (supplied separately) can be used.

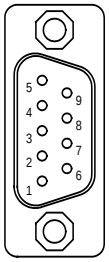
If another cable is to be used, the following connections will apply:

Signal Name	DB9F Pin No.	FCC-68 Pin No.
Rx Data from M2	2	4
Tx Data to M2	3	1
Ground Reference	5	2
All other pins are reserved and must not be connected.		

Table 2.1: Pin allocation of connectors on M1831A programming cable

2.5 Connecting Serial Port 1

This serial port is capable of RS232, RS422 or RS485 communications (two-wire or four-wire). The selection of either RS232 or RS422/RS485 is achieved by specific wiring of the serial port connector. No other settings need be changed to select between RS232 and RS422/485.



Pin number	Communication Standard	
	RS232	RS485
1	Do not connect	Rx Data + (In)
2	Rx Data (In)	Rx Data – (In)
3	Tx Data (Out)	Do not connect
4	Do not connect	Tx Data+ (Out)
5	Ground	Ground
6	Do not connect	Vcc
7	RTS (Out)	Do not connect
8	CTS (In)	Do not connect
9	Do not connect	Tx Data – (Out)

Table 2-2: Pin allocation of Port 1 serial port connector on Teleterm M2.

NOTE: The RTS and CTS handshaking lines are available for applications that require them. It is not a requirement of the CPU to use handshaking. In most applications connecting the RTS and CTS handshaking lines is not necessary.

2.6 Connecting Network Ports

2.6.1 Teleterm M2G (Models C236xB-11, -12) with internal GSM/3G modem

2.6.1.1. Inserting the Network SIM Card

The Teleterm M2G requires a SIM card (not supplied) to enable the unit to operate on the selected GSM mobile phone network.

To insert the SIM card:

1. Remove the top cover of the Teleterm M2 by undoing the two hex screws holding the top cover of the unit, using a 2.5mm hex key (supplied). The cover is connected to the unit by the internal antenna cable, so be careful not to place any strain on this cable while removing the cover or inserting the SIM card.

2. Insert the SIM card into the SIM card holder you will see in the centre of the unit. Take special care that the SIM card is correctly seated in the connector, and that the SIM card holder is properly closed. Press firmly down and slide forward to close securely.

3. Replace the top cover.

2.6.1.2. Connecting the Antenna

The supplied Antenna's cable should be screwed into the Antenna socket. Do not over tighten. This connector should be only finger tight to avoid damage.

2.6.1.3. Positioning the Antenna

The antenna should be placed away from the Teleterm M2G in a position that gives the best possibility of a good signal on the mobile phone network. Avoid proximity of the antenna to shielding materials such as metal enclosures.

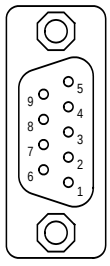
The signal strength of the chosen location can be easily checked by holding a mobile phone (connected to the same network) in the intended position of the antenna, and checking that the signal strength on the phone is good.

CAUTION: The antenna emits RF energy on a continuous basis, and should be positioned away from sensitive instrumentation, and away from areas where close proximity to personnel on a regular basis would occur. A separation distance of in excess of 30cm is recommended.

2.6.2 Teleterm M2C (Model C236xB-21) with Conet network port

It is recommended that the Teleterm M2C be connected to the Conet network using the C6169 Conet Termination Board and interconnecting cable. This ensures the integrity of the Conet network during maintenance of the RTU, and provides additional surge suppression and protection to the Teleterm M2C.

See the C6169 Datasheet with application notes for full Conet installation details.



Pin number	Description
2	Signal +
5	Cable screen (S)
8	Signal -
1, 3, 4, 6, 7 and 9	No connection

Table 2-3: Pin allocation of Conet port connector on the Teleterm M2C

2.6.3 Teleterm M2R (Model C236xB-31, -32, -33, -34) with Radio Network Port

2.6.3.1. Connecting the Antenna

The M2R RTU is equipped with an RPSMA antenna connector found on the top edge of Teleterm M2R RTU.

The appropriate antenna suitable for the application must be selected and purchased separately.

Screw the antenna's cable into the Antenna socket. Do not over tighten. This connector should be only finger tight to avoid damage.

2.6.3.2. Positioning the Antenna

The antenna should be placed away from the Teleterm M2R in a position that gives the best possibility of good reception. Avoid proximity of the antenna to shielding materials such as metal enclosures.

The signal strength of the chosen location can be easily checked by using the Omniset configuration software.

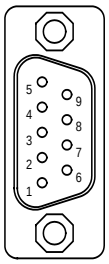
CAUTION: The antenna emits RF energy on a continuous basis, and should be positioned away from sensitive instrumentation, and away from areas where close proximity to personnel on a regular basis would occur.

2.6.4 Teleterm M2S (Model C236xB-41) with two additional Serial Ports

The M2S is equipped with two additional serial ports called PORT 3 and Port 4.

Port 3 is capable of either RS232 or RS485 operation. Port 4 is RS232 only with full handshaking suitable for driving a modem or other external serial device.

Port 3 is capable of RS232, RS422 or RS485 communications (two-wire or four-wire). The selection of either RS232 or RS422/RS485 is achieved by specific wiring of the serial port connector. No other settings need be changed to select between RS232 and RS422/485.



Pin number	Communication Standard	
	RS232	**RS485**
1	Do not connect	Rx Data + (In)
2	Rx Data (In)	Rx Data – (In)
3	Tx Data (Out)	Do not connect
4	Do not connect	Tx Data+ (Out)
5	Ground	Ground
6	Do not connect	Vcc
7	RTS (Out)	Do not connect
8	CTS (In)	Do not connect
9	Do not connect	Tx Data – (Out)

Table 2-4: Pin allocation of Port 3 serial port connector on Teleterm M2S.

NOTE: This port is not isolated, and the Signal Ground is connected internally to the M2S Power Supply 0 Volt connection.

NOTE: The RTS and CTS handshaking lines are available for applications that require them. It is not a requirement of the CPU to use handshaking. In most applications connecting the RTS and CTS handshaking lines is not necessary.

The pin-out of PORT 4 is given in the following table:

Pin number	In/Out	Name	Description
1	I	CD	Carrier Detect
2	I	RD	Received Data
3	O	TD	Transmitted Data
4	O	DTR	Data Terminal Ready
5	-	SG	Signal Ground
6	I	DSR	Data Set Ready
7	O	RTS	Request To Send
8	I	CTS	Clear To Send
9	I	RI	Ring Indicator

Table 2-5: Pin allocation of Port 4 serial port connector on M2S.

NOTE: This port is not isolated, and the Signal Ground is connected internally to the M2S Power Supply 0 Volt connection.

2.7 Powering up the Teleterm M2

Upon power up, the Teleterm M2 will take approximately a few seconds to initialise the system and connect to the network. The front panel LED's will all light for a short period before switching to their operational state.

3. Configuring the Teleterm M2

3.1 Overview

The Teleterm M2 is configured using the 'Omniset' software utility version 7.3 or above.

Omniset is a Windows98/NT/2000/XP compatible software package designed to configure a wide range of Omniflex products, including the Teleterm Teleterm M2.

Omniset is available in two versions:

The standard Omniset software is on the CD supplied with the Teleterm M2 RTU.

Omniset may also be downloaded for free from the Omniflex web site www.omniflex.com .

Omniset allows the Teleterm M2 to be configured through the serial port on the front of the unit.

The EziFORTH Workbench software is used for more advanced programming of the Teleterm M2.

3.2 Incompatibility with Previous Versions of Omniset

3.2.1 Versions of Omniset prior to 7.3

The Teleterm M2 is only compatible with Omniset or Omniset PRO Version 7.3 onwards. If you have a previous version of Omniset installed on your computer, then you need to upgrade to the latest version.

You can check which version of Omniset you have installed by opening Omniset and then selecting the "Help>About…" menu item.

3.3 Installing Omniset from the CD supplied

Omniset is Windows98/NT/2000/XP compatible, and requires access to an RS232 port on your Windows computer.

If your computer does not have a serial port available for use with Omniset, then inexpensive USB-to-Serial Converter modules are readily available that can be used with Omniset.

To install Omniset from the CD supplied, follow these steps:

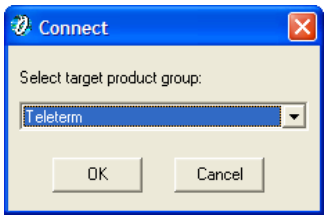
1. Insert the CD into the CD drive of your computer. The Omniset installation should start automatically. If it does not, then, using Windows Explorer, navigate on the CD drive to the 'Omniset' directory and double click the file 'setup.exe'.
2. Follow the prompts on the screen to complete the installation.
3. Select the COM port that you wish to use with Omniset by selecting 'COM Port' on the Data menu.
4. Omniset uses "templates" to customise its appearance to suit the product being configured. Omniset is supplied with a complete library of templates for all Omniflex products, including the Teleterm Teleterm M2. This library is frequently being updated with new products and enhancements. If your computer is connected to the Internet, you can easily check for and download the latest template library by selecting "Update Template Library from Web…" on the Omniset File menu. Follow the prompts to update your template library to the latest version. If you installed

Omniset from the CD supplied with your Teleterm M2, and you do not have access to the Internet then do not worry. You will already have the template necessary to configure the Teleterm Teleterm M2 (although it may not be the latest version available).

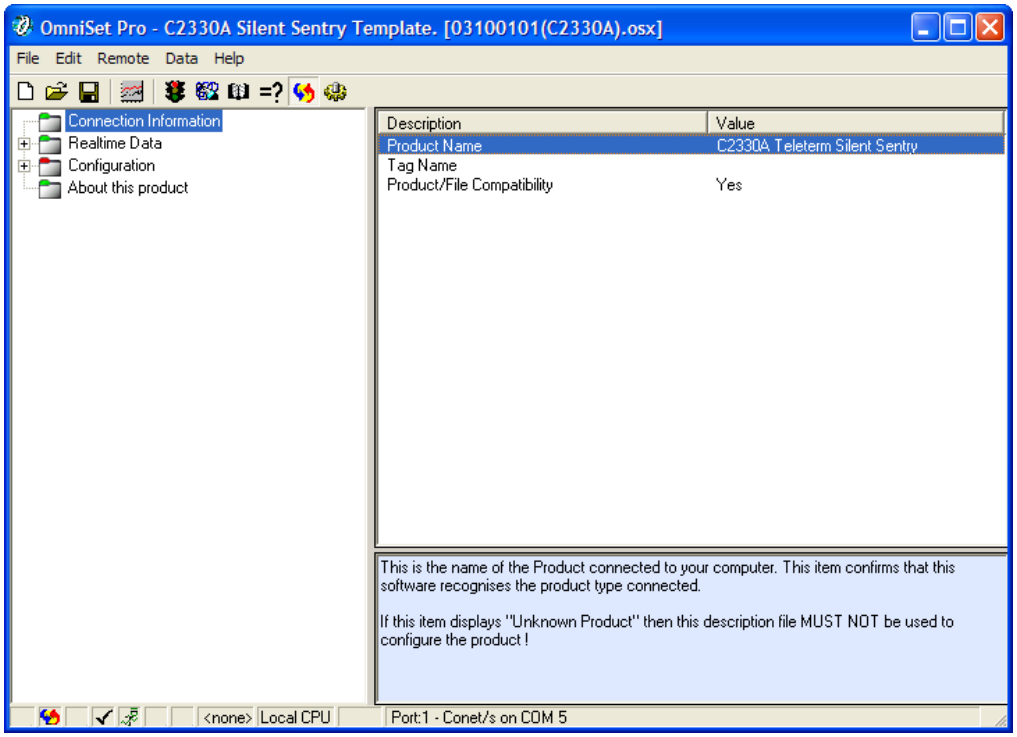
3.4 Connecting Omniset to the Teleterm M2 for first time

To setup the Teleterm M2 using Omniset, follow this procedure:

- Plug the programming cable supplied into the serial port on the front of the Teleterm M2 (marked Port 1) and into a serial port on your computer.
- Ensure that the Omniset software utility is running on your computer.
- Hold down the MODE pushbutton on the Teleterm M2, until the MODE LED indicator starts to flash green and red alternatively. This places the Teleterm M2 into programming mode.
- Select 'Connect...' from the File menu.
  Select the 'Teleterm' Product Group if prompted, and press OK:



If successfully connected, you should see the following screen in Omniset



Check that the Product Name is correct for the version of Teleterm M2 connected and that the Product/File Compatibility is 'Yes'.

Make sure that the Sync button is depressed, and that the Sync mode icon is present in the Status bar at the bottom of the Omniset window. This indicates that Omniset is in Sync mode, and that the data visible in Omniset is synchronised with the Teleterm M2 connected. In this Sync mode, any changes that you make in Omniset will automatically be written to the Teleterm M2. If Sync mode is NOT enabled, then changes you make to the configuration will NOT be written automatically to the Teleterm M2. You can write these values manually to the Teleterm M2 by selecting "Write Current Group" or "Write All Groups" from the "Data" menu.

You are now ready to view or change any of the parameters in the Teleterm M2.

3.5 Overview of the Teleterm M2 Configuration Template

The pane on the left of the Omniset window shows a list of Groups of Items to be viewed or changed, arranged in Folders. Select a Group in the group pane on the left, to see the contents of the individual Items for that Group in the item pane on the right.

By selecting either a Group, or an Item, Help information will be displayed for that Group or Item in the Help pane below the Item pane at the bottom of the Omniset window.

See the Omniset Help for a more detailed description of the operation of Omniset.

There are two important Groups in the left group pane:

The Real-Time Data Group contains the current status of all data items in the Teleterm M2. Select one of the Real-Time Data Groups to see the current data in the Teleterm M2.

The Configuration Group contains all the Items that can be configured in a Teleterm M2.

The value of an Item in the right hand pane can be changed in a number of ways:

1. Double-click the Item or
2. Right Click the Item and select "New Value…" from the options provided.

Enter the new value in the dialogue box and then press Enter or the 'OK' button.

Once you have completed the configuration of your Teleterm M2, you should save your configuration to your hard drive, so you have a backup of the configuration.

Remember that if your Omniset is not synchronised to your target Teleterm M2 when you make any changes in Omniset, these changes will not be written to the Teleterm M2 until you press the "Write" or "Write All" button.

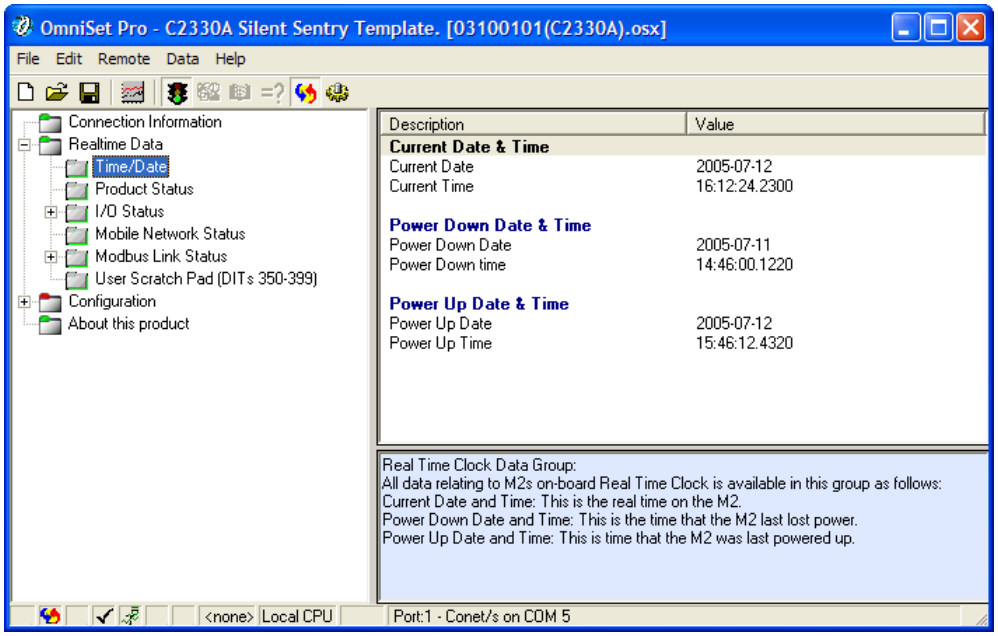
3.6 Quick Configuration

This procedure is recommended to check the Teleterm M2 operation for the first time. This provides the minimum amount of configuration necessary to achieve a simple functional test. This will give you a good starting point for further customisation to suit your specific application.

3.6.1 Set the Real-time Clock

The Real Time Clock Data Group shows the current date and time in the Teleterm M2, the time and date of the last power down, and the time and date of the last power up.

To set the real-time clock, write the current time and date to the relevant Data Items in this Data Group. The clock will run immediately from this new time when it is written to the Teleterm M2. To change a data item, double the Item, or right click and select "**New Value…**".

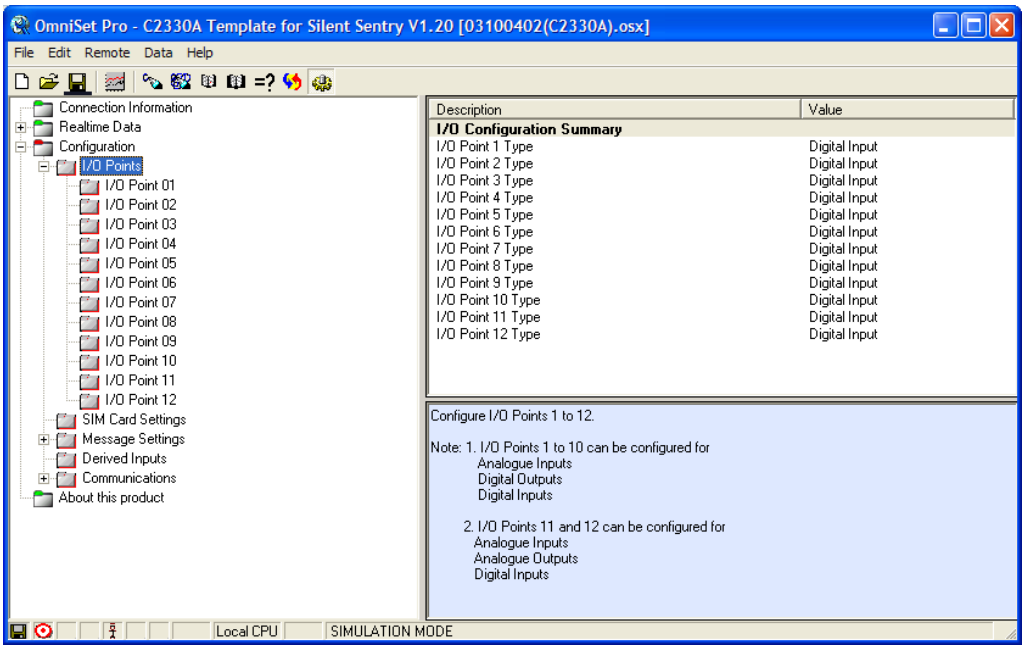


3.6.2 Set the I/O Points to the type required

The default setting as shipped from the factory is with all inputs set as digital inputs.

Ensure that these inputs as set as Digital Inputs by selecting the I/O Points Group. This gives a summary of each Input setting.

For detailed configuration of each Input to suite your application, select the actual I/O Point in the left Group pane.



3.7 Configuring the Programming Port

This port is set in the factory to its default of Conet/s protocol used for programming the Teleterm M2.

The programming port on the Teleterm M2 comes equipped with four protocols options:

1. Modbus Master (ASCII and RTU)
2. Modbus Slave (ASCII and RTU)
3. Conet/s protocol.
4. User Protocol (Requires an installed user program to access the serial port)

CAUTION: It is not recommended that the programming port be assigned to other duties other than reserved for programming, because of the increased difficulty for configuration changes and debugging caused in the field when the programming port is not available for this purpose.

The programming port can be switched between two operating modes: Program mode and General mode. As shipped, the programming port is configured to allow programming in either mode.

Programming Mode is selected by holding down the black SD button on the lower right corner of the unit for three seconds. Programming mode is indicated by the Tx1 and Rx1 LED' turning steady on.

When in programming mode, the Prog Port is always set to the Conet/s programming protocol required by the programming tools. While in Program mode, the Prog Port's Normal Mode settings may be changed. The required protocol including any address selection is made in the "Configuration>Communications>Ports>Programming Port" group of Omniset.

To enable these settings to take effect, the Prog Port must be switched to normal mode by holding down the SD button again for three seconds. The Tx1 and Rx1 lights will go off to indicate Normal mode, and will resume their normal mode if flashing whenever valid data is received.

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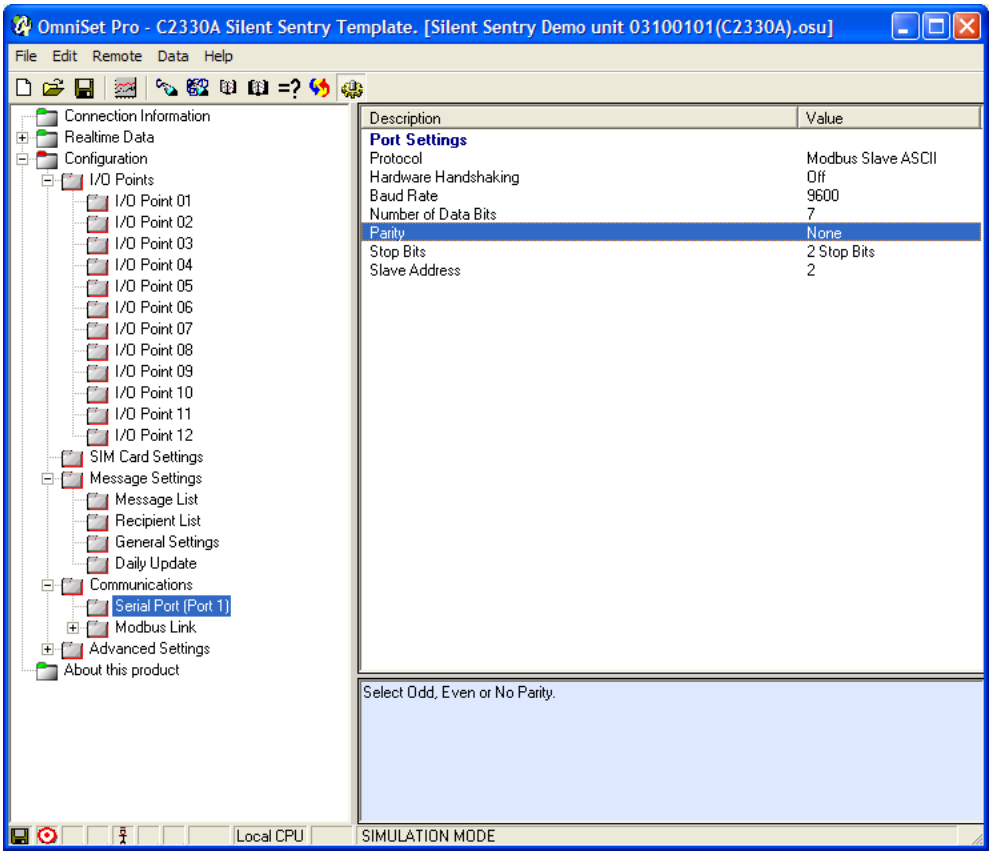
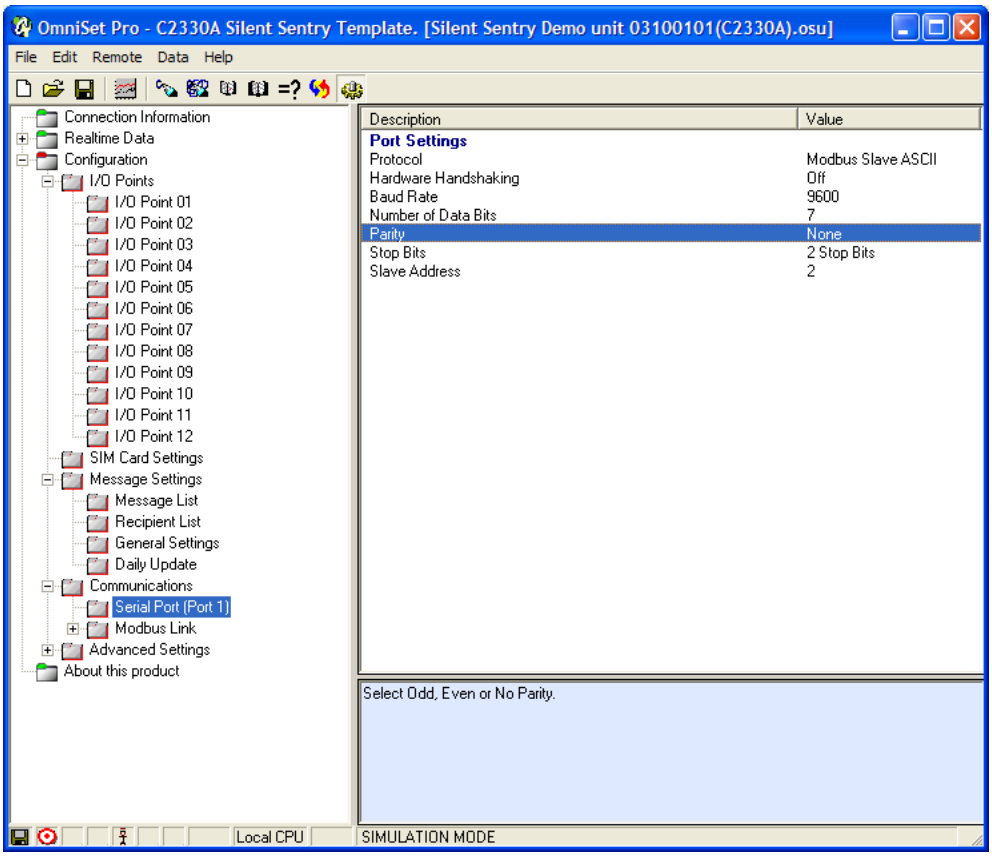


3.8 Configuring the Serial Port 1

The serial port (Port 1) on the Teleterm M2 comes equipped with four protocol options:

5. Modbus Master (ASCII and RTU)
6. Modbus Slave (ASCII and RTU)
7. Conet/s protocol.
8. User Protocol (Requires an installed user program to access the serial port)

The required protocol including any address selection is made in the Configuration>Communications>Ports>Serial Port (Port 1)" Group.



3.9 Configuring the Conet/c Network Port (available on the Teleterm M2C only.)

The Conet/c Port selection switch is located on the top edge of the M2 RTU along side the Port 2 Conet Network connector. Use this switch to configure the Node address of the RTU on the Conet network and the desired CONET baud-rate (Normal or Slow).

Communications Protocol	Conet Address switch setting
Conet (Normal mode): Baud rate: 62,500 baud	**Switches 1-7: Conet ID** (Set in binary Switch 1 = LSB Switch 7 = MSB) **Switch 8: Baud Rate** Switch 8 OFF = 62.5 kBaud [Switch shown set to Address 2, Normal baud rate]
Conet (Slow mode): Baud rate: 7,800 baud	Switches 1-7: Conet ID Switch 8: Baud Switch 8 ON = 7.8 kBaud [Switch shown set to Address 2, Slow baud rate]

Table 3-1: Conet Port Address switch settings on the M2C RTU)

Each node on the Conet/c network should be allocated a unique address in sequence, starting at 1. While a Conet/c network will operate reliably with missing node addresses,

best performance of the network will be achieved with all operating nodes having consecutive addresses.

All Conet nodes in a network must be set to the same baud rate.

Please refer to the Conet Installation Guide and Conet Protocol Datasheet for more information on the CONET network.

3.10 Configuring the Conet/r Network Port (available on the Teleterm M2R only.)

Conet/r is a full peer-to-peer radio network which allows the system designer to take advantage of flexible network topologies.

The following parameters need to be configured in every node in the Conet/r network. These parameters can be found in the Omniset “Configuration>Communications> Ports>Radio Port” group.

3.10.1 Configuring the Radio Network Node Address

Each M2R connected to the radio network is considered a "Node" on the network. Each node must have a unique address. Set the address for each node uniquely in this item.

Node addresses can be in the range 1 - 65535.

If the node address is set to 0, then the radio will not transmit data on to the network, and will be unable to respond to requests from the network.

3.10.2 Configuring the Inactivity Protection Timer

This timer is used to reset the radio channel when an unacceptable length of time has elapsed without radio communications. In unusual network conditions it is possible for the radio network to enter a “deadlock” condition, where radio communications is prevented. This protection timer is used to prevent this extreme condition from causing permanent loss of communications.

Set this timer to longer than you expect the network to ever be quiet. If this timer times out without network activity, then the M2 will assume that a deadlock condition has occurred, and will reset the radio channel to allow communications to resume.

3.10.3 Configuring the Hopping Sequence Number

The Conet/r network uses a Frequency Hopping Spread Spectrum (FHSS) to improve noise immunity and to allow multiple networks to exist within range of each other.

FHSS is a technique where the transmitting node transmits for short time on one frequency and then hops to another frequency to continue transmission, and so on through a range of frequencies in a particular order. The frequencies are used in a predefined pseudo-random sequence that both the transmitter and receiver know. Receiving nodes listen in order on each of these frequencies to receive the entire message.

Because the system transmits on a number of frequencies, the communication is more reliable and resistant to interference than a a system operating on a single frequency.

By varying the hopping sequence, different radio networks can coexist within the same geographic area.

The M2R can be set with one of 7 Hopping Sequences (0-6). All nodes on a single network must have the same Hopping Sequence Number.

3.10.4 Configuring the node as a Repeater or End Node

If an RF link is weak, an M2R in the network is out of range, or a difficult RF environment is present, then repeaters can be used to extend the effective range and reliability of the radio network.

A repeater is a regular Teleterm M2R node that has repeating enabled. Any node in a Conet/r network can be designated as a repeater node or as an end node.

Select “Repeater Node” for radios that you wish to perform the repeater function. All other nodes must b set to “End Node”.

3.11 Other Configuration Settings

There are a number of other settings that can be made in Omniset to fully configure your Teleterm M2. The settings for your particular M2 RTU will vary dependent upon the model. There is an Omniset Template customised for each version of M2 RTU.

Browse through all of the Configuration Groups in Omniset. The Help pane in Omniset will explain each of these additional settings.

3.12 Programming the M2 RTU in EziFORTH

Please refer to the separate EziFORTH Programmer’s Manual.

4. Modbus and the Teleterm M2

4.1 Overview

A unique and powerful feature of the Teleterm M2 is its ability to read data from any device equipped with a Modbus port and send SMS Alarm messages based upon the contents of that data.

Examples of equipment that can be interrogated for alarm data are instruments such as PLC's, SCADA packages, on-line analysers, flow meters etc.

Modbus is the most popular standard for the exchange of data between industrial instrumentation today. Modbus is a well established reliable standard that is easy to use.

Modbus is a serial multi-drop Master/Slave protocol. This means that you can connect one or more Slave devices to a Master device over a serial communication link. If only one Slave device is being used, and the distance between the Master and Slave devices is less than 15m, then the simpler more popular RS232 electrical standard can be used. If two or more Slaves are to be connected to the Master Device, or the distance between the devices is greater than 15m, then the RS485 electrical standard must be used.

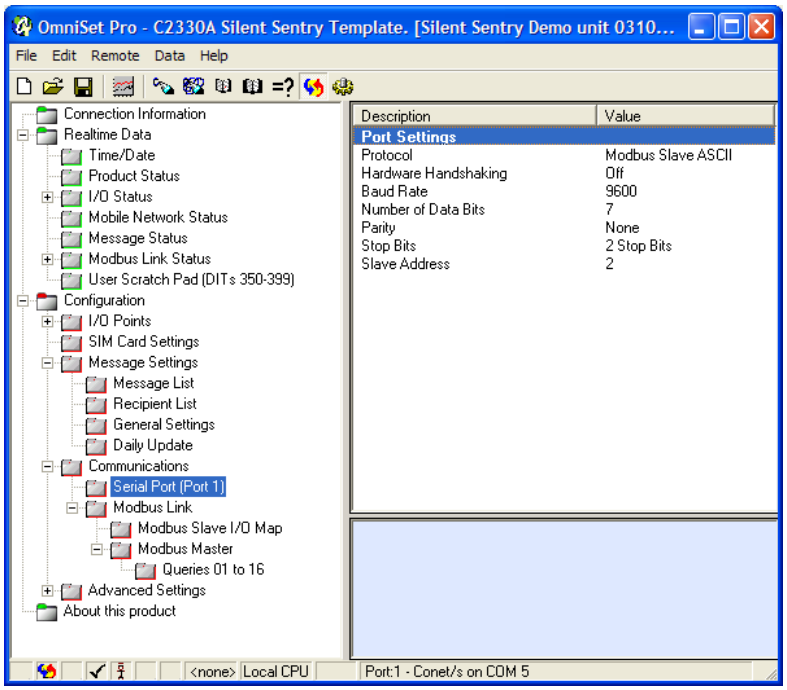
There are no internal settings in the Teleterm M2 for selecting RS232 or RS485. All that is required is to wire the appropriate pins of the serial connector for the chosen standard.

4.2 Modbus Slave

4.2.1 Selecting the Slave Protocol Details

Setting up Modbus Slave protocol only requires configuration of the serial port in the "Configuration>Communications>Serial Port" group, including ASCII and RTU mode, Baud Rate, Parity, number of Data bits and Stop bits etc.

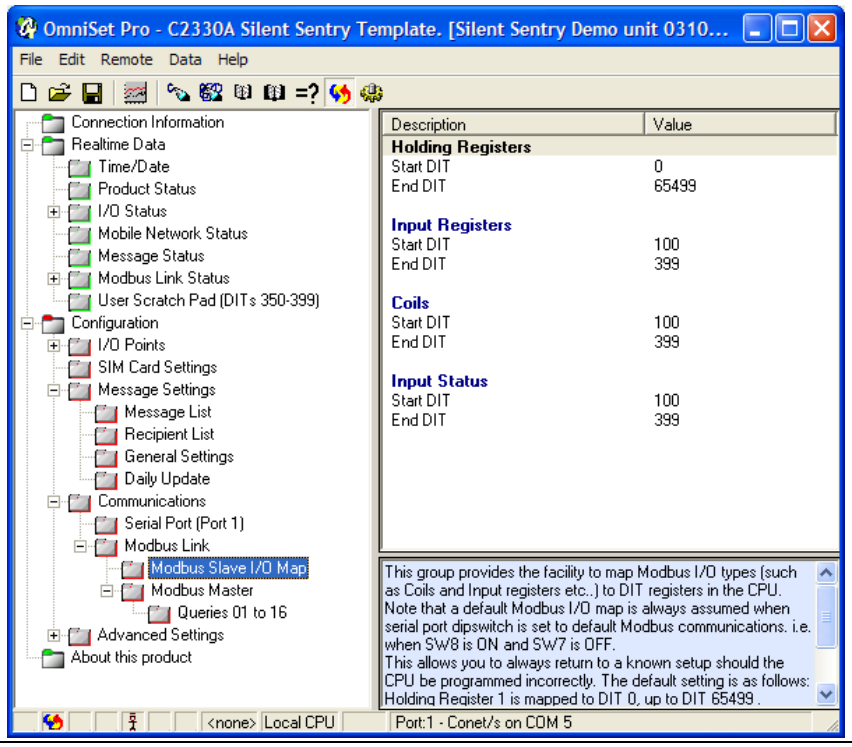
The simplest operating mode for Modbus Slave is to configure the Teleterm M2 (and the Master Device) as follows:



4.2.2 Modbus Data Register Mapping

The Modus protocol in the Teleterm M2 supports the reading and writing of a number of different types of data: Digital Status Inputs, Coil Outputs, Input Registers and Holding Registers.

These Modbus Data types are mapped to specific areas of the Teleterm M2's Scratch Pad Registers. It is not normally necessary to change this layout, but you may do so for specific applications. The default settings are as follows:



The most efficient data type to use is Holding Register Read (Modbus Function 3) and Holding Register Write (Modbus Function 16).

4.3 Modbus Master

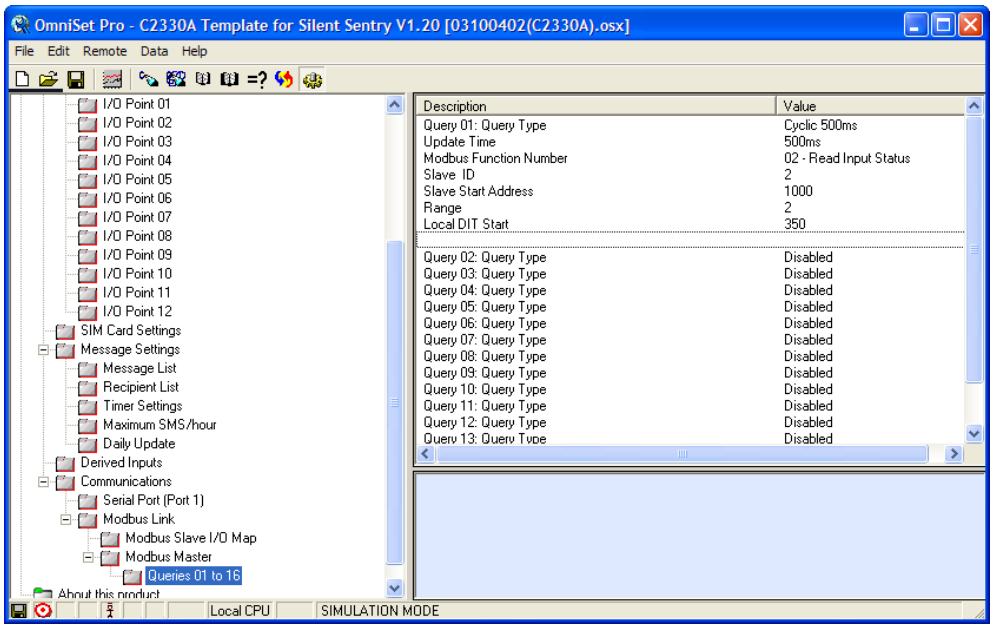
4.3.1 Selecting the Master Protocol Details

Setting up Modbus Master protocol requires configuration of the serial port in the "Configuration/Communications/Serial Port" group, including ASCII and RTU mode, Baud Rate, Parity, number of Data bits and Stop bits etc.

4.3.2 Query Blocks

In order to use the Modbus Master facility in the Teleterm M2 to get data from another Modbus Slave, "Query Blocks" have to be configured that tell the Teleterm M2 where to get the data from which Slave, where in the Teleterm M2 to place the data, and which Modbus Function to use to acquire the data.

Up to 32 Query Blocks can be configured in the Teleterm M2:



In the example shown above for Query 01, each data item has the following meaning:

Query Type Cyclic: This means that the query will repeat on a timed cycle as set.

Update Time: This setting shows often the query will be sent – in this case every 500 milliseconds (0.5 seconds).

Modbus Function Number: There are number of types of messages called "functions" that the Modbus protocol supports. Function 3 for reading general purpose Holding Registers is the most commonly used for this purpose because it is the most efficient for reading larger amounts of data.

Function	Description
1	Read Coil Status
2	Read Input Status
3	Read Multiple Holding Registers
4	Read Multiple Input Registers
5	Write Single Coil
6	Write Single Holding Register
15	Write Multiple Coils
16	Write Multiple Holding Registers

Slave ID: This is the Modbus Address of the Slave device to be polled.

Slave Start Address: This is the address of the first Holding Register to be read from the Slave device,

Range: This is the number of Holding registers to be read from the Slave device.

Local DIT Start: This is the starting address of the local Register in the Teleterm M2 where the data will be written. The registers in the range 350 to 399 are reserved for this purpose in the Teleterm M2.

Once the Queries required are configured, then you need to unplug the programming cable from the serial port, switch the serial port back to normal mode by holding down the Mode pushbutton until the OK light is steady green, and then plug in the slave device to the serial port.

5. The Data Interchange Table explained

5.1 DIT Table Layout

All data exchange with the M2 RTU is done via the “Data Interchange Table” (DIT). Any exchange of data between functions in the M2 RTU and/or with the outside world takes place through this DIT.

The Data Interchange Table (DIT) in the M2 RTU is used for reading and writing all configuration and dynamic data in the M2.

The DIT is an array of 16 bit registers accessible from any function or communications port in the M2 RTU. Even the Omniset configuration template interfaces to the M2 RTU through the DIT.

Each data register in the DIT has a data address on the range 0 to 65535. Not all addresses are accessible. See the DIT Table Detailed Layout in Section 8 for more details for your particular product.

Any of these registers may be accessed through any of the network ports, allowing remote I/O systems to be implemented “out-of-the-box” without any programming required.

6. The Subscription Service Explained

6.1 Introduction to Subscriptions

Central to many applications involving communications across networks is the need to replicate data between nodes on the network.

Examples include a SCADA system acquiring data from remote telemetry units in the field; or a point-to-point telemetry application, where inputs are transmitted from one location to outputs at another location.

In all these cases, the traditional method is for a controlling master node to poll the slave nodes regularly for data in case something has changed. This crude method is an inefficient use of the limited network bandwidth, and is inherently slow in typical and worst case update times. It also limits the number of master nodes in the system to one, and makes the system update times very slow where many outstations are involved.

The Teleterm M2 provides a far superior mechanism to accomplish this commonly used function through its Subscription Service. The subscription Service runs on all Conet/c (industrial LAN), and Conet/r (FHSS radio) and Conet/e (Ethernet) networks, and is supported on all Omniflex products supporting these network types. This allows the M2 RTU to be used as remote I/O for other Omniflex equipment such as the Maxiflex Process Automation Controller Suite of products, or to be interconnected in a unified data environment.

6.2 How Subscriptions Work

The Subscription Service operates as follows:

The node requiring the data (the receiver) sets up a subscription with the node that has the data (the sender), very much like you would subscribe to a magazine through your newsagent. You establish a magazine subscription by telling the newsagent which magazine you want, your home address, and how often you want it, and then the newsagent takes the responsibility to send you the magazine whenever a new issue becomes available.

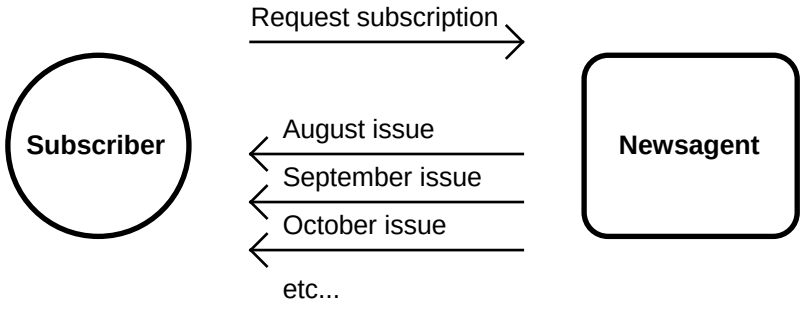


Figure 6.1 The Magazine Subscription Analogy.

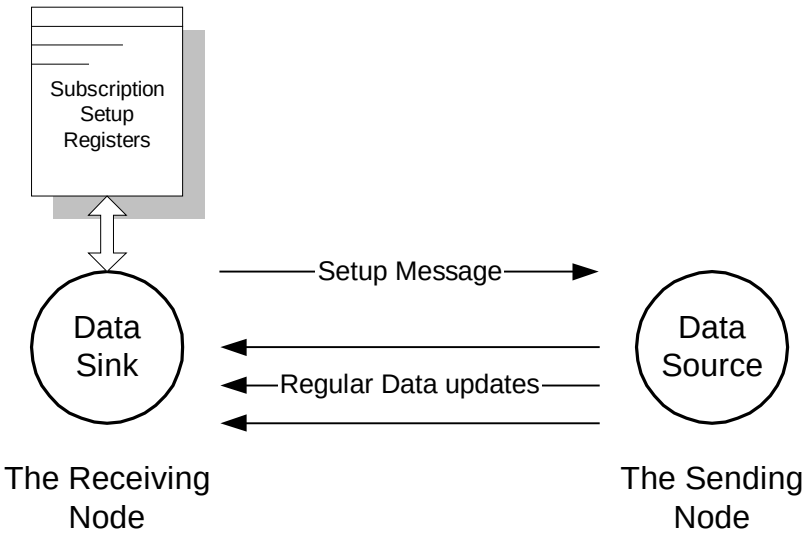
In the same way, the M2's Subscription Service allows the M2 (acting as a node on the network) to subscribe to a range of DIT registers on a remote node.

The remote node will then send the data at an agreed time interval, plus, if required, when the data changes state. The receiving node expects these regular updates, and will flag an error if the subscribed data is interrupted for any reason.

6.3 Setting up subscriptions

Just like the magazine subscription, the receiving M2 is responsible for setting up and maintaining subscriptions with other nodes to replicate data across the network. The advantages of using subscriptions over regular polling mechanisms are as follows:

1. Only one message is required on the network for a data update as opposed to two in a Request/Reply polling method. This reduces network overhead allowing more data throughput on the network.
2. The regular data updates can be much slower than the response time required for the system by using change-of-state detection. The Source node will send data immediately there is a change of state, providing the optimum system response, without the need to have a fast regular update time. This reduces network overhead allowing more/faster data throughput on the network when something does change.
3. On peer-to-peer networks multiple subscriptions can be configured between nodes in different directions, each of which would operate independently of any other. This provides far more flexibility than typical Poll/Response Master/Slave methods.



The node acting as a data “producer” (the sending node) requires no user configuration to participate in a subscription contract with another node. The node acting as data “consumer” (the receiving node) is configured by the user for the required data. The “consumer” node then automatically manages the subscription including sending the requests to the data source, and managing errors in the process.

The following table shows the information required to configure a subscription:

ITEM	DESCRIPTION	VALID RANGE
Change-of-State Required	This sets whether the subscription data block will be sent when any data in the block changes.	Yes/No
Update time	This is the time between regular updates of data that will be sent whether the data has changed or not.	1 – 63 seconds, 1-63 minutes
Communications Port	This is the Network Port in this, the receiving node, to which the network containing the remote (source) node is connected.	Refer to the relevant product template file for network ports available on specific product suitable for subscriptions.
Destination DIT Start Address	This is the first DIT register address where the data will be written in this receiving node.	0 – 65535
Source Node Address	This is the node address of the sending or source node from where the required data originates. This can be expressed as a local network address plus the local slot and port to which the network is connected, or it can be expressed as a global network address if network routing is configured in the CPU.	0-65535 on Conet/r 0-126 on Conet/c (local) 128-254 on Conet/c (global)
Source DIT Start Address	This is the first DIT register address of the block of registers to be sent from the source node.	0 – 65535
Data Range	This is the number of 16 bit DIT registers that will be transferred in the subscription.	1 – 120

Table 6-1 Subscription Configuration Information

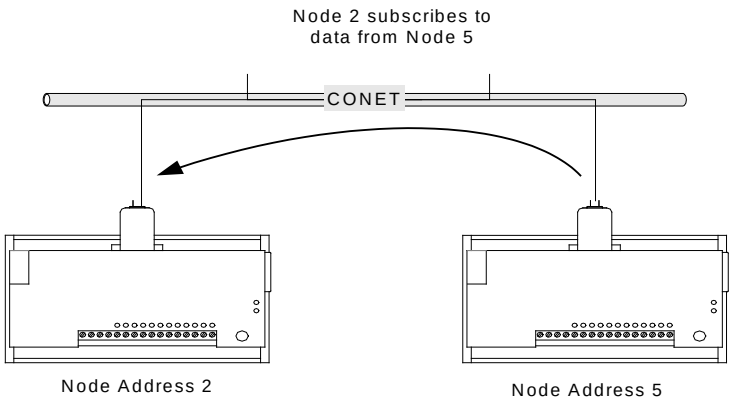
6.4 Number of subscriptions allowed

There is a limit to the number of subscriptions that a Teleterm M2 RTU can receive, and a limit to the number of subscriptions that it can send. The M2 RTU can be configured to receive subscriptions from a maximum of 16 other nodes and can send subscriptions to a maximum of 8 other receiving nodes.

In other words each M2 RTU can act as data receiver for 16 subscriptions, and data sender for up to 8 subscriptions simultaneously.

6.5 Subscription Application Example

Refer to the diagram of a simple network below:



Remote node 5 on the CONET network has digital information in DIT register 100. Node 2 needs to monitor these digital inputs. A regular update time of every 10s is quite satisfactory to determine that the remote system is still connected and functioning if nothing changes, but the data should be sent immediately if any of the digital inputs changes state.

Node 2 is the Destination node (it sets up the subscription and receives the data). Node 5 is the sending node, and requires no user configuration to participate in the subscription process.

Fill in the following data into one of the eight subscription blocks in the Subscription Table in the T2 CPU of Node 2 to configure this function:

NAME	VALUE	DESCRIPTION
Change of State Required	Yes	The data will also be sent whenever any bit the DIT registers 100 changes.
Update Time	10	The regular updates can be 10 seconds apart.
Local Port Number	2	The CONET network is Port 2 on the M2C
Destination DIT Start Address	100	This is the DIT Address in the receiver where we want to start writing the received data.
Source Node Address	5	The local CONET ID on the Conet network
Source DIT Start Address	110	The Source Data start at DIT address 620
Data Range	1	We require 1 DIT register to be sent

Table 6-2 Subscription Block Data Example

When configured, Node 2 automatically requests a subscription with the data from Node 5 on the Conet network.

Node 5 undertakes to send the contents of its own DIT register 100 over the network to node 2 whenever any of the bits change, or every 10s if no change occurs in that time. The information will be placed in node 2's DIT register 110.

Node 2 can monitor the status of the subscription by monitoring the relevant bit in the Subscription Status DIT register. If this bit is clear then the subscription is operating successfully. If this bit is set, then the subscription has failed and received data is not valid, or the subscription has not been correctly set.

7. Detailed DIT Layout

7.1 Dynamic Data Area

(DIT Registers 0 – 29999)

These are “volatile” registers. i.e. They are not retained on power fail.

7.1.1 System Information

System Information			
DIT Start	**No. of DITs**	**Datatype**	**Description**
0	1	BCD4	Product Code Unique Number in BCD format that reflects the version of the product as follows: 0350 – M2360B-0 M2 1350 – M2360B-11 M2G (GSM) 2350 – M2360B-12 M2G (3G) 3350 – M2360B-21 M2C (Conet Industrial LAN) 4350 – M2360B-31 M2R (2.4GHz) 5350 – M2360B-32 M2R (920MHz) 6350 – M2360B-41 M2S (Serial Port)
1	1	BCD4	Firmware/DIT Revision Number in BCD containing the firmware revision in the format MM.mm MM = Major firmware version number, which also reflects the version of the DIT layout. If the DIT layout changes, then the major version will also change. mm = minor firmware version number. e.g. 0614 (BCD) = Firmware Version 6.14
2	1	BIN16	Supported Functions Indicates any special functions enabled on this unit.
3	1	BCD4	Application Version The version number of any factory loaded application.
4	4	ASCII	User Tag Name The user is able to write up to 8 ASCII characters into these DIT registers (two characters per register) to uniquely identify each Teleterm M2. This User Tag Name is used by the **Omniset** software tool to verify that the matching M2 is connected. If this Tag Name is populated, then it must match the Tag Name set in **Omniset** to allow the configuration to be changed.
8	1	BCD4	Configuration Version The configuration version in the format MM.mm MM = Major configuration version number. mm = minor firmware version number. e.g. 0103 (BCD) = Configuration Version 1.03 This number is set in Omniset from the “File>Properties…” menu. When a “Write All Groups” is performed in Omniset, this register is written with the value set here. Assists the user to check the configuration version loaded.
9	1	UNIT16	Configuration Revision This number is automatically incremented in Omniset and written to the target when a “Write All Groups” is performed.
10	2	UINT32	MJD Current Date The current date in “Modified Julian Date” (MJD) format. (Number of days elapsed since 17 November 1858)
12	2	UINT32	IEC Current Time The current time in IEC time format. (number of 100us periods since midnight)

14	2	UINT32	MJD Power Down Date Date of last power down in MJD format.
16	2	UINT32	IEC Power Down Time Time of last power down in IEC time format.
18	2	UINT32	MJD Power Up Date Date of last power up in MJD format.
20	2	UINT32	IEC Power Up Time Time of last power up in IEC time format.
22	1	BIN16	System Register Bit 0: User Program HALTED (0) or RUNNING (1) Bit 1: Clock Backup Battery HEALTHY (0) or LOW (1) Bit 2: I/O Fault Bits 3-15: Reserved
23	1	UINT16	Alive Counter 16 bit Running counter increments every 10ms.
24	6	-	Reserved
30	1	INT16	PSU Voltage Incoming Power Supply Voltage with 0.1V resolution.
31	1	INT16	Temperature CPU temperature with 0.1degC resolution.
32	1	INT16	RTC Battery Voltage Backup Battery Voltage with 0.1V resolution
33	1	-	Reserved
34	1	INT16	SD Card Status
35	1	UINT16	SD Card Memory Used (%)_
36	1	UINT16	SD Card Memory Available (%)
37	13	-	Reserved

7.1.2 Communications Port Status

Communications Port Status			
50	1	UINT16	Programming Port Inactivity Counter
51	1	UINT16	Serial Port Inactivity Counter
52	1	UINT16	Network Port 1 Inactivity Counter
53	1	UINT16	Network Port 2 Inactivity Counter
54	1	UINT16	Prog Port Local ID
55	1	UINT16	Serial Port Local ID
56	1	UINT16	Network Port 1 Local ID
57	1	UINT16	Network Port 2 Local ID
58	1	UINT16	Prog Port Global ID
59	1	UINT16	Serial Port Global ID
60	1	UINT16	Network Port 1 Global ID
61	1	UINT16	Network Port 2 Global ID
62	1	UINT16	Serial Port Dipswitch
63	1	UINT16	Network Port 1 Dipswitch
64	1	UINT16	Network Port 2 Dipswitch
65	15	-	Reserved

7.1.3 EventForth System Timers

EventForth System Timers			
80	1	UINT16	System Timer 0
81	1	UINT16	System Timer 1
82	1	UINT16	System Timer 2
83	1	UINT16	System Timer 3

84	1	UINT16	System Timer 4
85	1	UINT16	System Timer 5
86	1	UINT16	System Timer 6
87	1	UINT16	System Timer 7
88	12	-	Reserved

7.1.4 Network Status

M2R Signal Strength			
100	1	2 x UINT8	M2R: Node Page Selection (0= node 1-20;1= Node 21-40, 2 = 41-60 etc,.) This register sets the page of 20 nodes to view for both RSSI and Network Inactivity Timers in the next table.
101	1	2 x UINT8	M2R: RSSI Node 1 & 2
102	1	2 x UINT8	M2R: RSSI Node 3 & 4
103	1	2 x UINT8	M2R: RSSI Node 5 & 6
104	1	2 x UINT8	M2R: RSSI Node 7 & 8
105	1	2 x UINT8	M2R: RSSI Node 9 & 10
106	1	2 x UINT8	M2R: RSSI Node 11 & 12
107	1	2 x UINT8	M2R: RSSI Node 13 & 14
108	1	2 x UINT8	M2R: RSSI Node 15 & 16
109	1	2 x UINT8	M2R: RSSI Node 17 & 18
110	1	2 x UINT8	M2R: RSSI Node 19 & 20
111	16		Reserved

Network Inactivity Timers (paged in groups of 20)			
127	1	UNIT16	M2R: Inactivity Node 1 (paged with RSSI above)
128	1	UNIT16	M2R: Inactivity Node 2
129	1	UNIT16	M2R: Inactivity Node 3
130	1	UNIT16	M2R: Inactivity Node 4
131	1	UNIT16	M2R: Inactivity Node 5
132	1	UNIT16	M2R: Inactivity Node 6
133	1	UNIT16	M2R: Inactivity Node 7
134	1	UNIT16	M2R: Inactivity Node 8
135	1	UNIT16	M2R: Inactivity Node 9
136	1	UNIT16	M2R: Inactivity Node 10
137	1	UNIT16	M2R: Inactivity Node 11
138	1	UNIT16	M2R: Inactivity Node 12
139	1	UNIT16	M2R: Inactivity Node 13
140	1	UNIT16	M2R: Inactivity Node 14
141	1	UNIT16	M2R: Inactivity Node 15
142	1	UNIT16	M2R: Inactivity Node 16
143	1	UNIT16	M2R: Inactivity Node 17
144	1	UNIT16	M2R: Inactivity Node 18
145	1	UNIT16	M2R: Inactivity Node 19
146	1	UNIT16	M2R: Inactivity Node 20
147	33	-	Reserved

7.1.5 Subscription Status

Subscription Status			
180	1	BIN16	Bit Status for Subscriptions 1 to 16
181	1	BIN16	Bit Status for Subscriptions 17 to 32
182	1	BIN16	Bit Status for Subscriptions 33 to 48
183	1	BIN16	Bit Status for Subscriptions 49 to 64
184	6	-	Reserved

7.1.6 Modbus Master Query Status

Modbus Master Query Status			
190	1	UINT16	Last Known Error Code
191	1	BIN16	Bit Status for Queries 1 to 16
192	1	BIN16	Bit Status for Queries 17 to 32
193	1	BIN16	Bit Status for Queries 33 to 48
194	1	BIN16	Bit Status for Queries 49 to 64
195	1	BIN16	Query Tigger 1 to 16
196	1	BIN16	Query Tigger 17 to 32
197	1	BIN16	Query Tigger 33 to 48
198	1	BIN16	Query Tigger 49 to 64
199	1	-	Reserved

7.1.7 ISaGRAF Program Information

Isa GRAF Program Information			
200	8	ASCII	Application Name
208	2	UINT32	Application Date
210	2	UINT32	Application Checksum
212	1	UINT16	Application Version
213	1	INT16	Program Space % Used
214	1	INT16	Variable Space % Used

7.1.8 Digital Input Status

Digital Input Status			
250	1	BIN16	Digial Input Status - DI 1 to 12
251	1	BIN16	Alarm Status - Alarm 1
252	1	BIN16	Alarm Status - Alarm 2
253	1	BIN16	Alarm Status - Alarm 3
254	1	BIN16	Alarm Status - Alarm 4
255	5	-	Reserved

7.1.9 Digital Output Status

Digital Output Status			
260	1	BIN16	Digital Output Status - DO 1 to 10
262	8	-	Reserved

7.1.10 Analogue Input Values

Analogue Input Values			
270	1	INT16	Measured Input A1
271	1	INT16	Measured Input A2
272	1	INT16	Measured Input A3
273	1	INT16	Measured Input A4
274	1	INT16	Measured Input A5
275	1	INT16	Measured Input A6
276	1	INT16	Measured Input A7
277	1	INT16	Measured Input A8
278	1	INT16	Measured Input A9
279	1	INT16	Measured Input A10
280	1	INT16	Measured Input A11
281	1	INT16	Measured Input A12
282	8	-	Reserved
290	2	INT32	Engineering Input E1/Counter Input C1
292	2	INT32	Engineering Input E2/Counter Input C2
294	2	INT32	Engineering Input E3/Counter Input C3
296	2	INT32	Engineering Input E4/Counter Input C4
298	2	INT32	Engineering Input E5/Counter Input C5
300	2	INT32	Engineering Input E6/Counter Input C6
302	2	INT32	Engineering Input E7/Counter Input C7
304	2	INT32	Engineering Input E8/Counter Input C8
306	2	INT32	Engineering Input E9/Counter Input C9
308	2	INT32	Engineering Input E10/Counter Input C10
310	2	INT32	Engineering Input E11/Counter Input C11
312	2	INT32	Engineering Input E12/Counter Input C12
314	6		Reserved

7.1.11 Analogue Output Status

Analogue Output Status			
340	2	INT32	Engineering Output F11
342	2	INT32	Engineering Output F12
344	16	-	Reserved
360	1	INT16	Calibrated Output B11
361	1	INT16	Calibrated Output B12
362	8		Reserved

7.1.12 User Dynamic Registers

The following registers are available for the user. These register contents are NOT retained during power down.

User Area			
500	29499		User Area – Volatile Registers
29999			Last Dynamic DIT

7.2 Static Data Area

(DIT Registers 30000 – 65000)

These are “non-volatile” registers. i.e. They are retained on power fail.

CAUTION: It can take up to three seconds for data written to these registers to be saved to non-volatile memory. Any values changed within three seconds of a power failure may NOT be saved.

7.2.1 Input Configuration

Input Configuration			
30000	50	INT16	Configuration Input 1
30050	50	INT16	Configuration Input 2
30100	50	INT16	Configuration Input 3
30150	50	INT16	Configuration Input 4
30200	50	INT16	Configuration Input 5
30250	50	INT16	Configuration Input 6
30300	50	INT16	Configuration Input 7
30350	50	INT16	Configuration Input 8
30400	50	INT16	Configuration Input 9
30450	50	INT16	Configuration Input 10
30500	50	INT16	Configuration Input 11
30550	50	INT16	Configuration Input 12

7.2.2 Serial Port 1 Configuration

Port 1 Setup (Serial Port - main board)			
30610	1	UINT16	Protocol and comms setting
30611	1	UINT16	RTS/CTS Timeout
30612	8	-	Reserved for Port

7.2.3 Serial Port 2 Configuration

Port 2 Setup (Second Serial Port – M2S Only)			
30620	1		Protocol and comms setting
30621	1		RTS/CTS Timeout
30622	8		Reserved for Port

7.2.4 Programming Port Configuration

Prog Port Setup			
30630	1	UINT16	Protocol and comms setting
30631	1	UINT16	RTS/CTS Timeout
30632	8	UNIT16	Reserved for Port

7.2.5 Modbus Port Configuration

Modbus Slave Register map			
30690	8		Modbus Slave Register Map
30698	2		Reserved

Modbus Master Query Configuration			
30700	1	UINT16	Query Response Timeout
30701	1	UINT16	Interquery Delay (ms)
30702	1	UINT16	Interpoll Delay (ms)
30703	1	UINT16	Retries
30704	4	-	Reserved
30708	1	UINT16	Query 1: Update Time
30709	1	2 x UINT8	Query 1: Slave ID (msb) : Function (lsb)
30710	1	UINT16	Query 1: Slave Start Address
30711	1	UINT16	Query 1: Range
30712	1	UINT16	Query 1: Local DIT Start
30713	1	UINT16	Query 1: Local Port Number (msb) : Local BIT position (lsb)
30714	4	UINT16	Reserved for future (I.e. IP address for Modbus Master TCP)
30718	10		Query 2 - as per Query 1
30728	10		Query 3 - as per Query 1
30738	10		Query 4 - as per Query 1
30748	10		Query 5 - as per Query 1
30758	10		Query 6 - as per Query 1
30768	10		Query 7 - as per Query 1
30778	10		Query 8 - as per Query 1
30788	10		Query 9 - as per Query 1
30798	10		Query 10 - as per Query 1
30808	10		Query 11 - as per Query 1
30818	10		Query 12 - as per Query 1
30828	10		Query 13 - as per Query 1
30838	10		Query 14 - as per Query 1
30848	10		Query 15 - as per Query 1
30858	10		Query 16 - as per Query 1

7.2.6 Network Subscription Configuration

Subscription Configuration			
31398	1	UINT16	Subscription Cancellation Timeout
31399	1	UINT16	Subscription Cancellation Retries
31400	1	UINT16	Sub 1: Message Type
31401	1	UINT16	Sub 1: Update Time
31402	1	UINT16	Sub 1: Local Hardware Port
31403	1	UINT16	Sub 1: Local DIT Start
31404	1	UINT16	Sub 1: Remote ID
31405	1	UINT16	Sub 1: Remote DIT Start
31406	1	UINT16	Sub 1: Range
31407	2	UINT16	Reserved
31409	7	UINT16	Reserved
31416	16		Subscription 2 – as per subscription 1
31432	16		Subscription 3 – as per subscription 1

31448	16		Subscription 4 – as per subscription 1
31464	16		Subscription 5 – as per subscription 1
31480	16		Subscription 6 – as per subscription 1
31496	16		Subscription 7 – as per subscription 1
31512	16		Subscription 8 – as per subscription 1
31528	16		Subscription 9 – as per subscription 1
31544	16		Subscription 10 – as per subscription 1
31560	16		Subscription 11 – as per subscription 1
31576	16		Subscription 12 – as per subscription 1
31592	16		Subscription 13 – as per subscription 1
31608	16		Subscription 14 – as per subscription 1
31624	16		Subscription 15 – as per subscription 1
31640	16		Subscription 16 – as per subscription 1

User Configuration Area			
34000	4000		Non-volatile registers available to the user

8. Maintenance

8.1 Battery Type

The Teleterm M2 is equipped with an internal clip-in battery for retaining the real time clock during power failures.

This battery is a type CR2032 Lithium Battery. This battery is commonly available from electronic stores or can be obtained from Omniflex by specifying Part Number 3.5701.001

It is recommended that the battery be replaced at least every three years, or when the battery low indicator in the Teleterm M2 shows LOW. (See the Real Time/Product Status Group in Omniset.

8.2 Battery Replacement Procedure

To replace the internal battery proceed as follows:

1. Remove the top cover of the Teleterm M2 by undoing the two hex cover screws on the top of the unit. The cover is connected to the unit by the internal antenna cable, so be careful not to place any strain on this cable while removing the cover or inserting the SIM card.
2. You will see the battery toward the left lower side of the unit.
3. Unclip the old battery and replace with a new battery
4. Replace the top cover.
5. Restore power to the Teleterm M2.
6. Using Omniset, check that the Battery Indicator is showing “Healthy”
7. Take care in disposing of the old Lithium battery to preserve the environment, and to prevent accidents.

9. Technical Support

Lifetime technical support for all Omniflex products is available by email on techsupport@omniflex.com.

Alternatively, you can check the knowledgebase on the Omniflex web site at www.omniflex.com.

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