

VxI Power Ltd.

IPM-01 / IPM-01H MODBUS TCP/RTU Bridge User Guide



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1.0 Device Overview

The IPM-01 can give any VxI MODBUS RTU compatible device network visibility, allowing a serially connected device to be controlled or monitored over the internet^{*}. The IPM-01 creates a communication bridge between MODBUS TCP and Modbus RTU devices, appearing transparent to both master and slave devices. The device is configurable via its embedded HTTP web server.



Figure 1

* The module will be visible to the Local Area Network. Your network administrator will need to configure the gateway beyond the local area network (using i.e. Dynamic DNS, Port Forwarding etc.) in order to give the device external visibility.



2.0 Getting Started



Figure 2A

Figure 2B

2.1 Connecting the Device

Figure 2A shows a IPM-01 device. The most common arrangement for the IPM-01 is for a MODBUS master to be connected to the IPM-01 via Ethernet and the slave device via serial (Default settings); see section 8.0 (Appendix I) for connection examples.

Figure 2B shows a IPm-01H device.

2.2 Finding the device

There are 2 options for initially connecting to the device, choice will be dependent upon whether you have access to a local area network and DHCP server, or if you want to connect directly to the IPM01 independent of or in the absence of any LAN.



2.2.1 Option1 connecting via your local network using DHCP

Connect both your computer and the IPM01 network connections to your local network.

DHCP is enabled on the device by default. This means that the IPM-01 will request an IP address from a DHCP server when connected to a network. Your DHCP server will supply an IP address to the IPM01. In order to find your devices IP address you will need to use the VxI Power TCP/IP discovery tool.

VxI Power TCP/IP Discovery tool: The VxI power TCP/IP Discovery tool is a desktop program and is available for download at <u>www.vxipower.com/ipm01/downloads/</u>.

Download and unzip to a location of your choice.

It is a Java based program (a single file ending .jar) meaning that Java must be installed on the machine for the program to run. If the file does not run the application (shown in Figure 3), then please ensure that the Java Runtime Environment has been installed on your machine.

Note: When running for the first time, Windows may show that the firewall has blocked the program's execution. A dialog may be shown asking the user if windows firewall should block/unblock the program. If this dialog is shown, the 'unblock' option must be selected for the program to run correctly.

VxI Power TCPIP	Discovery Tool			
Help				
Discover	Devices			Exit
IP Address	Host Name	MAC Address	Other Info	

The program's interface is shown in figure 3:

Figure 3

In order to find the IP address of a connected IPM-01 device, the user should click on the 'Discover Devices' button. If the program is able to find a device on the network, its details should populate the table below as is shown in **Figure 4**.



VxI Power TCP	IP Discovery Tool				- D X
elp					
Discove	r Devices			Exit	
IP Address	Host Name	MAC Address	Other Info		
10.0.0.55	IPM01	00-04-A3-67-E6-0C			

Figure 4

If the TCP Discovery tool is not showing your device, then please see the Troubleshooting procedure (Section 4.0).

The IP Address will be required for a Master device to connect to the IPM-01. The IP Address is also used to access the Device's built-in client and configuration menu.

The IPM-01 can also be found via its NetBIOS Hostname. If the device has been plugged into a network or a Host that supports NetBIOS, then its configuration page can be accessed via the address 'http://IPM01/' in the browsers address bar.

If your network will not allow a DHCP enabled device to acquire an IP address, connect to the device using the crossover cable supplied as shown in option2.



2.2.2 Option2 Using a Crossover cable (direct connection)

By default the IPM-01's DHCP client is enabled. This means that it will request an IP address from a DHCP server when connected to a device or network. When connected directly to a PC, unless the PC has a DHCP server installed (no DHCP server in Windows by default), the IPM-01 receives no response, it uses its default Static IP address instead.

169.254.1.2

When connected to the IPM-01, the PC is in a similar state. It also attempts to request an IP address from a DHCP server. The request fails and the PC assigns itself an IP address on the 169.254.X.X subnet (more details in Appendix III), as it is also unable to acquire an IP address from a DHCP server.

NOTE: It may take a few seconds before Windows assigns itself a 169.254.X.X (APIPA) address.

Once you are connected to your device you can then configure the device, disable DHCP and select an appropriate IP address for network compatibility if required.



3.0 Web Browser Client/ Configuration

The IPM-01's configuration and Modbus Client are presented to the user in the form of a website, accessible via a browser.

3.1 User Authentication

The user is prompted to enter a username and password to gain access to any section of the website that allows changes to the device's configuration to be made: SERIAL CONFIG, TCP CONFIG, FIRMWARE UPGRADE and USER. The default Username and Password for the IPM-01 is:

Username: admin

Password: password

If the assigned Username and Password has been forgotten, the device must be reset to its factory default values.

3.2 Modbus Client

The in browser MODBUS client makes extensive use of JavaScript and some native browser JavaScript functions. It is for this reason that the MODBUS client is only supported by the following Browsers:

Internet Explorer 9 and above

Google Chrome (All Versions) - Recommended

Mozilla Firefox 5 and above

Safari (All Versions)



The IPM-01 features an in browser MODBUS Master and client. The MODBUS CLIENT page gives a live display of the slave device's Modbus data. The client also allows a user to perform standard MODBUS write operations.

Depending upon your devices factory configuration you may have a single MODBUS client option or dual, single client configuration is shown for simplicity.

			M	DDBUS Client Status		Buttons		
		Status		Description		Master Dell		
Pollin	g IPM01	GOOD	The	IPM01 is responding to the browse	er.	On Off		
IPM01 Pollin	l (Master) g Slave	IDLE	The Ena	IPM01 is not Polling the slave devi able Master Polling to get a respons	ce. You must e.	Reset Alarms		
Slave	onse	IDLE	No	Response expected when IPM01 is	not Polling.			
				_	_			
Dig	gitals			Analogues		Holdings		
Parame	ter	Sta	te	Parameter	State	Parameter	State	
СОК				Maia Outrut Vallana		Battery Low limit		change
ombined Battery F	ault			main Output voltage		Delayed Battery		change
ombined PSU Faul	t			Main Output Current		Undervoltage Limit		unange
ombined Thermal I	Fault			Internal Rail Voltage		Undervoltage Delay		change
lain O/P Overcurre lattery Present	nt Trip	1		Aux1 Voltage		Fast Battery Undervoltage Limit		change
Battery Low				Aux2 Voltage		Battery Charge Current		change
lattery Connected				Internal Ambient Temp		Battery Manual set Charge		change
lattery Charge Enal	bled	- 22		Hsk Temp				
attery Charging				Battery Voltage		Main O/P voitage Limit Set		change
harger Internal Lin	nit	- 22				Main Current Trip Delay		change
attery UVLO		- 22		Battery Charge Current		Battery Capacity		change
lattery OVP fault	h C#	- 22		Battery Temperature		Potters test Bulas test		
verremperature C	narge Cu	- 22		Battery Charger Voltage Limit		interval		change
verTemperature S	hutdown Dol	av.		Battery Charger Current Limit		Battery test - Capacity test		change
verTemperature S	hutdown	ay				Rotton: Rules test deviation		
Rattery Thermistor	Short	- 22		Battery OC Terminal Voltage		limit		change
attery Thermistor	Open			Time since last PBT - H:M:S		Battery Capacity test deviation limit		change
Ambient Temperatu	re Fault			Time since last PBT - Days				
leatsink Thermisto	r Fault			Test Result		Coils		
ixed O/P 30V				Test Limit		Parameter	State	
ixed O/P 24V				Tomporatura		Main O/P Enable Request		toggle
ixed O/P 22V				remperature				
ixed O/P 18V				Final Voltage		Batt Connect Enable Request		toggle
ntrail V regulation				Time since last CBT - H:M:S		Battery Charger Enable Request		toggle
Battery V regulation				Time since last CBT - Days				
Static				Jujo		Aux 1 Output Enable Request		toggle
Battery Test Inprogr	ess			lest Result		Manual Charge Voltage select		toggle
T Pulse Inprog				Test Limit				
T Cap Inprog				Temperature		Hsk Thermistor Fitted		toggle
Stage1				Initial Voltage		Battery Test - Enable Testing		toggle
Stage2				midal voltage		Battery Test - Enable Pulse		
Stage3				Final Voltage		Testing		toggle
3T Pulse Pass				Initial Current		Battery Test - Enable Capacity		toggle
BT Cap Pass				Software Version		resung		
ulse Test Waiting						Battery Test - Pulse test Request		toggle
anacity Test Waitin	ng			Serial 1				

Figure 5 shows the Modbus client start up screen (***the figure shows the client for the 14653 PSU**). Most of the boxes appear grey, with only the ON/OFF button and Polling IPM-01 section of the MODBUS Client Status table, showing in colour. To activate the IPM-01 Master Polling, the user should click the ON/OFF button. Figure 6 shows the client when the MODBUS master has been switched on.

Figure 5



L					DE LIDCO	
		MODBUS CEIENT	RAL CONF		RE UPGR	ADE USER
					_	
	мо	DBUS Client Status		Buttons		
Stat	tus	Description		Master Po	a 📕	
Polling IPM01 GO	OD The	IPM01 is responding to the browse	r.	On		
IPM01 (Master) Polling Slave	OD The	IPM01 is Polling the slave device		Reset Alarms		
Slave	DD The	slave device is Responding to the	IPM01			
Response						
	_		_			
Digitals		Analogues		Holding	15	
Parameter	State	Parameter	State	Parameter	State	
COK	1	Main Output Voltage	0.0 V	Battery Low limit	24.0 V	change
ombined Battery Fault	0	Main Output Current	0.0 4	Delayed Battery Undervoltage Limit	24.0 V	change
ombined Thermal Fault	0	main Output Current	0.0 A	Undervoltage Delay	25.5.5-	-
lain O/P Overcurrent Trip	0	Internal Rail Voltage	27.7 V	Undervoltage Delay	20.0 Sec	change
attery Present	4	Aux1 Voltage	0.0 V	Fast Battery Undervoltage Limit	12.1 V	change
attery Low	0	Aux2 Voltage	0.0 V	Battery Charge Current	0.16 A	change
attery Connected	4	Internal Ambient Temp	24 °C	Battery Manual set		
attery Charge Enabled	1	Hsk Temp	0.50	Charge Voltage	27.2 V	change
attery Charging	0		0.0	Main O/P Voltage Limit Set	27.0 V	change
harger Internal Limit	0	Battery Voltage	27.2 V	Main Current Tris Dala	10.000	charges
attery UVLO	0	Battery Charge Current	0.0 A	Main Current Trip Delay	1.0 Sec	change
attery OVP fault	0	Battery Temperature	25 °C	Battery Capacity	7.0 AH	change
verremperature Charge Ctl	0	Battery Charger Voltage Limit	27.1 V	Battery test - Pulse test	7 Days	change
venemperature warning	0	Rattery Charges Current Limit	0.0.0	Battery test - Canacity test	32.6	
verTemperature Shutdown	0	cattery onarger current climit	0.0 A	interval	Days	change
attery Thermistor Short	0	Battery OC Terminal Voltage	27.1 V	Battery Pulse test deviation limit	8.3 V	change
attery Thermistor Open	1	Time since last PBT - H:M:S	0:1:46	Battery Canacity test		
mbient Temperature Fault	0	Time since last PBT - Days	0 Days	deviation limit	8.3 V	change
eatsink Thermistor Fault	0	Test Result	0.0 V			
xed O/P 30V	0			Coils		
ixed O/P 24V	0	lest Limit	0.0 V	Parameter	State	
ixed O/P 22V	0	Temperature	0 °C	Main O/P Enable Request	0	toggle
ixed O/P 18V	0	Final Voltage	0.0 V	Batt Connect Enable Reques	at O	toggle
trail V regulation	0	Time since last CBT - H:M:S	0:1:46	Battan Charter Fredda		
attery V regulation	1			Request	1	toggle
tatic	0	Time since last CBT - Days	0 Days	Aux 1 Output Enable Reque	st 0	toggle
ittery Test Inprogress	0	Test Result	0.0 V	11-10-20		
Pulse Inprog	0	Test Limit	0.0 V	select	0	toggle
Cap Inprog	0	Temperature	0.00	Hsk Thermistor Fitted	0	toggle
age1	0	remperature				
ayez	0	Initial Voltage	0.0 V	Battery Test - Enable Testing	3 1	toggle
ayes Pulso Pass	0	Final Voltage	0.0 V	Battery Test - Enable Pulse	0	toggle
T Cao Pass		Initial Current	0.0 A	resting		
ulse Test Waiting	0			Battery Test - Enable Capacity Testing	0	toggle
apacity Test Waiting	0	Software Version	219	Battery Test - Pulse test		togale
AX I 1 FLG	0	Serial 1	139	Request	0	toggle
AX I 2 FLG	0	Serial 2	0	Battery Test - Capacity test Request	0	toggle
AX I 3 FLG	0			Areques.		
		Unit voltage	0 V	Battery Test - Clear test fail	6	toggle

The Master Poll switch is used to stop/start the IPM-01 Modbus Master polling the PSU.

The 'Reset Alarms' Button can be used to reset the PSU Modbus to its default settings.

> The 'change' buttons can be used to change values in the Holding Register (*see note). The Toggle buttons can be used to change Coil values.

Figure 6



*Attempting to change a value in a Holding register presents the user with a dialog box. The box outlines the accepted value range for the selected Holding register. These values change depending on selected register, as does the resolution of these values. The value entered by the user will be scaled to the closest value possible within the limits of the number of bits assigned to storing that particular value (the size of the register e.g. 8-bits). The actual value may be slightly different to the one entered, but will be as close to the entered value as is possible.

1					
1	Th	e page at 10.0.0.8	30 says:		×
le	ple	ease enter a Integer v	alue betw	een 0 and 24	
١.	20)			
ate			ОК	Cancel	
0 V 8 V		Number of automatic test per year	12	Change	
v		Interval after battery test/mains failure	3 Days	Change	
3 V		Battery test duration	25 Mins	Change	



3.3 Configuration

Once the address of the device has been resolved, the user is then able to change its configuration settings. This section shows the available configuration settings for the device.

3.3.1 Serial Configuration

The serial configuration page (Figure 8) allows the user to change the following Serial Port settings:

- Parity enabled checkbox.
- Parity odd or even. Radio buttons disabled when 'parity enabled' is unchecked.
- Baud Rate dropdown menu with the following options: 9600, 19200, 38400, 57600.



VxI	-			IPM-0	1 MODBUS RTU/	TCP Br	ridge
	MOL	DBUS CLIENT	SERIAL CONFIG	TCP CONFIG	FIRMWARE UPGRADE	USER	HELP
This page	Serial C	Configu	ration	ngs.			
Parity Ena	able:						
Parity:		Odd O Eve	en				
Force Sla	ave Address:		_				
Slave Add	aress:	0x09 (HEX valu	ie Required)				
Baud Rate	le:	9600 V Save Config					
·	Copyrigh	ht © 2014 VxI Powe	er Ltd.				

Figure 8

3.3.1.1 Slave Address

The Slave address for the Modbus RTU client is specified by the TCP master device.

The slave address for the Modbus RTU client is automatically extracted from the message header sent from the Modbus TCP master. MODBUS TCP supports the use of a slave address to allow communication with RTU devices and includes the field as a part of its message header. For a MODBUS TCP master to talk to a MODBUS RTU device using the IPM-01, the slave address must be configured at the TCP master device.

When using an IPM-01 RS485 version, it is possible to communicate with multiple RS485 clients (configured with individual slave addresses) if the master TCP device is able to request data from different RTU slave addresses whilst using the same IP address.

The MODBUS TCP master device must also be able to do this sequentially as multiple message handling is not supported.

See Section 9.1 Appendix I: Connection Examples

3.3.2 TCP Configuration

The TCP configuration page (Figure 9) allows the user to change the following values:

- MAC Address A unique number assigned to IP based electronic devices. This value is Read only.
- NetBIOS Host Name Netbios name, 1-16 alphanumeric characters. (Default is 'IPM01')
- DHCP enable Checkbox.



- If checked, the device will request the assignment of an IP address from the local server. We recommed the use of a static IP address or statically allocating an ip address in the servers DHCP table. Please contact your network administrator for more information regarding DHCP.
- IPM-01 IP Address IP Address Format (e.g. 169.254.1.1).
- Gateway IP Address Format.
- Subnet Mask IP Address Format.
- TCP Port decimal value between 0-65535.

V×T				IPM-0	1 MODBUS RTU/	TCP Bi	ridge
	м	DOBUS CLIENT	SERIAL CONFIG	TCP CONFIG	FIRMWARE UPGRADE	USER	HELP
	TCP (Configur	ation				
This page	e allows the cont	figuration of the IF	M-01's network set	tings.			
CAUTION: Incorrect settings may cause the IPM-01	to lose network	connectivity Rec	overy options will b	e provided on the	next page		
	Estastina asu			e provided on are	nox page.		
1	Enter the new	settings for the in	M-01 below.	1			
MAC Ac	ddress:	00:04:A3:67:E5	6C				
NetBIO	S Host Name:	IPM01					
		Enable DHC	P				
IPM-01	IP Address:	10.0.0.77					
Gatewa	ay:	10.0.0.1					
Subnet	t Mask:	255.255.255.0					
TCP Po	ort:	502					
		Save Config					
kananananan							
	Convri	abt © 2014 Vyl Pow	er I tel				
	oopyn	an e zer t txi i un					

Figure 9

3.3.3 Firmware Upgrade

If there are Firmware updates for this product they will be available for download at <u>www.vxipower.com</u>. The Firmware Upgrade page allows the upload of a file from a local directory. **Figure 10** shows the Firmware Upgrade page. The can upload a file to the device by clicking the 'choose file' button, navigationg to the file and then clicking on the 'Upload and Flash' button.

If the IPM-01 accepts the uploaded file, it will then reboot and reflash its firmware to the new version. When the new firmware has been applied, it will display a newer firmware version number on the configuration startup page and display "Firmware Update Success". If the update was unsuccessful, or the IPM-01 continues to have problems, then the device can also be rolled back to its factory default settings. When a rollback is selected a dialog box appears asking for confirmation before performing the action. If selected, a rollback will be perfomed and a "Firmware Rollback Success" message shown on the configuration startup screen (**Figure 11**).



A rollback to factory defaults can also be executed by holding down the Reset button (see Section 7.0) for 4 seconds.

3.3.4 Webpage Update Procedure

Though the Firmware update also includes a webpage update, it may be that only the webpage has changed. In this case, a new webpage can be uploaded using the device address appended with /mpfsupload (e.g. <u>http://169.254.1.2/mpfsupload</u>). The user can then select the downloaded webpage 'Image' file to perform this task.

VxT				IPM-0	1 MODBUS RTU	TCP B	ridge
		MODBUS CLIENT	SERIAL CONFIG	TCP CONFIG	FIRMWARE UPGRADE	USER	HELP
	Fir	mware Up	grade				
	File: Choose File N	Upload a File Io file chosen	Upload and	Flash			
	If you have experienced problems when a rollback can also be per	Rollback Firmwar upgrading the firmware Firmware version. formed by holding down Rollback	e on this device, it can b the reset button for 5 t	e rolled back to its : seconds.	stock		
		Copyright @ 2014 VxI Pow	ver Ltd.				

Figure 10

VyT			IPM-0	1 MODBUS RTU/	тср в	ridge
	MODBUS CLIENT	SERIAL CONFIG	TCP CONFIG	FIRMWARE UPGRADE	USER	HELP
ROLLBACK SUCCESS						
Current Fi	rmware Version:	2.1				
Rollback	Firmware Version:	2.1				
Webpage	Version:	1.5 - 14961-V186				
Bootloade	er Firmware Version:	1.1				
	Copyright © 2014 VxI Po	ower Ltd.				

Figure 11

3.3.5 User Configuration

Figure 12 shows the User Page. The User page allows the user to change the current Username and Password. To do so it requires:



- Current Username
- Current Password
- New Username
- Confirm New Username
- New Password
- Confirm New Password

Only when this data is submitted correctly will it be saved and the board reset. The new settings are loaded on reboot.

V×T				IPM-0	1 MODBUS RTU/	TCP Bri	idge
		MODBUS CLIENT	SERIAL CONFIG	TCP CONFIG	FIRMWARE UPGRADE	USER	HELP
	Cha	an <mark>ge Us</mark> er	Data				
	Current Username Current Password New Username: Confirm New Username: New Password: Confirm New Password:	:					
	C	opyright © 2014 VxI Pov	ver Ltd.				

Figure 12





4.0 Troubleshooting

Before executing any of the following, please ensure that:

- ✓ The Device is powered via an appropriate input source (See Input Power in Specification).
- ✓ The network cable is securely plugged in to the Ethernet Port.
- ✓ A device is securely attached to the Serial Port (Not required for configuration or device discovery).

4.1.1 The TCP Discovery Tool is unable to find my device?

a. Check that the Program is not being blocked by a firewall. Did you see a dialog box from a firewall program asking you if the program was safe?

(The windows firewall may ask to 'Block' or 'Unblock' the program)

Please make sure that the VxI Power TCP/IP Discovery tool is not being blocked by a firewall program. If you are being presented with a dialog box from windows firewall, make sure that you select 'Unblock'. It may also be possible that your firewall is set to automatically block suspicious programs, so always make sure that the Discovery Tool is 'Allowed' on the local network.

If after verifying that your firewall is not preventing the execution of the program, you are still having problems, continue to **b**.

b. The network to which you have attached the device may have rejected your device's request for an IP Address. The device therefore needs to be given an IP Address that the Network will allow.

In its default configuration, the IPM-01 asks for an IP Address using DHCP and then Defaults to '169.254.1.2' if DHCP is not enabled on the network. Talk to your network administrator about what an appropriate setup for the IPM-01 would be.

The following procedure describes how to change the device's IP Address:

- a) Connect the device directly to a computer, via a CAT5 crossover cable.
- b) Type '169.254.1.2' (device default IP address) into the address bar of your browser.



c) The Device configuration menu should now be displayed. Click on the 'TCP CONFIG' tab and configure your device to work with your network.

5.2 Master TCP

4.2.1 My MODBUS TCP master is unable to establish a TCP connection with the IPM-01?

The IPM-01 implements a TCP server, allowing a MODBUS TCP Master Client to open a connection to the device. The information the client needs to make a connection is the IP Address of the IPM-01 device (or sub network that it is attached to), and the Port on which the device resides. By default the IPM-01's Port number is **502**. Its IP Address can be found using the TCP discovery tool. These values can be changed in the IPM-01's configuration menu.

4.2.2 The IPM-01's configuration menu is accessible, and a TCP connection has been established but the device isn't sending data to my Serially Attached device?

a. Is the Green (Serial Transmission) LED blinking when the device is sent a request by the master?

No – If the LED does not blink, then there may be a problem with the data being sent from the master on the TCP port. The IPM-01 will ignore any MODBUS TCP request that:

- Is larger than 150 bytes.
- Is smaller than 5 bytes.
- Has incorrect MODBUS TCP header information.

For more information on the structure of a MODBUS TCP request message visit www.modbus.org.

Yes - See answer to question 3.

4.2.3 The IPM-01 Sends data on its serial port, but receives no response?

If the IPM-01 is sending data to a Slave device and the Slave receives no or bad data, then there is likely an issue with the Serial configuration on the IPM-01. **The IPM-01's Serial configuration (Baud rate, Parity and Slave ID) must match that of the slave device**. If the configurations do not match, then the slave device could receive bad data and respond with an error message, which will in turn be received as bad data by the IPM-01 and ignored.



4.2.4 The IPM-01 Works fine with a direct Ethernet connection, but not when used on the network?

This problem may occur as the result of the device's response to the master not being fast enough. High network traffic or general lack of band-width may cause performance issues. If this happens the master program may time-out before receiving a response. Please see section **8.0 IPM-01 Performance Considerations**.

If you are still experiencing problems with your IPM-01 then contact VxI Power Technical Support

Phone: +44 (0)1522 500511

Email: support@vxipower.com

4.4 Error Codes

Error codes are returned when incorrect data is submitted to the device, via its web interface. The error codes are shown and described below:

Error	Cause	Solution
101	If you have received this error it is because the browser is submitting bad data to the IPM-01.	Ensure that you have JavaScript enabled in your browser
302	This error occurs if the uploaded file fails its validity check	Ensure correct file is being uploaded.

4.5 Reset procedure

The device has a reset button accessible through a pin-hole in the casing. The functionality of this button is as follows:

- If pressed when board is running, the board will reboot and load default settings.
- If the button is pressed and held down for longer than **4 seconds**, the device will roll back to its factory settings and firmware.





5.0 Specification

Table 1

	IPM-01 (Din-Rail)	IPM-01H (Hand Held)	
Input Voltage Range:	9-32V DC 5V (USB) or		
		9-32V DC	
Connections	Power – 2x Screw Terminal (Max Power – Micro USB or 2way Micro-		
	Conductor Size 4mm ²)	Fit.	
	Serial – 3x Screw Terminal (Max	Serial – RJ45 / DE-9 Cable	
	Conductor Size - 4mm ²)	Ethernet RJ45 socket	
	Ethernet RJ45 socket		
	See Section 6.0 for connection details	See Section 6.0 for connection details	
User Indicators	1x Serial Transmit indicator LED –	1x Reset/Restore Button	
	Green		
	1x Serial Receive indicator LED – Red		
	1x Reset/Restore Button		
Operating Temperature:	-20°C - +50°C *		
Storage Temperature:	-20°C - +85°C		
Storage Humidity:	5% - 95%, non-condensing		
	* -40oC version available on request		
Storage Humidity:	5% - 95%, non-condensing		
Dimensions:	20mm DIN-rail mountable case	Hand Held moulded case	
Power Requirement	720mW (See Power Consumption information - table 2)		
(typical Active):			
Protocol:	MODBUS TCP		
	MODBUS RTU		
Serial Port Details:	Parity: 80-1, 8E-1, 8N-2		
	Supported Baud Rates: 9600, 19200, 38400, 57600		
Ethornot Dotails	PLAE 10Paco T 802.2 compliant		
Ethernet Details	KJ45, LUBase-1, 802.3 compliant		
Maximum Read/write	Supports Reads/Writes of up to 150 registers		
request size:			
Other Features:	DHCP (Client only) – Enabled by default		
	NetBIOS Device name resolution		
	HTTP Server with Configuration Interface		
EMC	Low voltage directive 2006/95/FC		
-	EN60950-1:2006 + A12:2011 EMC directive 2004/108/FC:		
	EN 61000-6-1:2007 FN	N 61000-6-2: 2005	
	EN61000-6-3:2007 + A1:2011	N 61000-6-4: 2007 + A1:2011	
	RoHS directive 2002/95/EC		



Power Consumption information

Table 2

Input Voltage	Current	Power
(V)	(mA)	(mW)
8	90	720
12	60	720
24	30	720
32	22	704



6.0 Basic Hardware Information



Figure 13 – Front View



Figure 14 – Top view



Figure 15 – Bottom view

- 1. RJ45 Socket (Ethernet)
- 2. Ethernet LEDs Please See Table1 in sub-section **2.1** (Ethernet LED behaviour) for more information.
- 3. Serial Port Pins (Screw Terminal x3:

RS232 - TX, RX, OV

- RS485 A(+), B(-), OV)
- Input Power Pins (Screw Terminal x2: +VIN, 0V)
 Serial Receive (Red) indication LED
- 6. Serial Transmit (Green) indication LED
- 7. Reset Button



IPM-01H



- 1. RJ45 Socket (Ethernet)
- Ethernet LEDs Please See Table1 in sub-section 2.1 (Ethernet LED behaviour) for more information.

Top View

- 3. RJ45 Socket (Serial RS232)
- 4. Input Power (Micro-Fit: +VIN, 0V)
- 5. Input Power (USB)
- 6. Reset Button

6.1 RJ45 Socket LED Behaviour

The RJ45 socket features two LEDs, primarily used for Ethernet activity indication. The LEDs can emit both **Orange** and **Green** light. Green is used to indicate Ethernet activity and orange is used for Firmware update and rollback operations.

Table 3

	Orange		Green	
	LEDA	LEDB	LEDA	LEDB
On	N/A	N/A	N/A	Network Link
				made
Off	N/A	N/A	No Activity	No Network
				Link
Blinking	Firmware	Firmware	Transmit/Receive	N/A
	Update/Rollback	Update/Rollback	Activity	



7.0 IPM-01 Performance Considerations

When using the IPM-01 in your system, it is important to consider the potential performance impact of involving a networked device. The time it takes for a MODBUS TCP device to receive a response may be affected by high network traffic. For this reason a master device must give adequate time for a response.

Consideration should also be given to the available bandwidth of the slave device. The performance of this device will dictate how quickly it is able to perform an operation and respond. Appropriate timeout values and settings may need to be applied to the master program in order to account for these constraints.



8.0 Appendices

8.1 Appendix I: Connection Examples

Networked Master TCP (Typical)



Direct Master TCP





8.2 Appendix II: Crossover Connection details (direct connection)

DHCP enabled on both PC and IPM-01 (Default Configuration)

If a windows machine is unable to retrieve an IP address from a DHCP server (as in this case, due to the IPM-01's lack of DHCP server) it uses APIPA to assign itself an IP address. Windows will assign itself an address in the 169.254.x.x subnet, (reserved for when DHCP fails) a subnet mask of 255.255.0.0 and a default gateway of 0.0.0.0. No default gateway address is required as devices in the 169.254.x.x address range are link-local only. This means that they are only able to communicate with other devices on the immediate local network. The IPM-01 behaves in the same way, and reverts to its default address, if DHCP is enabled and the request for an address from a server has failed.

NOTE: It may take a few seconds before Windows assigns itself an APIPA address.

DHCP enabled on IPM-01, Disabled (static IP) on PC

If the PC has a static IP address or DHCP disabled, it must be manually set to have an IP address on the 169.254.X.X subnet. This will allow the IPM-01's configuration menu to be accessed and changed if necessary.

Static IP Address for both devices

To have both devices communicate with each other via crossover cable and each have assigned static IP addresses, it is best to revert the IPM-01 to factory Defaults, if DHCP is not already enabled. Using the instructions above, you can then access the configuration menu and assign the IPM-01 with a known static IP address and gateway address. Make sure that the gateway Address of the IPM-01 is the same as the PC's IP address (or IP address that you intend to assign it), and that the IPM-01's IP address is recorded so that the PC's gateway address can be assigned accordingly.

For example:

IPM-01 IP address:	192.168.1.4
PC's address:	192.168.1.92
IPM-01 Gateway Address:	192.168.1.92
PC's Gateway Address:	192.168.1.4



9.0 Appendix II: Other Resources

www.modbus.org – Information on the MODBUS protocol

www.vxipower.com - Information about the IPM-01