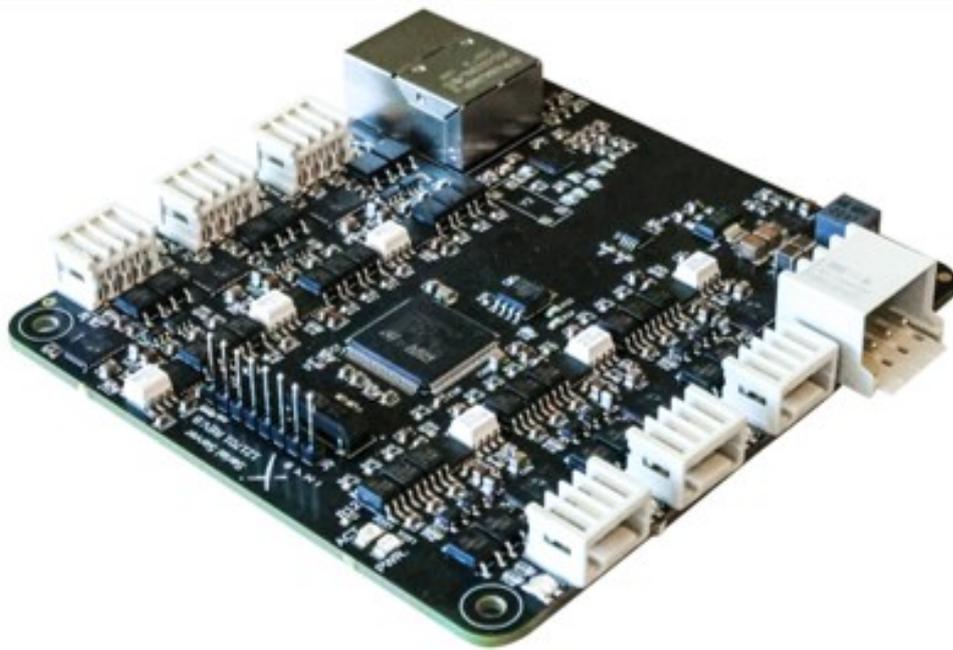


USER MANUAL



SERIAL SERVER

REVISION A



REVISIONS

PUBLISHED	REVISION	NOTES	REVISED BY
12.03.2026	A	Initial release	OMH



CONTENT

1	INTRODUCTION	5
1.1	PURPOSE AND SCOPE.....	5
1.2	ABBREVIATIONS.....	5
1.3	SUPPLIER CONTACT INFORMATION.....	5
1.4	DOCUMENT REFERENCES.....	5
2	HEALTH, SAFETY AND ENVIRONMENT.....	6
2.1	GENERAL.....	6
2.2	SAFETY MESSAGE LEVELS.....	6
3	TECHNICAL INFORMATION AND DATA.....	7
3.1	TECHNICAL DESCRIPTION	7
3.2	TECHNICAL DATA	7
3.3	WARRANTY CONDITIONS AND GUARANTEE	7
3.4	ORDERING.....	7
3.5	ACCESSORIES.....	8
4	HARDWARE DESCRIPTION	9
4.1	DRAWING.....	9
4.2	LEDS.....	10
4.3	CONNECTIONS.....	10
5	FUNCTIONAL DESCRIPTION.....	11
5.1	GENERAL.....	11
5.1.1	WEB INTERFACE.....	11
5.1.2	HEARTBEAT BROADCAST.....	11
5.1.3	FIRMWARE UPGRADE	11
5.2	NETWORK CONFIGURATION	12
5.3	SERIAL CONFIGURATION	12
5.3.1	GENERAL.....	12
5.3.2	MESSAGE SPLITTING	13
5.3.3	TIMESTAMPING	14



5.4	OPERATION MODE CONFIGURATION.....	15
5.4.1	UDP SERVER.....	15
5.4.2	TCP SERVER	16
5.4.3	INTERFACE OVERRIDE	16
6	TROUBLESHOOTING / FAULTFINDING	17



1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This document outlines and defines the installation, operation, and maintenance procedures for the Ixys Serial Server PCB. The manual will contain all relevant data and methods to be able to use and maintain the device for its intended purpose.

The manual includes technical specifications, installation information, description of the various product features, as well as troubleshooting suggestions.

1.2 ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ESD	Electrostatic Discharge
IP	Internet Protocol
NTP	Network Time Protocol
PCB	Printed Circuit Board
PTP	Precision Time Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
VLAN	Virtual Local Area Network

1.3 SUPPLIER CONTACT INFORMATION

Ixys AS
Langmyra II
4344 Bryne
Norway

+47 51 42 22 22

post@ixys.no

<https://ixys.no>

1.4 DOCUMENT REFERENCES

DOCUMENT NUMBER	DESCRIPTION
121701-ICS-PD-DAS-0001	Datasheet

See ixys.no for the latest revisions of these documents.



2 HEALTH, SAFETY AND ENVIRONMENT

2.1 GENERAL

Safety Notes and General Precautions shall be presented to all personnel concerned prior to testing, operation, maintenance, and repair. The operations shall be performed by the responsible engineer/supervisor. The personnel using this equipment must have knowledge of this type of equipment and have familiarized themselves with the applicable procedures and manuals for this product.

2.2 SAFETY MESSAGE LEVELS

Safety message level	Indication
	DANGER: A hazardous situation which, if not avoided, will result in death or serious injury
	WARNING: A hazardous situation which, if not avoided, could result in death or serious injury
	CAUTION: A hazardous situation which, if not avoided, could result in minor or moderate injury or damage to equipment
	Electrical Hazard: The possibility of electrical risks if instructions are not followed in a proper manner
Note:	A potential situation which, if not avoided, could result in an undesirable result or state. A practice not related to personal injury



3 TECHNICAL INFORMATION AND DATA

3.1 TECHNICAL DESCRIPTION

The Serial Server is a PCB that enables bridging up to 6 serial devices onto an Ethernet network. Each port is configurable to use either RS232, RS485, with an optional termination enabled. The client can communicate with the serial device over either UDP or TCP.

It is also possible to enable timestamping of received serial data, to support survey use cases.

3.2 TECHNICAL DATA

Manufacturer	Ixys AS
Ixys part number	121701
Description	Serial Server
Weight	~60 g
Dimensions	96x90x16 mm
Supply voltage	24 VDC (21.6-26.4)
Power consumption	~2 W
Channels	6

3.3 WARRANTY CONDITIONS AND GUARANTEE

- Improper use of equipment where use is not reflected in what it was intended to.
- Where general maintenance is not performed leading to defective parts or other types of defects.
- Incorrect handling or use of equipment.
- Packing not carried out in an ESD protective way.

3.4 ORDERING

Ixys Part Number	Description
121071	Serial Server PCB



3.5 ACCESSORIES

Ixys Part Number	Description
100088	Connector 4-way plug Wago 733-104 (serial ports)
112073	Connector 4-way plug Wago 2091-1124 (power input)



4 HARDWARE DESCRIPTION

4.1 DRAWING

Dimensions are in millimeters.

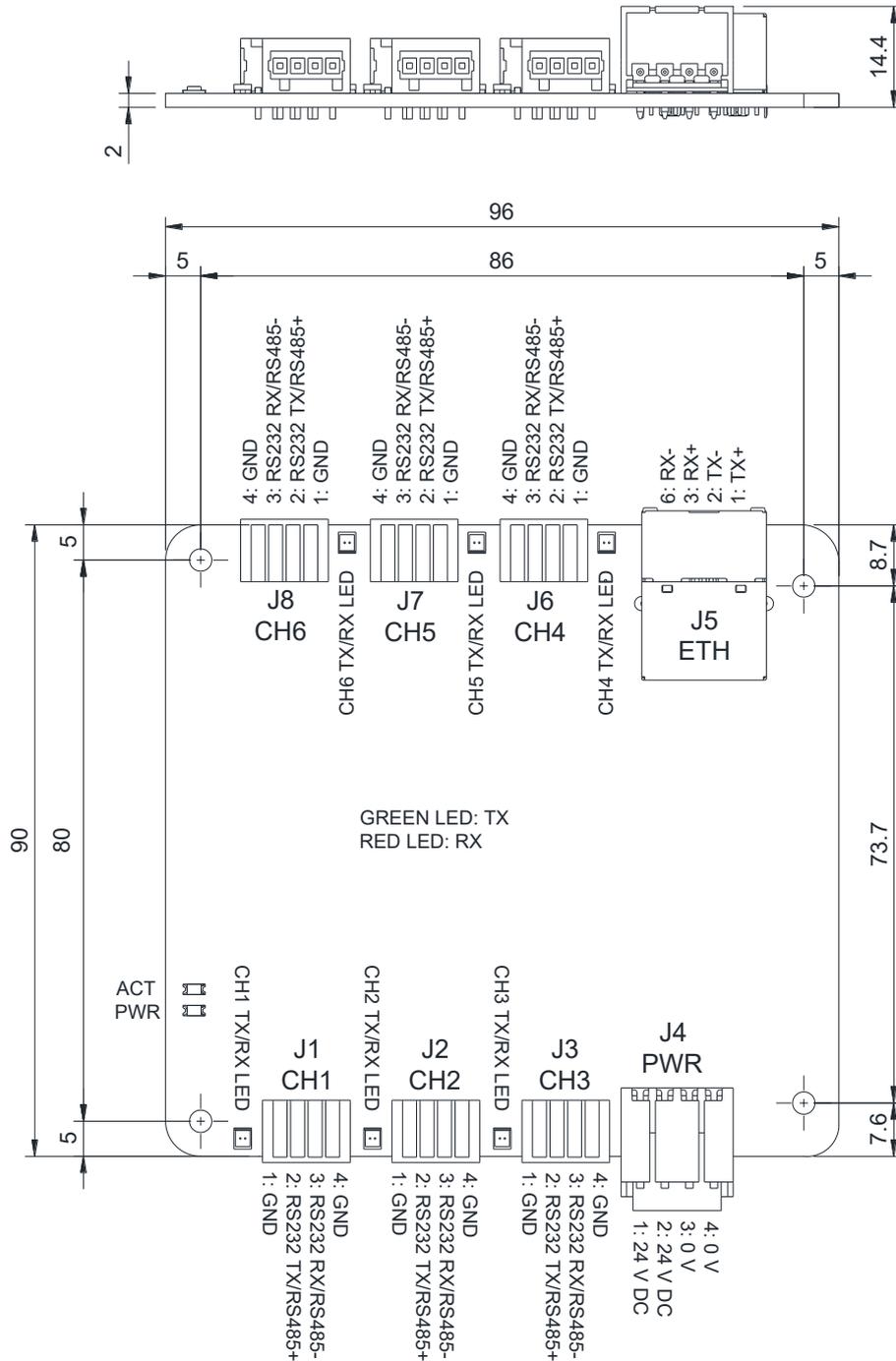


Figure 1 - Dimensions and pinout



4.2 LEDS

The POWER LED will light up as soon as the board is powered correctly. The ACTIVITY LED will blink once per second when the application is running correctly.

Each channel has two LEDs. The green LED is lit when the serial server is transmitting on the corresponding channel, while the red LED is lit when data is being received.

4.3 CONNECTIONS

The Serial Server should be powered by connecting supply voltage on J4 and connecting an Ethernet cable on J5. For each channel to be used, the serial interface must be connected to the remote serial device. The pinout for each connector is shown in Figure 1, and also printed on the bottom side of the PCB.

Each channel's GND is isolated from each other and from the main supply 0 V.

When using RS485, connect RS485+ on the Serial Server to RS485+ on the serial device, and RS485- to RS485- on the serial device.

When using RS232, connect RS232 TX on the Serial Server to RS232 RX on the serial device, and RS232 RX on the Serial Server to RS232 TX on the serial device.

Note: When using RS232, it is important to connect either pin 1 or pin 4 on the Serial Server's channel connector to the remote serial device, to ensure that signal levels are correctly referenced.



5 FUNCTIONAL DESCRIPTION

5.1 GENERAL

The default IP of the Serial Server is 10.0.37.240/24. By default, each channel is configured for RS232 and as a UDP server.

5.1.1 WEB INTERFACE

All features of the PCB can be configured from a user-friendly web interface. The web interface is accessible by opening the device's IP address in any modern browser.

The About page shows the firmware version, serial number and hardware revision. It is also possible to perform a Factory reset to return all settings to default, and to reboot the PCB.

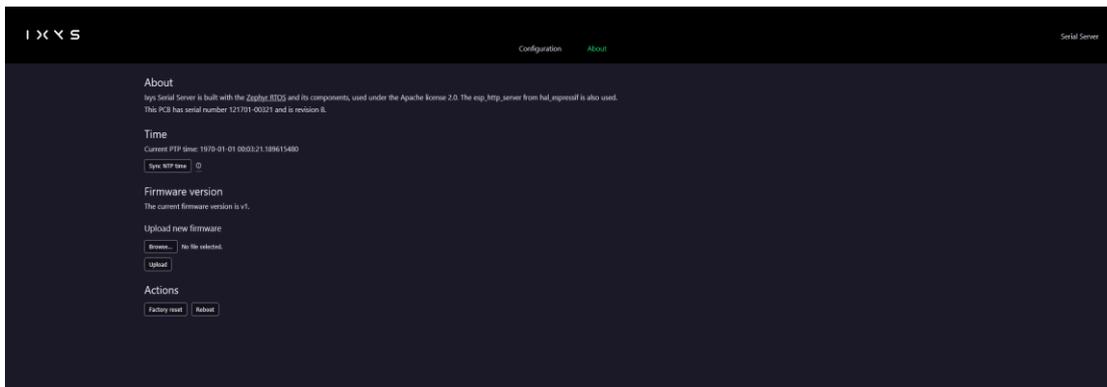


Figure 2 About page

5.1.2 HEARTBEAT BROADCAST

Every 5 seconds, the device sends a UTF-8 encoded JSON object in a UDP packet to the broadcast IP 255.255.255.255 on port 65000. This message includes the device's IP address, firmware version, serial number, and allows easy identification.

Ixys VJU Studio software will use this to automatically identify the device, but it can also be found manually for instance with Wireshark, or by other applications.

5.1.3 FIRMWARE UPGRADE

Firmware upgrades will be made available on an ongoing basis on ixys.no. Upgrades are provided as a zip archive of an updater-application. The updater application will upgrade both the actual firmware and the web interface.



```
Ixys Serial Server updater v3
-----
Make sure you're connected to the card's Ethernet interface.
Enter the card's IP address, or press enter to use default [10.0.37.240].
```

Figure 3 Updater application

After an upload has been completed, the device should be kept powered for a couple of minutes to allow the upgrade to finalize.

5.2 NETWORK CONFIGURATION

The serial server's Ethernet interface is always in auto-negotiate, supporting 10/100 Mbps. By default, the serial server has a single, statically allocated IP, and data from the different channels are sent on different ports. See section 5.4.3 for an alternative mode, where each channel can be allocated on a separate IP and/or VLAN.

It is possible to configure the Serial Server to use an NTP server to acquire current time. See section 0 for a description of the use cases this enables.

5.3 SERIAL CONFIGURATION

5.3.1 GENERAL

The Serial Server is used to make serial devices available to one or more Ethernet clients, and in that way enabling using data from the serial device in applications that may be located remotely.

Each channel is handled separately, and data received from the network is sent out on the serial port, while data received on the serial port is sent back to the network. See section 5.3.2 for a description of the currently implemented network communication methods.

Each channel can be configured to either use RS232 or RS485. When using RS485, there's a built-in termination resistor that can optionally be enabled.

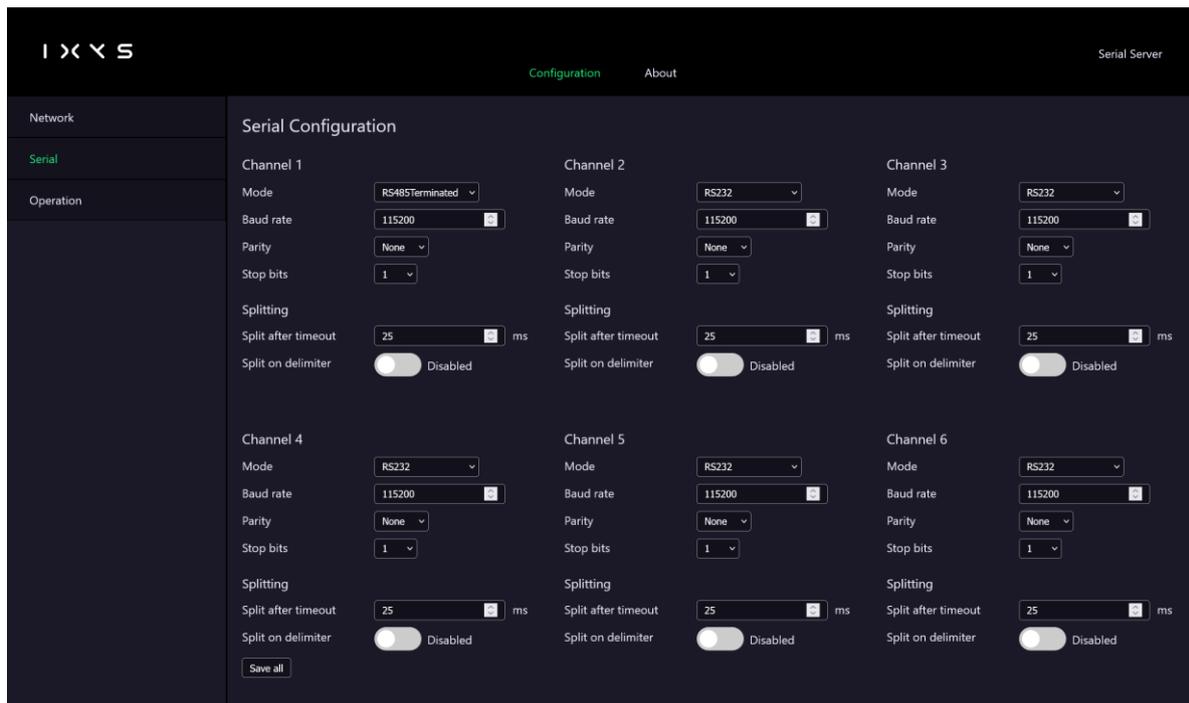


Figure 4 Serial configuration

5.3.2 MESSAGE SPLITTING

To transmit a continuous serial data stream over a network, the Serial Server is required to split the stream into discrete messages. No message splitting method is perfectly suitable for every use case, so the Serial Server provides multiple options. Messages can either be split with a timeout, in which case a pause in the serial data is used as a boundary between messages, or with a delimiter byte, in which case a specific byte value is used.

Splitting is only applied to data received on a serial port, not to data received over the network, to be transmitted on a serial port. Data received over the network is always sent directly on the serial port.

TIMEOUT SPLITTING

By default, the Serial Server splits incoming serial data based on a timeout. In this mode, when a byte is received on the serial port, the Serial Server waits for the configured number of milliseconds. If no additional bytes are received before the timeout expires, the accumulated data is sent as a network message.

The timeout must be long enough to allow all bytes in a message to arrive before the timer expires. At very low baud rates, or when a device may pause between bytes within the same message, a longer timeout may be required. However, an



excessively long timeout can introduce unnecessary delay before the data is forwarded to the network client.

Timeout-based message splitting is useful for binary serial protocols, for instance Modbus RTU.

Setting the timeout to 0 disables timeout-based splitting.

DELIMITER BYTE

If each message ends with a known byte value, it is possible to split messages based on this byte value. For instance, if the data is ASCII messages terminated with a newline character (`'\n'`, `0x0A`, `10`), it is recommended to set the delimiter to `10`, to ensure that each line is sent in a separate message, and sent as quickly as possible after the line is complete.

When using a delimiter to split messages, it is optionally possible to strip the delimiter from the network message. For instance, if messages are split on newline, and the delimiter is removed, the network message will not include the newline.

5.3.3 TIMESTAMPING

It is possible to enable timestamping of serial data. The Serial Server will record the exact time when the complete serial message is received, and if timestamping is enabled it will add a header with the timestamp to the network packet being sent.

The time used is the PTP (Precision Time Protocol) clock of the serial server, which by default counts time from the Serial Server is powered on. If there is a PTP master on the network, the Serial Server will synchronize its time to the master. Alternatively, if no PTP master is available, and an NTP server is configured, the Serial Server will synchronize its time with the NTP server.

Timestamping can be enabled or disabled per channel. The format for timestamped packets is shown below.

0	1	2	3	4	5	6	7	8	9	10	11	...
LSB	MSB	LSB			MSB	LSB			MSB	Byte 1	Byte 2	Byte n
Seconds (high 16 bit)		Seconds (lower 32 bit)				Nanoseconds				Serial data		

Figure 5 Timestamped data packet format



5.4 OPERATION MODE CONFIGURATION

The Operation modes determine how the data received on the serial ports are made accessible to other devices.

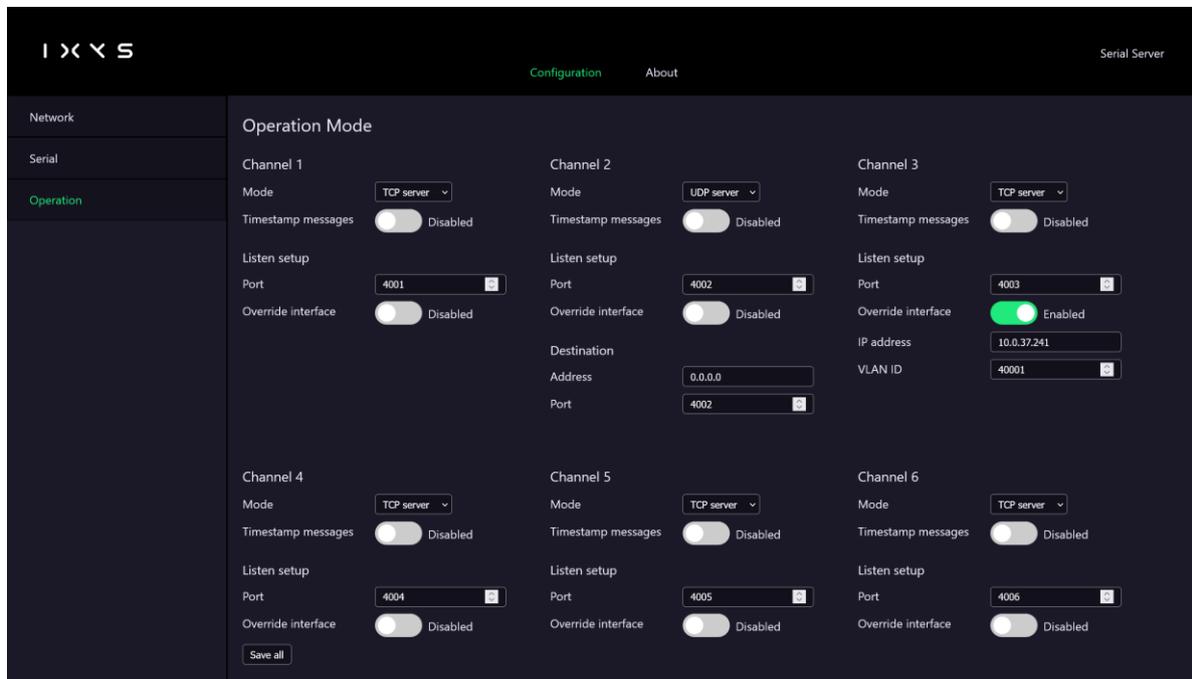


Figure 6 Operation mode configuration

5.4.1 UDP SERVER

To use a channel in UDP server mode, the Listen port needs to be set to a unique port. The default is 4000 plus the channel index.

If a channel is set up as a UDP server, the Serial Server will listen for UDP data from any device sent to the Serial Server's IP and the channel's port. Any UDP data received will be sent out on the corresponding serial port.

The Serial Server will cache the IP and source port of the last UDP client sending data to it, and any response received from the serial device will be sent back to the cached address and port.

If a Destination address and port is configured, data received when a UDP client has not recently been communicating with the serial port will be sent to the Destination address and port. The Destination address can be a broadcast address.

Setting a Destination address is useful for sensors that just broadcast data as soon as they're powered, if multiple devices want to receive the sensor data.



5.4.2 TCP SERVER

To use a channel in TCP server mode, the Listen port needs to be set to a unique port. The default is 4000 plus the channel index.

If a channel is set up as a TCP server, the Serial Server will listen for any TCP client connecting to the port configured. Once a TCP client is connected, any data received over the TCP connection will be sent out to the serial device, and any data coming back will be sent to the client.

Data received on the serial port while no TCP client is connected is discarded by the serial server.

If multiple TCP clients are connected, data received from any client will be sent out on the serial port, and data received on the serial port will be sent back to all currently connected clients. Data received from one client will not be sent back to another client.

5.4.3 INTERFACE OVERRIDE

By default, all the channels of the Serial Server are accessible on the same IP address, on VLAN (Virtual LAN) ID 1. If required, it is possible to override the IP and/or the VLAN used per channel.

This enables use-cases where it may be desired for the different channels to be completely isolated.

To move a channel to a different IP and/or VLAN, enable the Override interface toggle, and write the IP and VLAN ID which should be used for this channel. If VLAN separation is not required, set the VLAN ID to 0.



6 TROUBLESHOOTING / FAULTFINDING

Symptom	Possible cause	Remedy
Power LED not lit, or Activity LED not blinking	Not powered	<ul style="list-style-type: none">• Verify power connections are according to specifications in section 3.2 and connected as in section 4.3
	Faulty PCB	<ul style="list-style-type: none">• Contact Ixys support
No link LED	Linked device not powered	<ul style="list-style-type: none">• Verify linked device is powered
	Faulty cabling	<ul style="list-style-type: none">• Try different network cable• Verify cable used with other equipment
	Wrong configuration	<ul style="list-style-type: none">• Verify that linked device is correctly powered• Try using fixed speed and duplex on both devices
No serial activity LED blinking	Wrong configuration	<ul style="list-style-type: none">• Verify what communication method the corresponding channel is set up with, and that the client device matches• Verify that the configured serial communication mode matches the serial device
Not able to access web interface	Wrong IP address being used	<ul style="list-style-type: none">• Use VJU Device Discovery or read broadcast messages to identify IP. See section 5.1.2 for details.
	Client device in wrong subnet	<ul style="list-style-type: none">• Verify the client is in the same subnet as the PCB
No data on serial port	Wrong configuration	<ul style="list-style-type: none">• Verify configuration