Using Citect and Modbus Protocol with Relay Monitoring System's Digital Protection Relays

relay monitoring systems pty ltd

Advanced Protection Devices

1. Introduction

This document is intended as a guide for users of μMATRIX platform relays and programmers wishing to utilize the SCADA communications port available on these relays.

The Citect program has been used to demonstrate the Modbus functionality of the μMATRIX platform. Citect demonstration discs are readily available from the supplier and sample Citect screen templates (.ctz files) for μMATRIX relays from our web site.

2. Contents

3. Modbus register allocation tables

A separate file for each specific relay model is provided which lists the Modbus register allocation tables. A copy of these files in PDF format may be downloaded from:

http://www.rmspl.com.au/uMATRIX.htm

- 2V67   Modbus allocation table
- 2H34   Modbus allocation table
- 2V164 Modbus allocation table

4. Other Information

Additional documentation and programs may be downloaded from:

http://www.rmspl.com.au/uMATRIX.htm

- μMATRIXwin   Generic PC programming software
- μMATRIXinfo μMATRIX Users Guide
- .umx files μMATRIX firmware upgrades
- .ump files   Sample μMATRIX setting parameter files
- .ctz files   Sample Citect screen templates for μMATRIX relays

AS/NZS ISO9001-94
REGISTRATION
6869

QUALITY
MANAGEMENT
SYSTEM
ISO9001 NATA CERTIFIED

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DPR register mapping scheme

The DPR CDB register mapping scheme is very simple:

- Scalar CDB parameters must have 40000 added to the parameter number and be defined as UINT type (unsigned 16 bit quantity), and must be divided (scaled) by 100 to convert from Raw to Engineering units. Reading the Tag (using or displaying in a Citect page) will read from the CDB parameter and writing to the Tag (setting or modifying in a Citect page) will cause the CDB parameter to be updated in the DPR.

- Boolean CDB parameters must have 00000 added to the parameter number and be defined as DIGITAL type (1 bit quantity), and must be defined as 0 Raw to 0 Eng (False) and 1 Raw to 1 Eng (True). Reading the Tag (using or displaying in a Citect page) will read from the CDB parameter and writing to the Tag (setting or modifying in a Citect page) will cause the CDB parameter to be updated in the DPR.

- To define tags (variables) representing DPR CDB parameters, do the following:
- Run Citect
- Create a New Project Named "RMS DPR"
- Select 'My Projects | RMS DPR | Tags' from the Projects List.
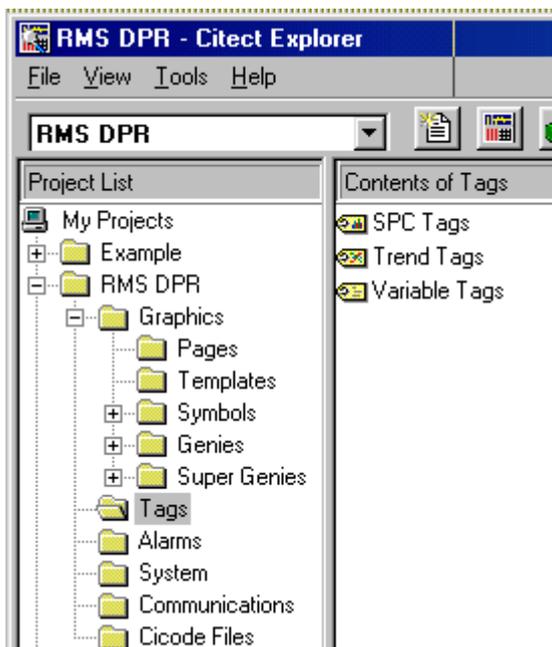
- Select 'Variable Tags' from the 'Contents of Tags'.
- Define Tags representing DPR scalar CDB parameters (registers) that will be used in Citect as UINT (unsigned 16 bit quantities), and add 40000 to the desired CDB register number. In the example below, CDB register 250 (Setpoint Voltage) is mapped in the ModBus RTU protocol to register 40250. This register can be read from and written to the DPR. Note the scaling factor of 100: All scalar CDB parameters are stored internally as integers; to obtain the floating point value for use in Citect, the CDB parameter must be divided by 100, for example, if the scalar CDB parameter 250 contained the number 12450, it is meant to be interpreted as 124.50 (Volts in this case).
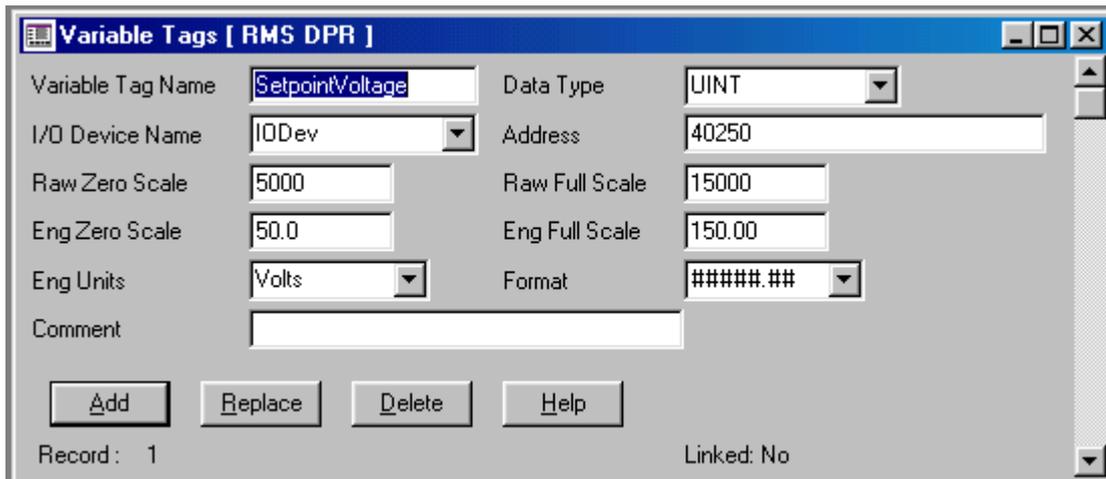
Variable Tags [RMS DPR]

Variable Tag Name	SetpointVoltage	Data Type	UINT
I/O Device Name	IODev	Address	40250
Raw Zero Scale	5000	Raw Full Scale	15000
Eng Zero Scale	50.0	Eng Full Scale	150.00
Eng Units	Volts	Format	#####.##
Comment			

Add   Replace   Delete   Help

Record : 1   Linked: No

- Define Tags representing DPR boolean CDB parameters (registers) that will be used in Citect as DIGITAL (1 bit quantities), and add 00000 to the desired CDB register number. In the example below, CDB register 936 (Save CDB To Flash) is mapped in the ModBus RTU protocol to register 00936. This register can be read from and written to the DPR. Scaling must be set to 0 for False and 1 for True.
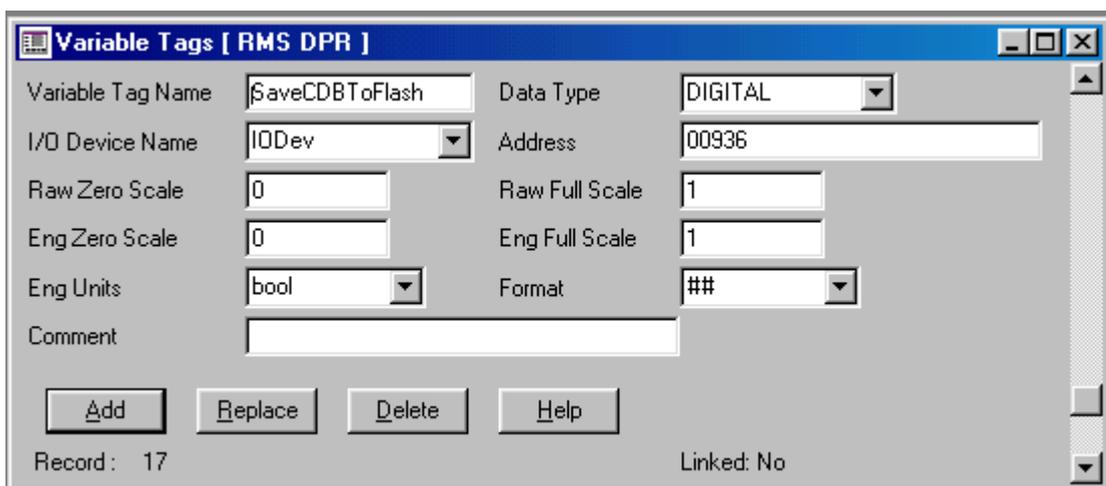
Variable Tags [RMS DPR]

Variable Tag Name	SaveCDBToFlash	Data Type	DIGITAL
I/O Device Name	IODev	Address	00936
Raw Zero Scale	0	Raw Full Scale	1
Eng Zero Scale	0	Eng Full Scale	1
Eng Units	bool	Format	##
Comment			

Add   Replace   Delete   Help

Record : 17   Linked: No

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6. Citect setup for RS485 connection to DPR

The example is based on Citect 5.30 communicating with a RMS DPR 2V164 with the following communications and ModBus RTU protocol settings:

- RS485 half duplex connection with RTS control of the RS232 port.
- 19200 bps
- 8 bits data size
- No parity
- Default Slave id = 96

An RS232/RS485 converter is connected to the COM2 port of the computer running Citect.

Proceed as follows:

- Run Citect
- Select the project named "RMS DPR"
- Set ModBus Protocol Parameters in Citect

- Select 'My Projects | RMS DPR | Communications' from the Projects List.
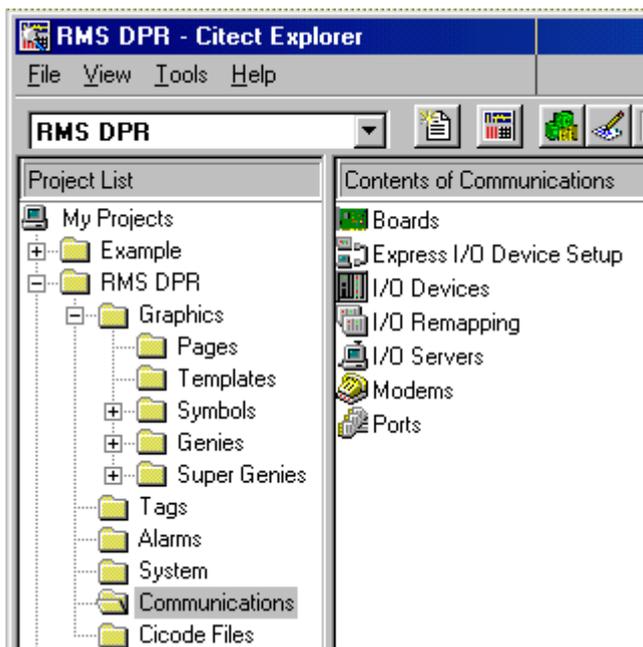
- Select 'Express I/O Device Setup' from 'Contents of Communications'

- Select 'Next >' to start creating the new I/O Server
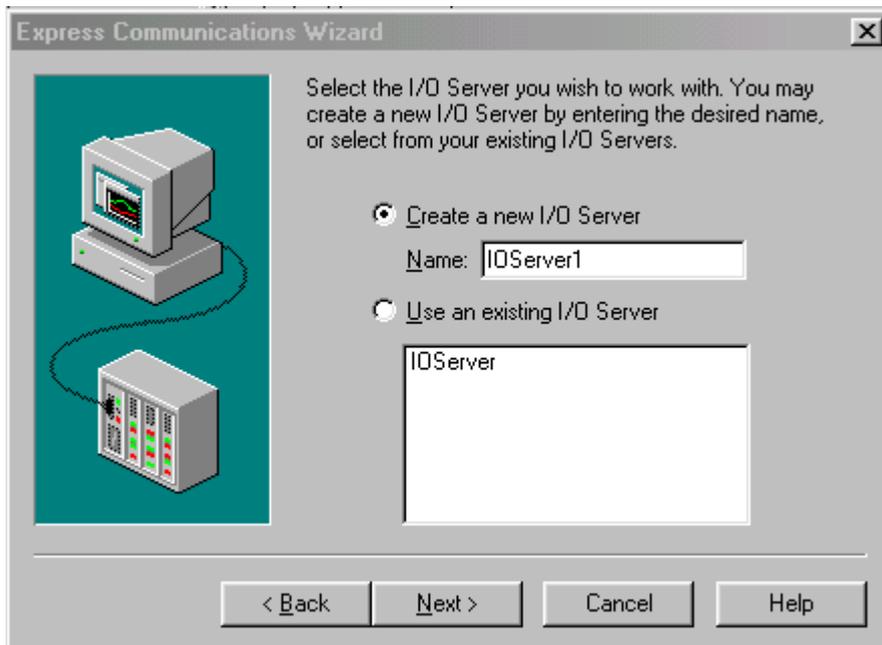
- Enter the server name and select 'Next >'
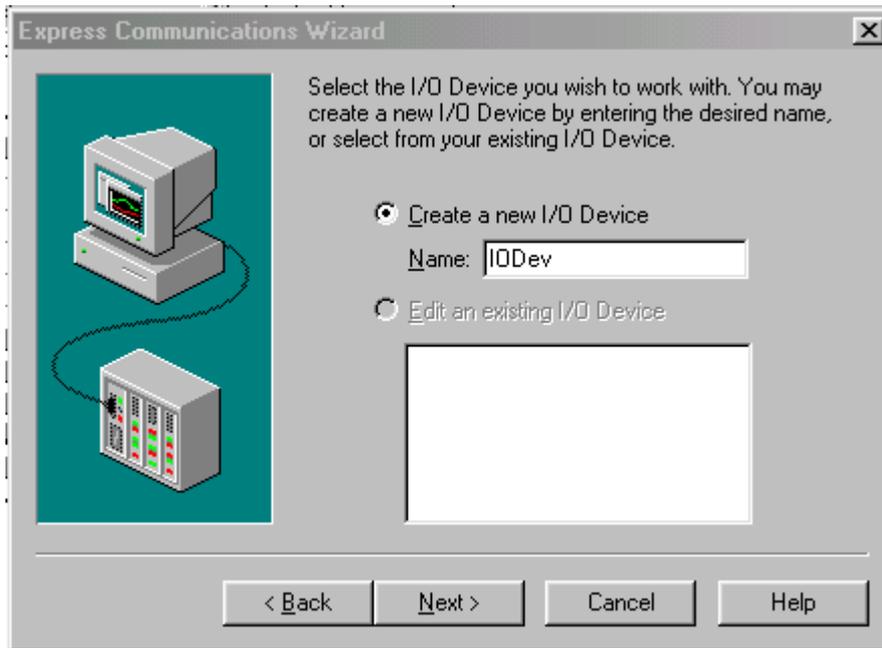
- Select External I/O Device
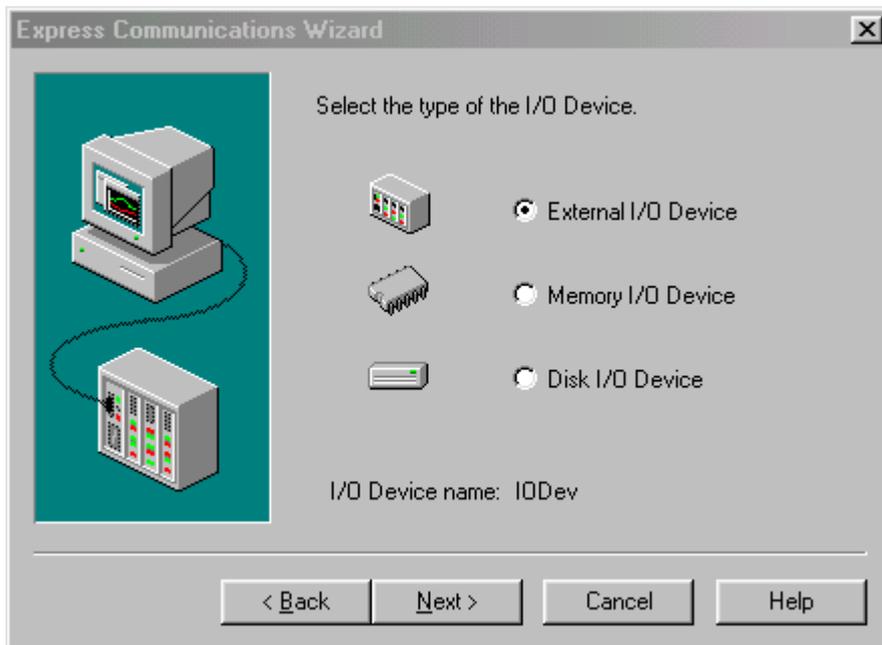
- Select device template as 'Modicon | 484 | Serial (Modbus Binary Protocol)
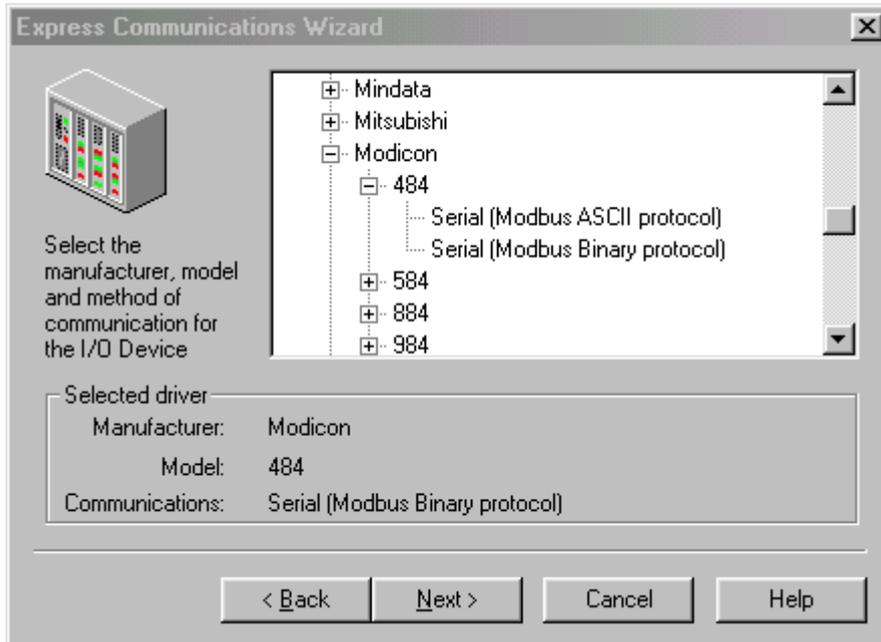
- Select driver address (96 is the factory default)

- Don't connect to PSTN, select 'Next >'
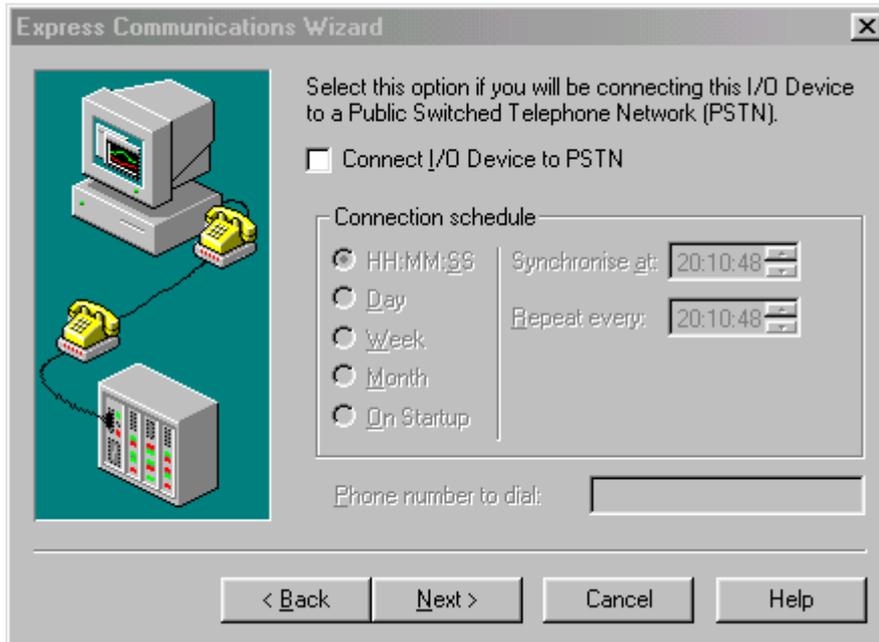
- Select the comms port
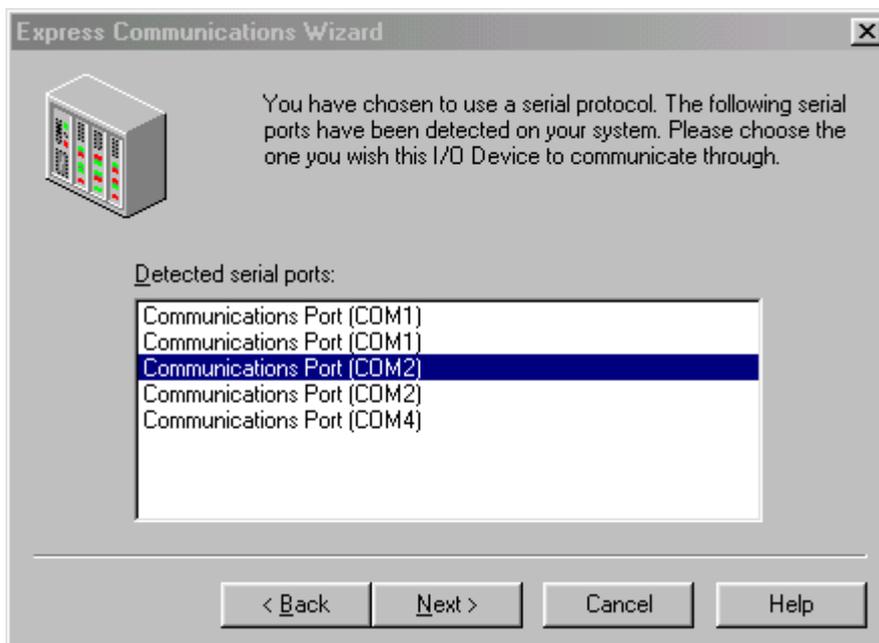
- Don't link to external tag database, select 'Next >'
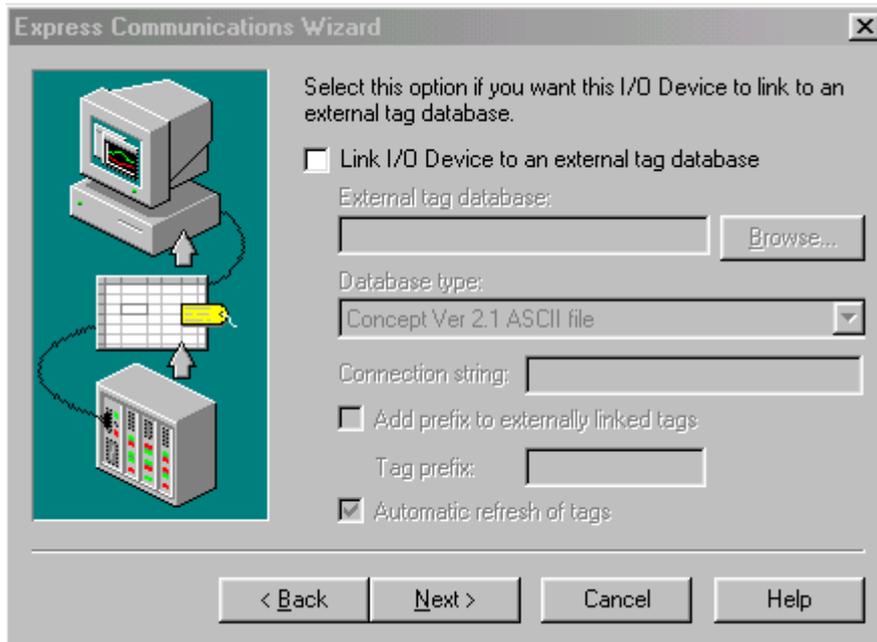
- Finished.
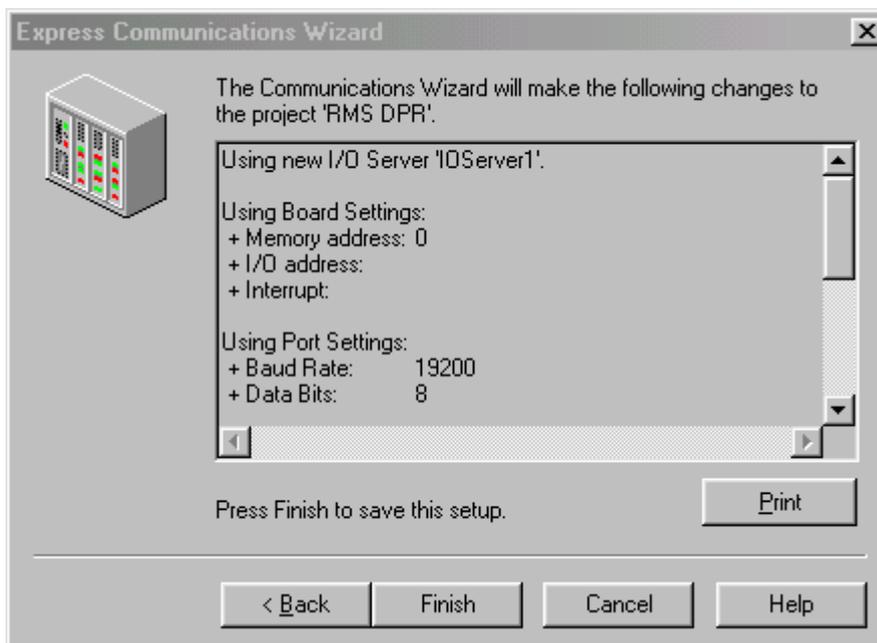
7. Modifying and editing the Modbus protocol settings for RS485

- The I/O Server - needs no change
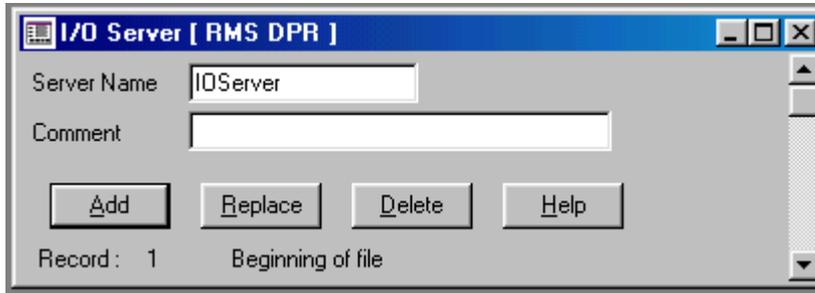
- The I/O device - ensure MODBUS and address are set
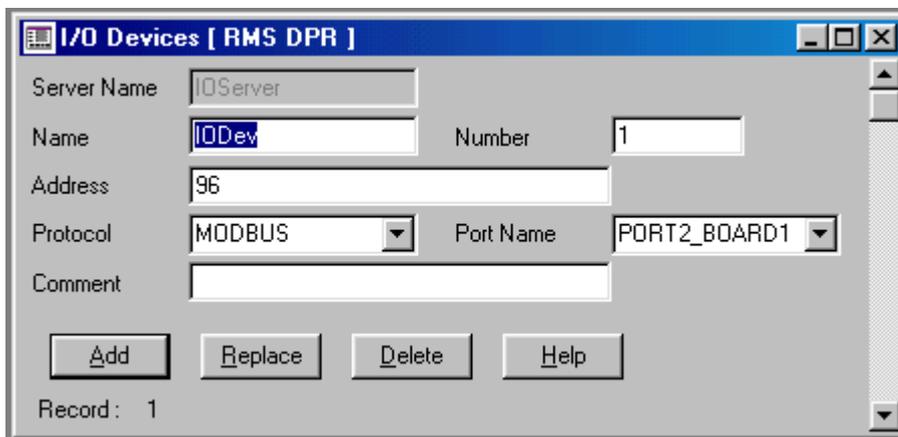
- Ports - need to add -t1,6 to control RTS timing for RS485 half duplex operation -t (RTS signal control enabled), 1 (raise RTS for 1 millisecond before transmitting to DPR), 6 leave RTS high for 6 milliseconds while transmitting to DPR)
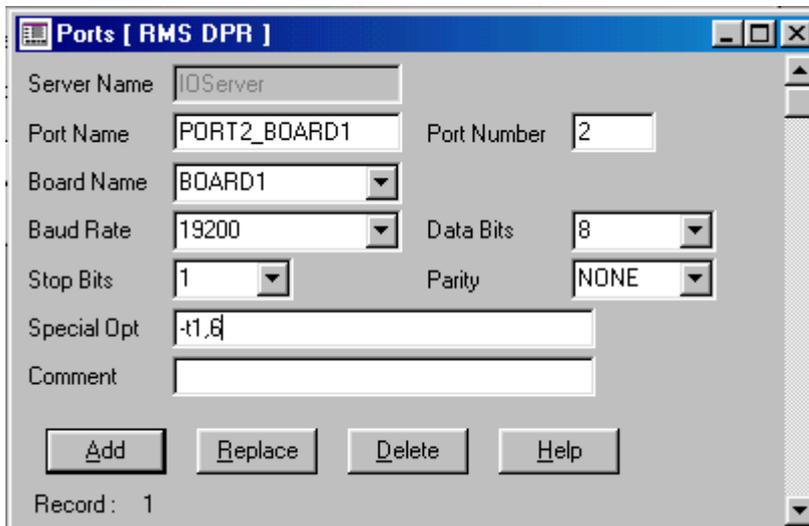
Ports [RMS DPR]

Server Name	IOServer		
Port Name	PORT2_BOARD1	Port Number	2
Board Name	BOARD1		
Baud Rate	19200	Data Bits	8
Stop Bits	1	Parity	NONE
Special Opt	-t1,6		
Comment			

Add   Replace   Delete   Help

Record : 1

- Board - needs no change
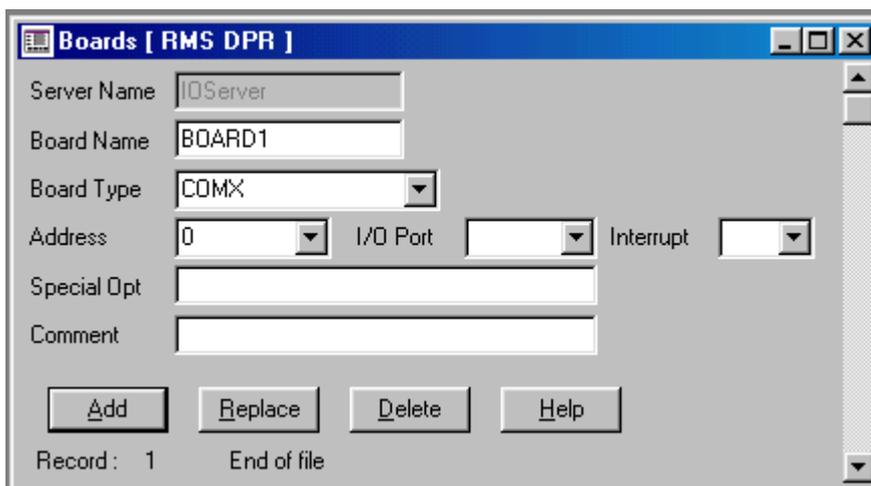
Boards [RMS DPR]

Server Name	IOServer				
Board Name	BOARD1				
Board Type	COMX				
Address	0	I/O Port		Interrupt	
Special Opt					
Comment					

Add   Replace   Delete   Help

Record : 1   End of file

Australian Content

Unless otherwise stated the product(s) quoted are manufactured by RMS at our production facility in Melbourne Australia. Approximately 90% of our sales volume is derived from equipment manufactured in house with a local content close to 90%. Imported components such as semi-conductors are sourced from local suppliers & preference is given for reasonable stock holding to support our build requirements.

Quality Assurance

RMS holds NCSI (NATA Certification Services International), registration number 6869 for the certification of a quality assurance system to AS/NZS ISO9001-1994. Quality plans for all products involve 100% inspection and testing carried out before despatch. Further details on specific test plans, quality policy & procedures may be found in section A4 of the RMS product catalogue.

Product Packaging

Protection relays are supplied in secure individual packing cardboard boxes with moulded styrene inserts suitable for recycling. Each product & packing box is labeled with the product part number, customer name & order details.

Design References

The products & components produced by RMS are based on many years of field experience since Relays Pty Ltd was formed in 1955. A large population of equipment is in service throughout Australia, New Zealand, South Africa & South East Asia attesting to this fact. Specific product & customer reference sites may be provided on application.

Product Warranty

All utility grade protection & auxiliary relay products, unless otherwise stated, are warranted for a period of 24 months from shipment for materials & labour on a return to factory basis. Repair of products damaged through poor application or circumstances outside the product ratings will be carried out at the customers expense.

Standard Conditions of Sale

Unless otherwise agreed RMS Standard Terms & Conditions (QF 907) shall apply to all sales. These are available on request or from our web site.

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