

INTECH Micro 2300-NET



10/100 Ethernet to RS485 Converter.

Overview.

The 2300-NET is an Ethernet to serial (RS485) bridge specifically designed to connect the 2300 series I/O stations to the 10/100 Base-TX Ethernet network. This facilitates the MicroScan V5 SCADA software to allow remote I/O station addressing to the 2300 series stations via the Ethernet TCP/IP network.

The 2300-NET can also be configured to operate in a number of different modes including as a gateway function of converting Modbus TCP messages to Modbus RTU messages.

Installation Guide.

2300-NET Installation Guide Index.

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2300-NET 10/100 Ethernet to RS485 Converter.

Converts Modbus TCP 10/100 Ethernet to Modbus RTU RS485 for communication to field 2300 Series Remote I/O Station(s).

Features.

- Easy to Install.
- LED Status Indications.
- Compact DIN Rail Mount Enclosure.
- Modbus TCP to Modbus RTU.
- MicroScan V5 SCADA software compatible.
- Easy configuration via MicroScan V5.
- 12~24Vdc Power Supply.
- Low Cost.



Description.

The 2300-NET is an Ethernet TCP/IP to RS485 serial bridge specifically designed to connect the 2300 series I/O stations to the 10/100 Base-TX Ethernet network. This facilitates the MicroScan V5 SCADA software to allow remote I/O station addressing to the 2300 series stations via the Ethernet TCP/IP network.

The 2300-NET can also be configured to operate in a number of different modes including as a gateway function of converting Modbus TCP messages to Modbus RTU messages.

Intech Micro 2300 Series I/O stations:

- 2300-A8II** - 8 Isolated Current Inputs.
- 2300-A8VI** - 8 Isolated Voltage Inputs.
- 2300-Tc8** - 8 Isolated Thermocouple Inputs.
- 2300-RTD6** - 6 RTD Inputs.
- 2300-MULTI** - 2 RTD, 2 AI, 1 AO, 4 DI, 2 DO.
- 2300-D16** - 16 Digital Inputs.
- 2300-RO4** - 4 Relay Outputs.
- 2300-AO8I** - 8 Current Outputs.
- 2300-NET** - Isolated Ethernet TCP/IP to RS485.

Ordering Information.

2300-NET Ethernet TCP/IP to RS485 Isolating Converter, Modbus TCP to Modbus RTU. 12~24Vdc Power Supply.

PSW-10-F Instrument Quality 24Vdc, 1A Power Supply. Input Power Supply: 100~264Vac.



CAUTION: Dangerous voltages may be present. The 2300-NET has no user serviceable parts. Protective enclosure only to be opened by qualified personnel. Remove ALL power sources before removing protective cover.



Quality Assurance Programme.

The modern technology and strict procedures of the ISO9001 Quality Assurance Programme applied during design, development, production and final inspection grant long term reliability of the instrument. This instrument has been designed and built to comply with EMC and Safety Standards requirements.

Specifications.

Power Supply:	Field Supply Voltage	12~24Vdc.
	Field Supply Current	90mA @ 10Vdc / 40mA @ 26Vdc.
	Connector	8 way screw connector for Power and Comms.
Ethernet:	10/100 Mbit/s	10/100Base-TX.
	Connector	RJ45.
Serial:	RS485	2 Wire Multi drop twisted pair.
	Baud Rate	9600.
	Format	8 bit, No Parity, 1 Stop.

General Specifications: (Unless otherwise stated in other input specifications).

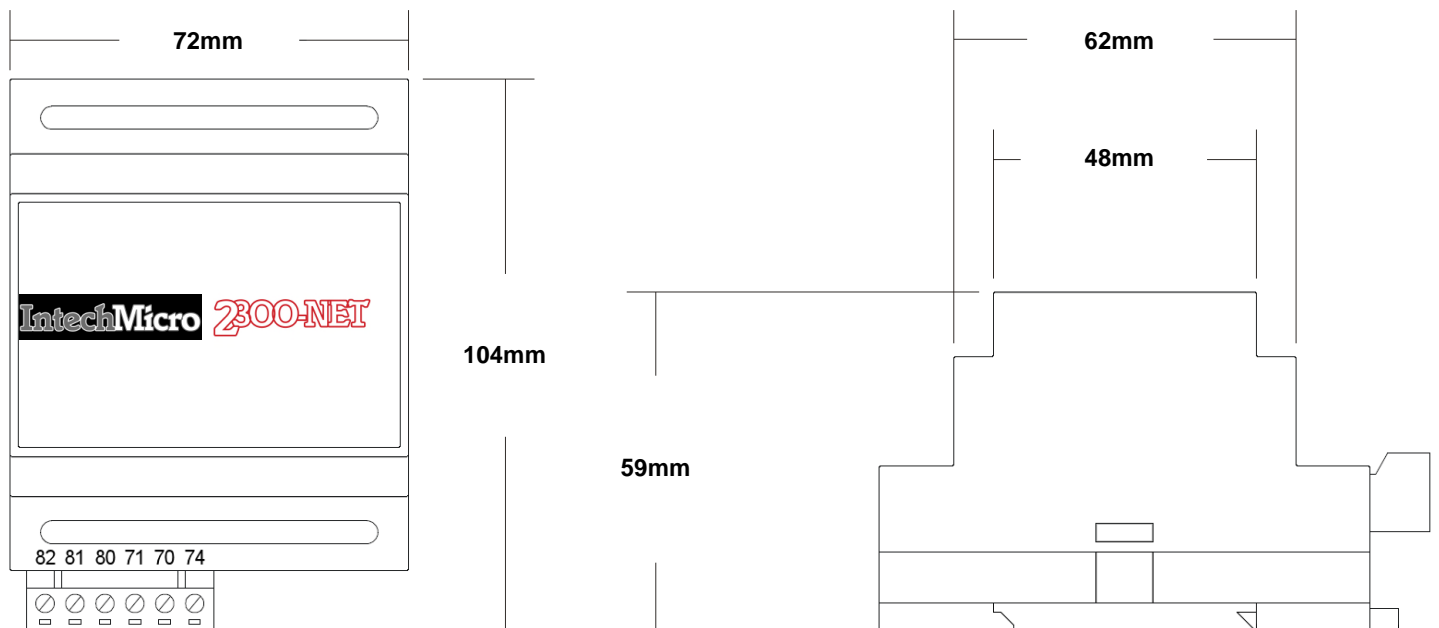
Operating Temperature	-20~70°C.	
Storage Temperature	-40~85°C.	
Operating Humidity	Up to 95% non condensing.	
Housing	Dimensions:	H=106, W=70, D=59.5mm.
	Mounting:	35mm Symmetrical Mounting Rail.

Note 1. Contact INTECH INSTRUMENTS for more detailed programming information.

Product Liability. This information describes our products. It does not constitute guaranteed properties and is not intended to affirm the suitability of a product for a particular application. Due to ongoing research and development, designs, specifications, and documentation are subject to change without notification. Regrettably, omissions and exceptions cannot be completely ruled out. No liability will be accepted for errors, omissions or amendments to this specification. Technical data are always specified by their average values and are based on Standard Calibration Units at 25C, unless otherwise specified. Each product is subject to the 'Conditions of Sale'.

Warning: These products are not designed for use in, and should not be used for patient connected applications. In any critical installation an independent fail-safe back-up system must always be implemented.

2300-NET Dimensions.



Power Connections.

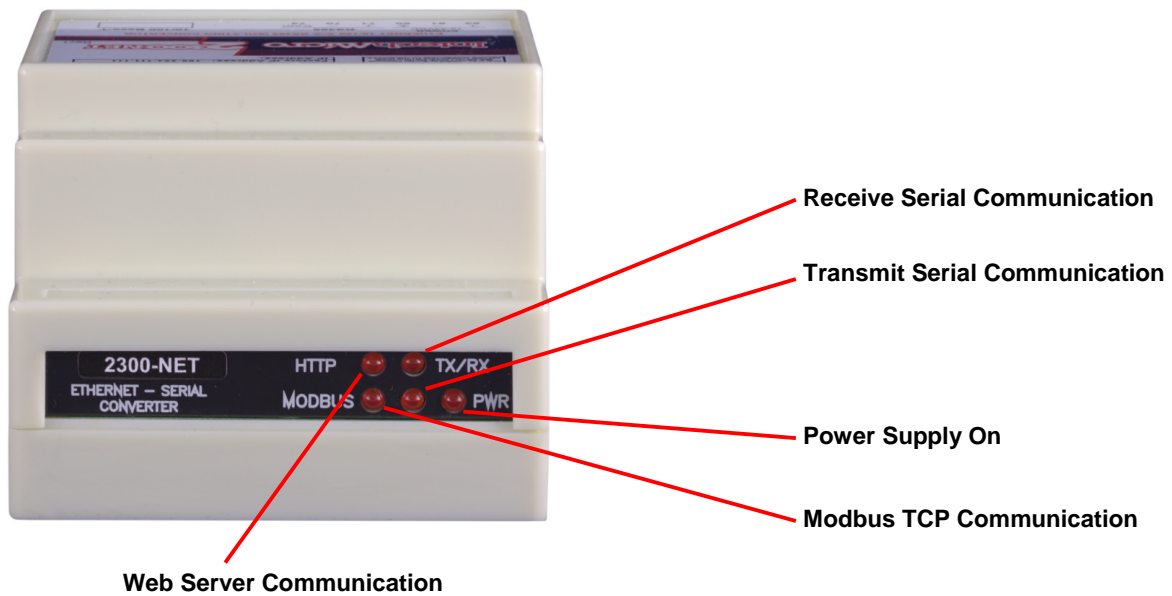
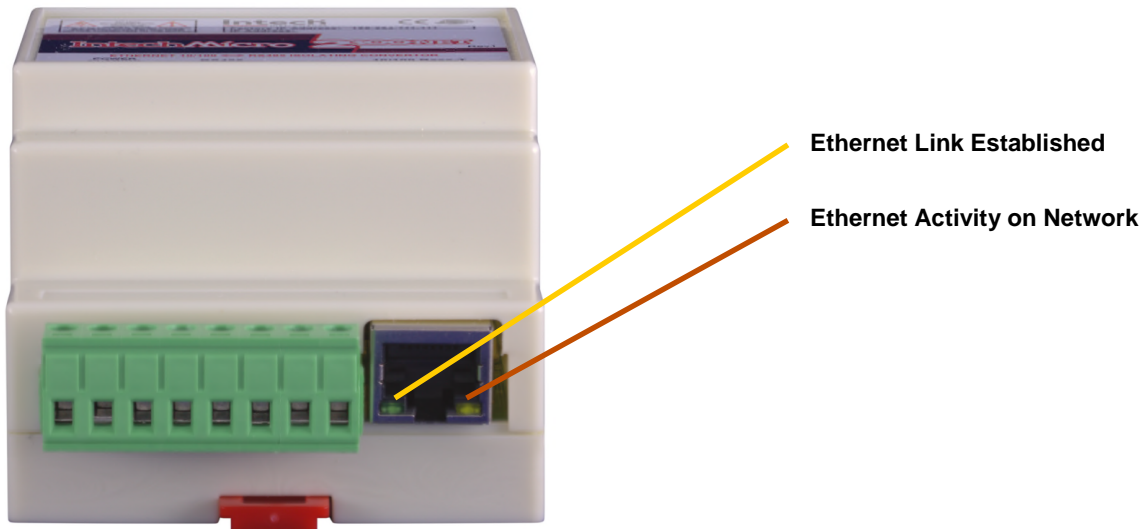
The Ethernet/Serial Protocol bridge 2300-NET must be clipped onto a DIN rail. Power for the 2300-NET must be applied to terminal 82 (+ 24Vdc) and terminal 81 (- 0V). The power LED will illuminate and all LED's will be off.

Ethernet Connection.

Ethernet connection is either through a network or directly to a PC. The Ethernet interface uses a standard RJ45 connector.

Indication LED'S.

The LED's on the 2300-NET are used to indicate the operation of the module:



Power and RS485 Comms Wiring.



RJ45 (Ethernet TCP/IP)

82 81 80 71 70 74

Connections are as shown on the 2300-NET label:

(Far left) Terminal 82: +12~24Vdc

Terminal 81: - Vdc

Terminal 80: Earth (Power)

Terminal 71: RS485 Tx +

Terminal 70: RS485 Tx -

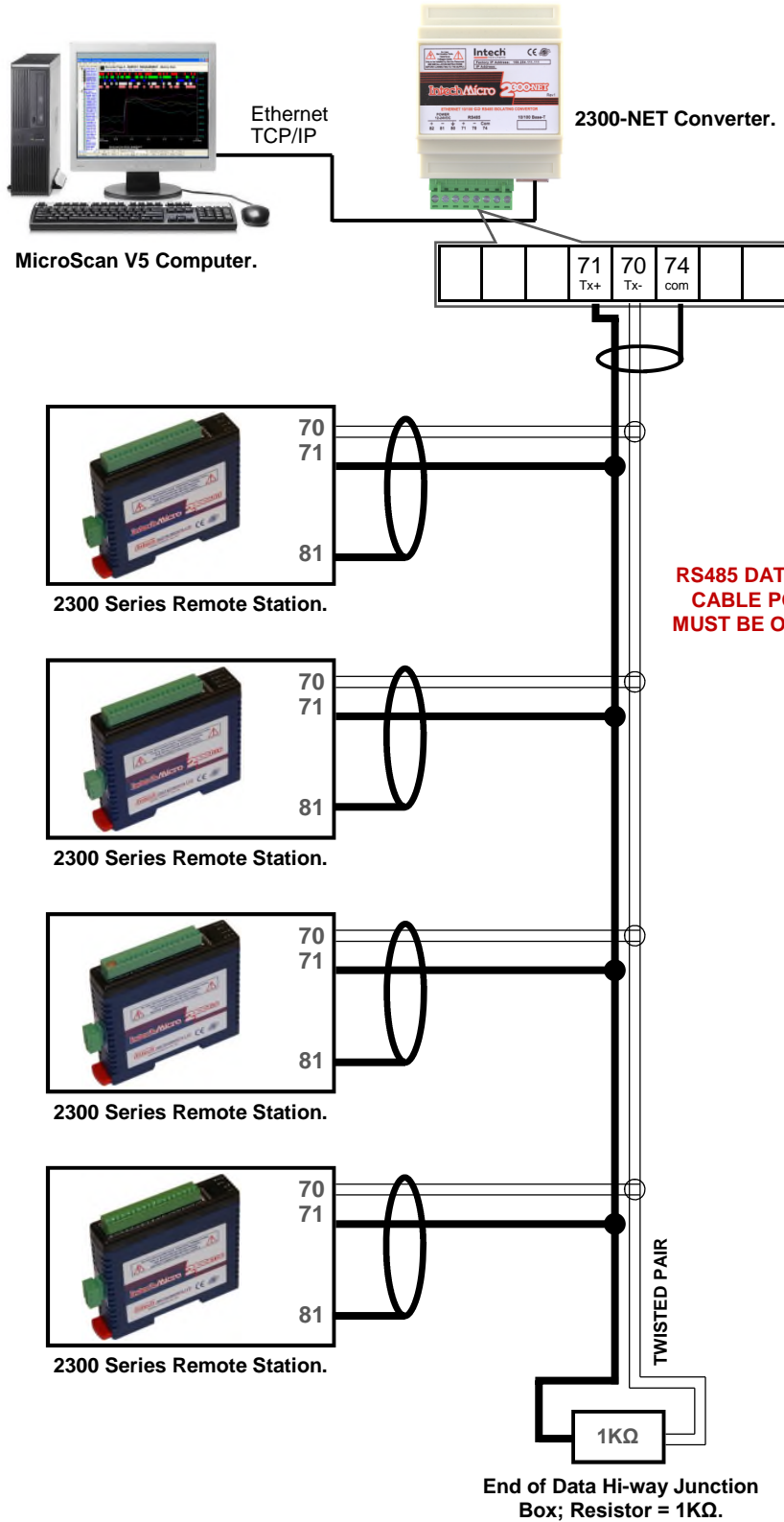
Terminal 74: RS485 Com (Shield)

(Far right) Terminal x2: 2x terminals = not used

Cautions on Ethernet Port.

- 1) Make sure that the Ethernet cable/plug is not physically damaged before insertion into the Ethernet port.
e.g. Burred on plastic edges.
- 2) Damage to the Ethernet port pins is not covered under warranty.

Computer to 2300 Series Comms Connections - 2300-NET:



Never guess Tx or Rx connections. Follow the terminal numbers in the serial connections diagrams exactly.

Important:

1. All cables must be screened.
2. All screens must be connected together.
3. The screen must not be earthed at any point.
4. **WARNING!** Take care to ensure that the screen does NOT contact terminal 82 on the 2300 station - damage will result.

**RS485 DATA HI-WAY.
CABLE POLARITY
MUST BE OBSERVED.**

TWISTED PAIR

End of Data Hi-way Junction
Box; Resistor = 1KΩ.

Important: The 2300-XX stations **cannot** share a data hi-way with the 2400-XX / 2100-XX stations and/or Shimaden Controllers.

Setting 2300-NET IP Address.

The 2300-NET is to be installed and/or setup by the Installer with Network IT support staff. **Please note that Intech will not be able to help with the setup and operation of an Ethernet TCP/IP network and assigning of IP addresses.** As part of commissioning, IT support staff should assign a static IP address to each 2300-NET. The 2300-NET should be listed as part of the Ethernet system for support by the IT support staff. It is considered good practice to write the assigned IP address/port numbers onto a label and attach to the unit for easy future reference.

The 2300-NET can be connected to a Network HUB (switch) or direct to a computer using a crossover cable. The 2300-NET is factory assigned to a default IP address of **169.254.111.111**. Using the MicroScan V5 SCADA software, this address will need to be changed to a static IP address to be used on your network. For the initial setup, the factory address must be valid on your network, by changing your computers IP address to 169.254.111.112 or by having IT staff add 169.254.111.111 as a valid address in your servers DHCP setup. When setting up the 2300-NET for your network, we recommend using a crossover Ethernet cable connected directly between the PC and the 2300-NET.

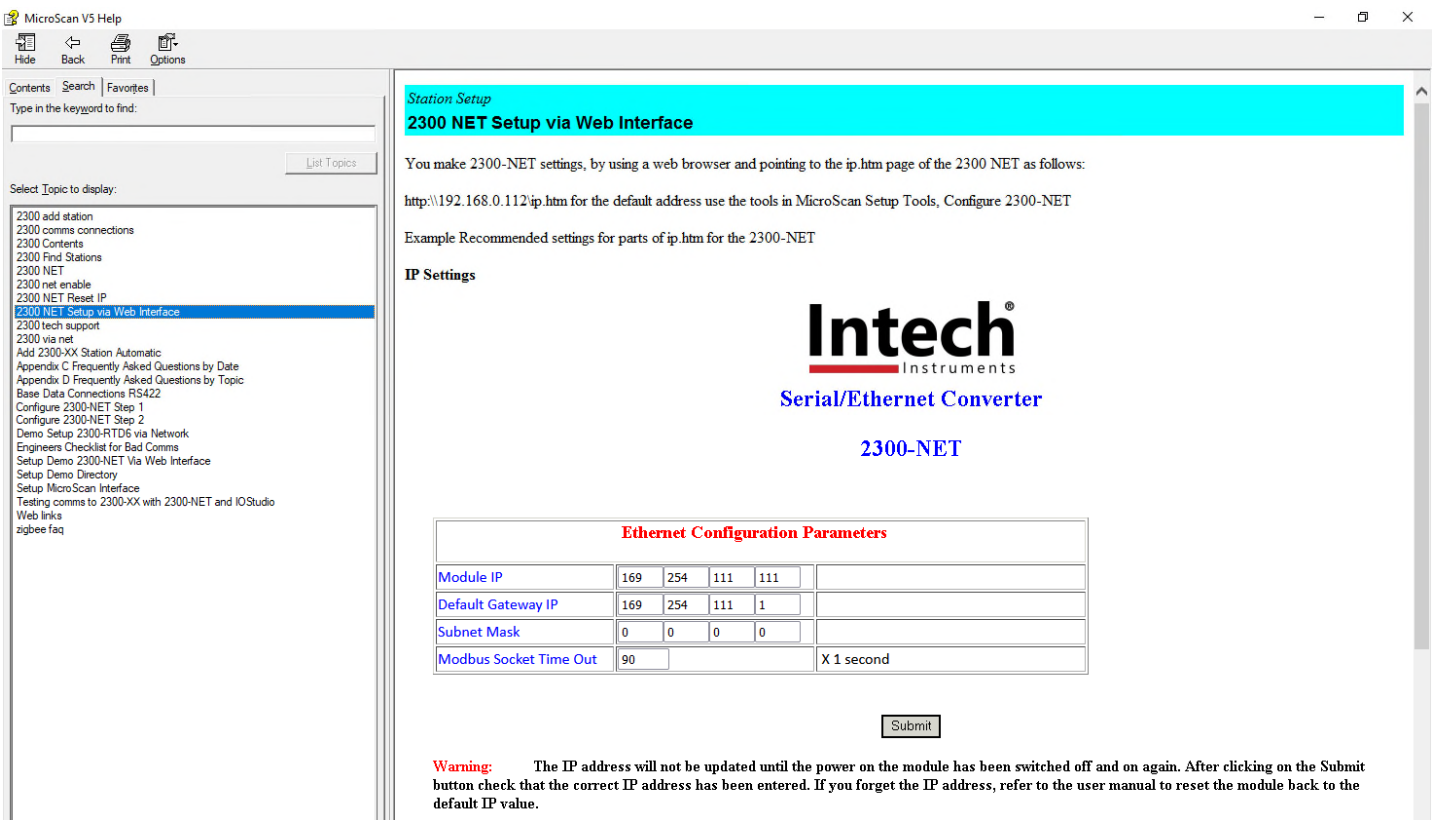
For other SCADA uses, to change this address, you must open 169.254.111.XXX on your network and use a web browser to change the settings of the 2300-NET to a valid address on your network.

The web server can be accessed by most web browsers.

The web page address for viewing the setup parameters is: <http://169.254.111.111/index.htm>

The web page address for configuring the 2300-NET is: <http://169.254.111.111/ip.htm>

For configuration please refer to MicroScan V5 Help. Search for “2300-NET”



The screenshot shows the MicroScan V5 Help web interface. The left sidebar contains a search bar and a list of topics, with '2300 NET Setup via Web Interface' selected. The main content area is titled '2300 NET Setup via Web Interface' and contains the following text:

You make 2300-NET settings, by using a web browser and pointing to the ip.htm page of the 2300 NET as follows:

<http://192.168.0.112/ip.htm> for the default address use the tools in MicroScan Setup Tools, Configure 2300-NET

Example Recommended settings for parts of ip.htm for the 2300-NET

IP Settings

Intech[®] Instruments
Serial/Ethernet Converter
2300-NET

Ethernet Configuration Parameters				
Module IP	169	254	111	111
Default Gateway IP	169	254	111	1
Subnet Mask	0	0	0	0
Modbus Socket Time Out	90			X 1 second

Warning: The IP address will not be updated until the power on the module has been switched off and on again. After clicking on the Submit button check that the correct IP address has been entered. If you forget the IP address, refer to the user manual to reset the module back to the default IP value.

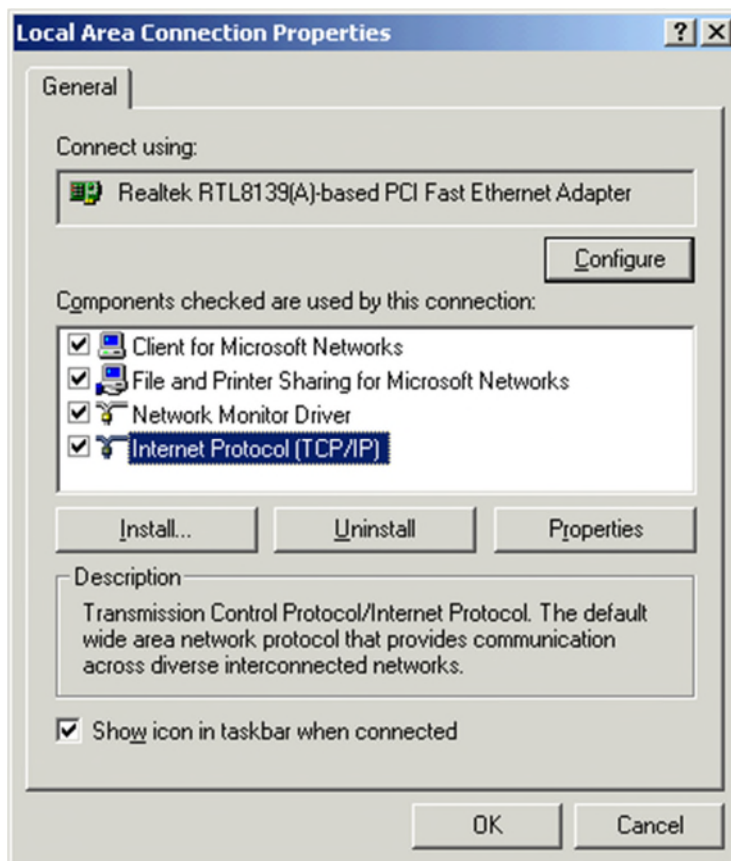
Procedure to reset 2300-NET to default IP address [169.254.111.111]:

- Remove power.
- Remove "Default IP" jumper.
- Plug in Ethernet cable and connect to switch.
- Apply power.
- After about 2 seconds the link LED should come on and must not flash (LED closest to green connector).
- Replace jumper. **WARNING:** The jumper must be in place for the 2300-NET to retain programmed settings!

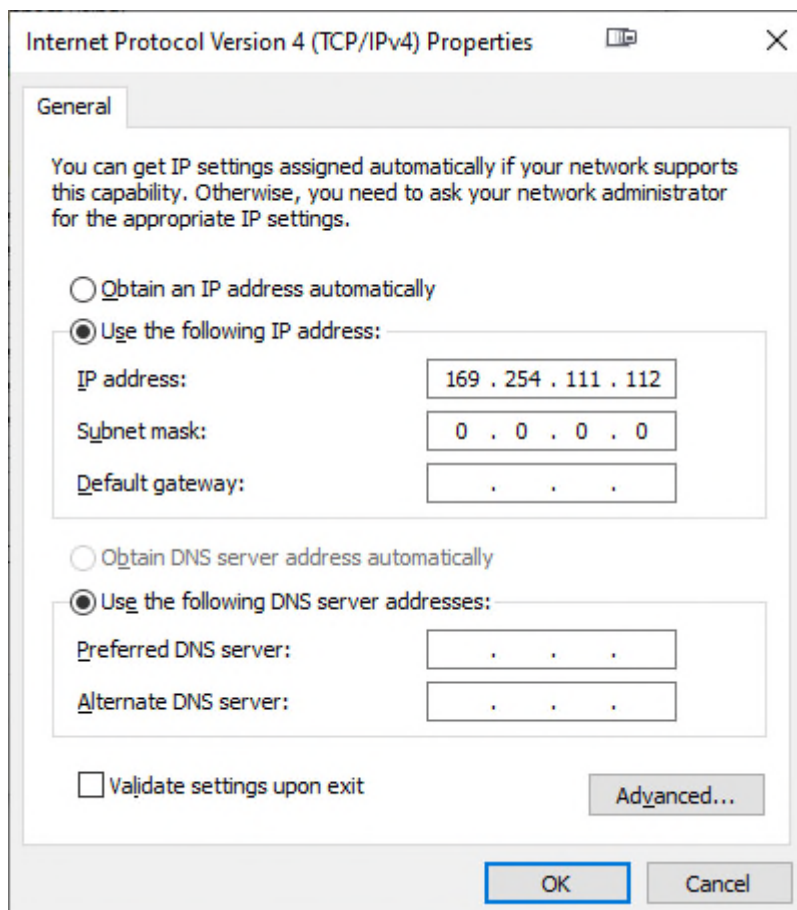
Setting Computer IP Address to use with 2300-NET.

Start Control Panel. Double Click On Network Connections.

Right Click on your Local Area Connection, click Properties:



Click on Internet Protocol and click Properties:



Enter the IP address **169.254.111.112** and Subnet mask of **0.0.0.0**, click OK, then click OK on the previous dialog.

2300-NET RS485 settings.

When setting up the 2300-NET IP address it is also necessary to check that the Comms is set for RS485 mode – scroll down the browser page to the area shown:

The screenshot shows a Microsoft Internet Explorer browser window displaying the 'RS232/RS485 Communications Port Parameters' form. The form contains several fields for configuring serial communication parameters. The 'RS232/RS485' dropdown menu is set to '1', and the text '0=RS232, 1=RS485' is circled in red. Other parameters include Baud Rate (9600), Data Bits (8), Parity (0), Stop Bits (1), Serial Reply Timeout (25), RS485 On Delay (0), and RS485 Off Delay (0). A 'Submit' button is located at the bottom of the form.

RS232/RS485 Communications Port Parameters	
Baud Rate	9600
Data Bits	8
Parity	0 0=None, 1=Even, 2=Odd
Stop Bits	1
RS232/RS485	1 0=RS232, 1=RS485
Serial Reply Timeout	25 X 10 milliseconds
RS485 On Delay	0 X 1 milliseconds
RS485 Off Delay	0 X 1 milliseconds

Make sure '1' is selected as shown above.

WARNING: The "Default IP" jumper must be in place for the 2300-NET to retain programmed settings!
This information is also available in the MicroScan help file.

Troubleshooting Guide.

#:	Checkpoint	Solution
1	Is the LINK LED on and is the ACTIVITY LED flashing with short pulses?	No No network connection is detected. The Ethernet cable is either not plugged in or wrong type of cable is used. For connection to a network with a hub or switch, a straight through network cable can be used. For direct connection between PC and the 2300-NET, a cross over Ethernet cable must be used.
		Yes A network connection is detected; the 2300-NET is connected to the network.
2	Does the 2300-NET respond to PING requests?	No Either the PC or the 2300-NET is setup with wrong IP address. Setup the 2300-NET with default IP address. To change the IP address of a PC, use the Windows "Control Panel -> Network -> TCP/IP properties" and setup an IP address close to the 2300-NET address. The 2300-NET is shipped with a default IP address of 169.254.111.111 , the PC can be setup with an IP address of 169.254.111.112
		Yes The PC and 2300-NET are setup with a correct IP address and they are able to communicate with each other.
3	Can the default Web page be accessed in a Web browser?	No This is normally caused by the setup of the Web browser. In the "options" or "preferences" menu, check that the Web browser is configured for direct network connection or local area network and NOT using a proxy server.
		Yes No problems.
4	Are the LINK LED and ACTIVITY LED flashing together?	No Switch off the power to 2300-NET. Wait for some time before switching on the power for next time.
		Yes No problems.

Wiring and Installation.

The 2300-NET is to be Installed and Serviced by Service Personnel Only. No Operator / User Serviceable Parts.

All power and signals must be de-energised before connecting any wiring, or altering any Jumpers or Dip Switches.

Mounting.

* Also refer to Connection Diagrams and Notes.

- 1) Mount in a clean environment in an electrical cabinet on 35mm Symmetrical mounting rail.
- 2) Draft holes must have minimum free air space of 20mm. Foreign matter must not enter or block draft holes.
- 3) Do not subject to vibration, excess temperature or humidity variations.
- 4) Avoid mounting near power control equipment.
- 5) Allow 10mm minimum clearance between the 2300-NET terminals and ANY conductive material.
- 6) To maintain compliance with the EMC Directives the 2300-NET is to be mounted in a fully enclosed steel fire cabinet. The cabinet must be properly earthed, with appropriate input / output entry points and cabling.

Power Supply Wiring.

* Also refer to Connection Diagrams and Notes - 'Power and RS485 Comms Wiring' on page 14.29-6.

- 1) For power supply, connect Neutral (or -Ve) to terminal 81, Phase (or +Ve) to terminal 82.

Ethernet Cabling.

Category 5e (Cat 5e) or better (e.g. Cat 6) cable is required for 100Mbps fast Ethernet transmission. The 2300-NET uses a standard RJ45 Connector.

For initial setup of the 2300-NET we recommend using a crossover Ethernet cable connected directly between the PC and the 2300-NET.

RS485 Comms Signal Cabling.

- 1) Use only low capacitance, twisted pair, overall screened data cable. The cable must equal or better the following specifications:

Cable Specifications.		
Conductor Size.		7/0.20mm, 24AWG
Conductor Resistance @ 20C.		8.9Ω/100m
Max. Working Voltage.		300Vrms
Capacitance between wires of a pair.		50pF/m
Capacitance between each wire to all others bunched together.		95pF/m
Cross-talk between pairs:	@ 1kHz @ 100kHz	>-90dB/100m >-50dB/100m
Characteristic Impedance .	@ 100kHz	135Ω
Attenuation of a pair:	@ 1kHz @ 10kHz @ 100kHz @ 50kHz @ 1MHz @ 1.5MHz	0.15dB/100m 0.42dB/100m 0.8dB/100m 0.9dB/100m 1.9dB/100m 2.4dB/100m

NOTE: All cables are to be subject during manufacture to in-process spark testing @ 4kVrms.
All cables are to be tested between conductors and conductors to screen for 1min @ 1500Vrms.

- 2) Minimum cable pairs: RS485 = 1. (Plus overall screen.)
- 3) Take care not to stress or damage cables during installation.
- 4) Total length of trunk line, including spurs, is not to exceed 1200m without isolating boosters.
- 5) Terminating resistors = 1kΩ.
- 6) Cabling paths should avoid sources of radio frequency interferences such as fluorescent lights, variable speed motor drives, welding equipment, radio transmitters, etc.
- 7) There should be a minimum of 200mm physical separation between power cables and data cables.
- 8) Data cables should not be exposed to excessive heat or moisture, and should not be buried directly in the ground without protection.
- 9) Avoid powering a remote station or controller from the same power supply as a variable speed drive.
- 10) All unused twisted pairs should be terminated at both ends with 1kΩ resistors. DO NOT ground unused pairs.
- 11) **Important:** The 2300-XX stations **cannot** share a data hi-way with the 2400-XX / 2100-XX stations and/or Shimaden Controllers.

2300-NET Commissioning.

- 1) The MicroScan V5 SCADA Data loop should be wired locally to the attached stations.
- 2) The Ethernet cable should be connected to the unit. For initial setup of the 2300-NET we recommend using a crossover Ethernet cable connected directly between the PC and the 2300-NET.
- 3) Check that all the above conditions have been met, and the wiring checked, before applying power to the 2300-NET.
- 4) The POWER LED should be ON.
- 5) The Ethernet port LEDS will light up.
- 6) The TX LED lights up when the 2300-NET is sending data to the attached stations.
- 7) The RX LED lights up when the 2300-NET receives data from the attached stations.
- 8) If no communication, check that the 2300-NET is set for RS485 (see page 14.29-10 or the MicroScan help file for instructions).

Port number information.

Port 1234	MicroScan mode
Port 502	Modbus TCP to Serial RTU bridge mode

