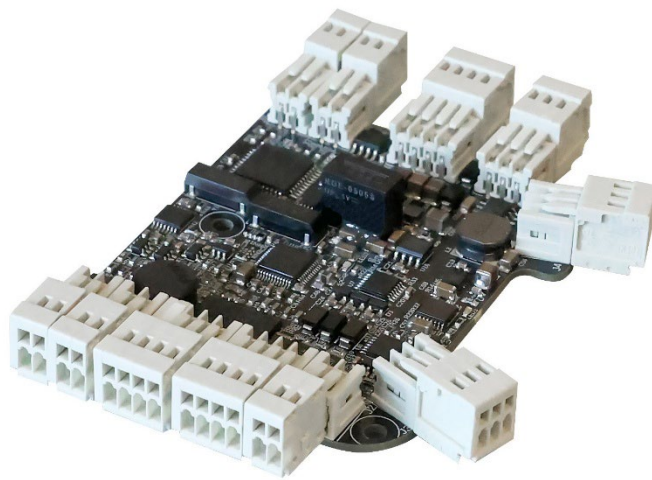


USER MANUAL



MOTOR MONITORING ETHERNET & RS485

REVISION A



REVISIONS

PUBLISHED	REVISION	NOTES
08.06.2026	A	Initial release.



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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This document outlines and defines the configuration and operation of the Motor Monitoring circuit board.

The manual is to be used by trained and competent personnel only.

1.2 ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ESD	Electrostatic Discharge
IP	Internet Protocol
PCB	Printed Circuit Board
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
PPM	Pulses Per Minute

1.3 SUPPLIER CONTACT INFORMATION

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Langmyra 11
4344 Bryne
Norway

+47 51 42 22 22

post@ixys.no

<https://ixys.no>

1.4 DOCUMENT REFERENCES

DOCUMENT NUMBER	DESCRIPTION
109504-ICS-PD-DAS-001	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

Motor Monitoring is a PCB with multiple temperature probe inputs, digital inputs, relative humidity monitoring and voltage monitoring of the motor windings. It is useful to provide information for when preventative maintenance is necessary in pressure compensated motors.

Communication with the board is possible over both Ethernet and RS485 using the Modbus protocol.

3.2 TECHNICAL DATA

Manufacturer	Ixys AS
Ixys part number	109504
Description	PCB Motor Monitoring Ethernet & RS485
Weight	~30 g
Dimensions	74x45x14 mm
Supply voltage	24 V DC
Power consumption	~1.3 W
Communication	1x RS485, 1x 10/100 Mbps Ethernet

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 is not carried out in an ESD protective way.



3.4 ACCESSORIES

Ixys Part Number	Description
100086	Connector Wago 4-way Cable Contact
100894	Connector Wago 3-way Cable Contact
100040	Connector Wago 2-way Cable Contact



4 HARDWARE DESCRIPTION

4.1 DRAWING

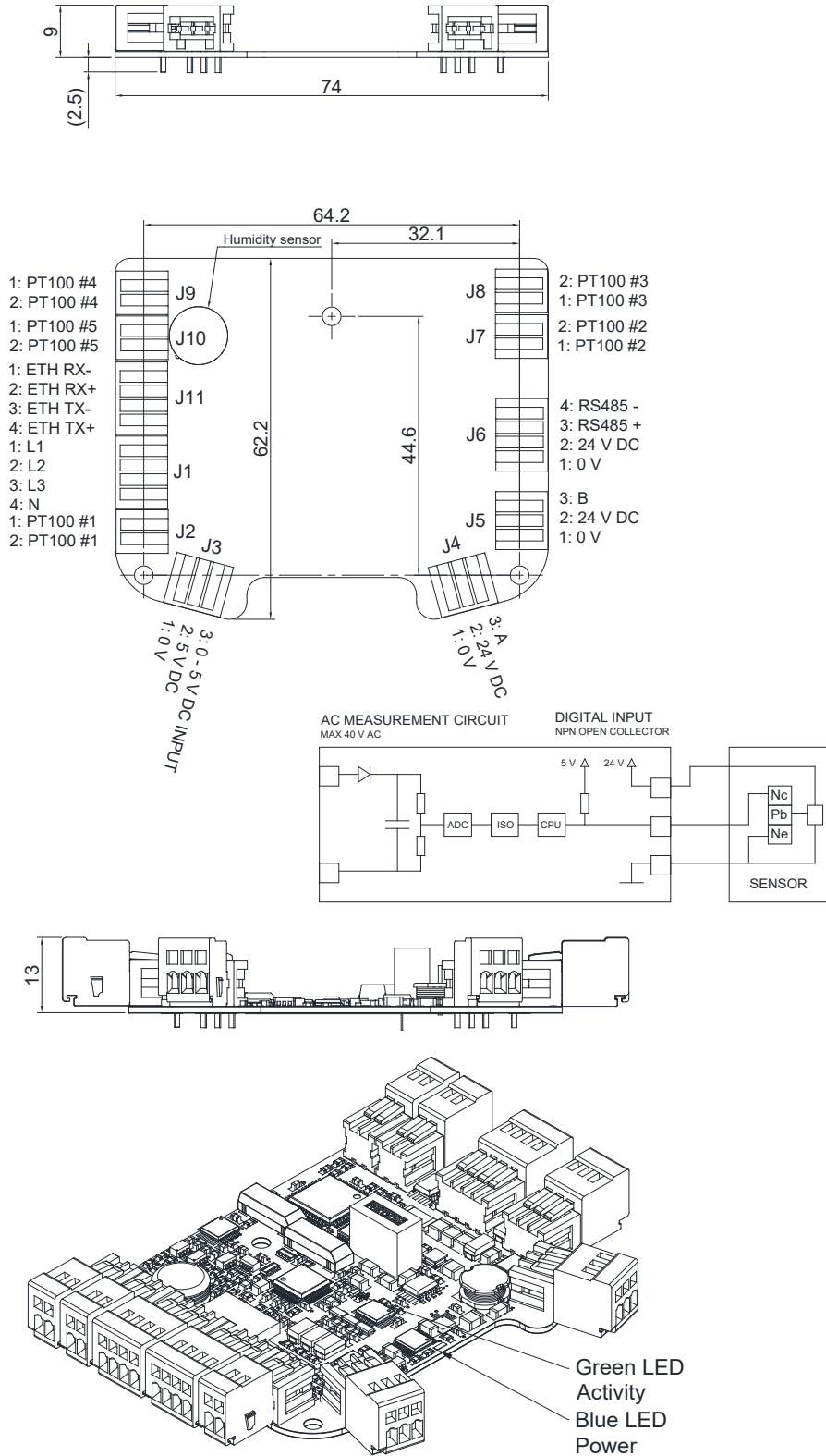


Figure 1 - Dimensions and pinout



4.2 LEDS

The blue power LED will light up as soon as the board is powered correctly.

When there is activity on the Ethernet interface, a green LED will flash to reflect this.

4.3 CONNECTIONS

Wires are installed into the connectors using the included Wago tool. Solid and fine stranded conductors between 0.08 and 0.5 mm² (28 and 20 AWG) can be used. With ferrule this is between 0.25 and 0.34 mm². See figure 1 under 4.1 for pinout information.

The Motor Monitoring PCB should be powered by connecting supply voltage on J6.

Note: J6 shares both 24 V DC and RS485 communication. Pay attention to the pinout. See section 5.5 regarding RS485 termination.

Ethernet on J11 has a coding key which keeps other 4 pin connectors from being accidentally installed.

PT100 temperature probes can be connected to J2, J7, J8, J9 and J10. See 5.7.1 for more details.

Motor windings are connected to J1. See 5.7.4 for more details.

A level sensor can be connected to J3. See 5.7.3 for more details.

Two encoders can be connected to the PCB on J4 and J5. See 5.7.2 for more details.



5 FUNCTIONAL DESCRIPTION

5.1 GENERAL

The Motor Monitoring PCB is intended for installation in a three-phase asynchronous motor and can monitor multiple parameters.

The default IP of the Motor Monitoring PCB is 10.0.37.240/24.

5.2 WEB INTERFACE

The device IP address and Modbus node ID can be configured from a web interface. The web interface is accessible by entering the IP address of the board in any modern browser.

The web page shows the Motor Monitoring's serial number and firmware version. Any changes made are stored by first clicking submit, then save. When status display "Saved OK" the Reboot button can be clicked for the changes to take effect.

Ixys Motor Monitoring

Status: OK
Serial Number: 310
Firmware version: 16
Firmware CRC: 0

Configuration:

10.0.37.240 IP Address
1 Modbus Node

Submit new configuration
 Save new configuration to memory
 Reboot for new configuration to take effect

Upload new firmware:

Filename: No file selected.

Figure 2 Web interface



5.3 FACTORY RESET

A factory reset of the settings can be performed by setting the Modbus node ID to 65535. Power cycle or reboot the PCB for the changes to take effect. See section 6.3 for a list of registers containing settings and their default values.

5.4 HEARTBEAT BROADCAST

Every second, the device sends an identification string in a UDP packet to the broadcast IP 255.255.255.255 on port 65000. This message includes the device's product name which 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.

5.5 MODBUS TCP/UDP

The Motor Monitoring PCB supports the Modbus protocol over TCP and UDP for reading and writing all registers described in section 6.

All registers are readable with Function Code Read Holding Registers and Read Input Registers. All registers are writable with both Write Single Register and Write Multiple Registers.

A 120-ohm termination resistor must be added to each end of the RS485 communication line. Motor Monitoring does not have internal termination.

Name	Value
Default Baudrate	115200 bps
Data bits	8
Parity	None
Stop bits	2
Default Modbus node ID	1
Default Modbus port	502



5.6 FIRMWARE UPGRADE

Firmware upgrades are done through the web interface. Click “browse” on the web page, select the upgrade file and click “upload”.

Note: The firmware upgrade process is risky and does not have any progress indicators. Not recommended to be performed without contacting Ixys support.

Upgrades are provided on request as an eeprom-file. Both the actual firmware and the included web interface will be upgraded.

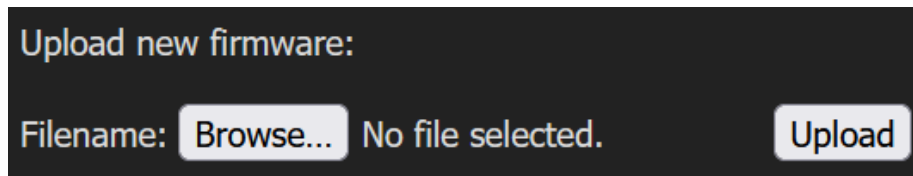


Figure 3 Firmware Upgrade



5.7 MOTOR MONITORING INPUTS

5.7.1 TEMPERATURE PROBES

Up to five two wire PT100 temperature probes can be connected, with a range of -200 to +200 °C. See section 4.1 for the connector locations and section 6.2 for Modbus read registers.

5.7.2 SPEED SENSORS

Two encoders can be connected to monitor the motor speed. These inputs allow up to 50,000 PPM. See section 4.1 for connector locations, section 6.2 for Modbus read registers and section 6.3.2 for encoder configuration.

5.7.3 LEVEL SENSOR

A 0 – 5 V analog input is provided for a level sensor that is powered by 5 V DC. See section 4.1 for connector location and section 6.2 for Modbus read registers.

5.7.4 MOTOR VOLTAGE

Three-phase voltage measurements of the motor windings are present. The input range is up to 80 V AC. See section 4.1 for connector location and section 6.2 for Modbus read registers.



CAUTION:

For high voltage motors, additional windings need to be added to the motor to step down the voltage to be within the board input range.

5.7.5 RELATIVE HUMIDITY

A relative humidity probe is present on the PCB. See section 4.1 for location and section 6.2 for Modbus read registers.



6 REGISTERS

The following sections describe all registers that can be read or written either over Modbus.

6.1 DATA TYPES

The following table describes the data types used. For 32-bit values two Modbus registers are used, where the first is the most significant.

Name	Size	Value Range
INT16	2 bytes	-32,768 to 32,767
UINT16	2 bytes	0 to 65,535
INT32	4 bytes	-2,147,483,648 to 2,147,483,647
UINT32	4 bytes	0 to 4,294,967,295
REAL32	4 bytes	1.2E-38 to 3.4E+38

6.2 READ REGISTERS

6.2.1 HEADER

Address	Description	Default	Note	Data Type
0	PCB Type	27	Motor Monitoring PCB Type = 27	UINT16
1	Serial Number	N/A	Last part of the serial number	UINT16
2	Firmware Version	N/A	Numeric part of firmware version	UINT16
3	Reserved	N/A		UINT16
4	Modbus Port	502	UDP/TCP	UINT16
5	Reserved	N/A		UINT16
6	Reserved	N/A		UINT16
7	Node Address	1	Modbus Node Address	UINT16
8	Heartbeat	N/A	1 Hz counter. Rolls over to zero after 65535	UINT16
9	Serial baudrate	5	The baudrate is indicated by a single digit. Changes to this register will be stored. 0=9600 1=19200 2=28800 3=38400 4=57600 5=115200	UINT16



6.2.2 INPUTS

The PT100 inputs, water sensor, encoder and vibration are factory calibrated. The compensator level and the phase voltages should be calibrated together with sensor and motor windings.

Address	Description	Note	Data Type
10	Input 1 Compensator Level	Unit = percent multiplied by 10	INT16
11	Input 2 Water Sensor	Unit = % Relative Humidity	INT16
12	Input 3 Encoder	Unit = RPM	INT16
13	Input 4 Phase 1 Voltage	Unit = Volt	INT16
14	Input 5 Phase 2 Voltage	Unit = Volt	INT16
15	Input 6 Phase 3 Voltage	Unit = Volt	INT16
16	Input 7 PT100 #1	Unit = Celsius multiplied by 10	INT16
17	Input 8 PT100 #2	Unit = Celsius multiplied by 10	INT16
18	Input 9 PT100 #3	Unit = Celsius multiplied by 10	INT16
19	Input 10 PT100 #4	Unit = Celsius multiplied by 10	INT16
20	Input 11 PT100 #5	Unit = Celsius multiplied by 10	INT16
21	Input 12 Vibration Amplitude	Unit = Milli-G (Process max and min is used to set bandpass filter)	INT16
22	Input 13 Vibration Frequency	Unit = Hz	INT16



6.2.3 INPUT RAW VALUES

Address	Description	Note	Data Type
50	Input 1 Compensator Level	Raw Value from ADC	UINT16
51	Input 2 Water Sensor	Sensor Measured Frequency in Hz	UINT16
52	Input 3 Encoder	Unit = Pulses per Minute	INT16
53	Input 4 Phase 1 Voltage	Raw Value from ADC	UINT16
54	Input 5 Phase 2 Voltage	Raw Value from ADC	UINT16
55	Input 6 Phase 3 Voltage	Raw Value from ADC	UINT16
56	Input 7 PT100 #1	Raw Value from ADC	UINT16
57	Input 8 PT100 #2	Raw Value from ADC	UINT16
58	Input 9 PT100 #3	Raw Value from ADC	UINT16
59	Input 10 PT100 #4	Raw Value from ADC	UINT16
60	Input 11 PT100 #5	Raw Value from ADC	UINT16
61	Input 12 Vibration Amplitude	Unit = Milli-G	UINT16
62	Input 13 Vibration Frequency	Unit = Hz	UINT16



6.3 READ/WRITE REGISTERS

These registers are stored in non-volatile memory when changed.

6.3.1 INPUT SETTINGS

Setting registers for PT100 inputs are factory calibrated.

Address	Description	Note	Data Type
300	Input 1 Reserved		UINT16
301	Input 1 Raw Max	Raw value corresponding to Scaled Max value	UINT16
302	Input 1 Raw Min	Raw value corresponding to Scaled Min value	UINT16
303	Input 1 Scaled Max	A high reference for calibration of input scaling (typically sensor maximum)	INT16
304	Input 1 Scaled Min	A low reference for calibration of input scaling (typically zero)	INT16
305	Input 1 Reserved		UINT16
306	Input 1 Reserved		UINT16
307	Input 1 Reserved		UINT16
308	Input 1 Reserved		UINT16
309	Input 1 Reserved		UINT16
310-499	Input 2 ...		

6.3.2 ENCODER SETTINGS

These input setting registers are only applicable for the encoder (speed) input.

Address	Description	Note	Data Type
320	Encoder Show Raw Values	0 = Register 12 shows scaled RPM 1 = Register 12 shows the state of the digital inputs in bit 0 and 1.	UINT16
325	Encoder Dual/Single Input	0 = Dual input mode 1 = Single input mode	UINT16
326	Encoder Single Input A/B	Only applicable if register 325 is in "Single input mode" 0 = Use digital input A 1 = Use digital input B	UINT16
327	Encoder Disable filter	0 = PPM and RPM are filtered for a smooth reading 1 = Filter is disabled and PPM and RPM are updated on each pulse	UINT16



7 TROUBLESHOOTING / FAULTFINDING

Symptom	Possible cause	Remedy
Power LED not lit	Not powered	<ul style="list-style-type: none">• Verify power connections are according to specifications in section 3.2 and connected as in section 4.1
	Faulty PCB	<ul style="list-style-type: none">• Contact Ixys support
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
	Client device in wrong subnet	<ul style="list-style-type: none">• Verify the client is in the same subnet as the PCB