USER MANUAL

Equipment Description	Subsea Motion Sensor
iCsys Part Number:	106601

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Prepared		**Checked**	**Approved**
VHA		SHA	MHA

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1. INTRODUCTION

1.1. GENERAL NOTES

This document outlines and defines the installation, operation and maintenance procedures for the iCsys Subsea Motion Sensor. The manual will contain all relevant data and methods to be able to use and maintain the device for its intended purpose.

It will be stated in the manual everything from technical specifications, installation and maintenance to troubleshooting.

1.2. PURPOSE AND SCOPE

The purpose of this manual is to give instructions to install, operate and maintain the Subsea Motion Sensor supplied by iCsys AS.

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

1.3. ABBREVIATIONS

Abbreviation	Description
PCB	Printed Circuit Boards
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
ESD	Electrostatic Discharge
IP	Internet Protocol
EEPROM	Electric Erasable Programmable Read Only Memory

1.4. SUPPLIER CONTACT INFORMATION

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www.icsys.no

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
NOTICE:		A potential situation which, if not avoided, could result in an undesirable result or state A practice not related to personal injury

3. SPECIFICATIONS

3.1. DESCRIPTION

The Subsea Motion Sensor is an Attitude and Heading Reference sensor that provides measurement of Heading, Roll and Pitch over an Ethernet connection and Modbus UDP/TCP protocol.

Configuration is possible through a simple Web interface.

3.2. TECHNICAL DATA

General	
Manufacturer	iCsys AS
Description	Subsea Motion Sensor
Weight	~1840g
Weight in Water	~1180g
Dimensions	134 x 100 x 100 mm

Electrical Data	
Supply Voltage	10 – 30 VDC
Power Consumption	< 5W

Cable Connectors	
Main Port	Glenair G5506-1508

Other	
Speed on Ethernet port	10/100 Mbps
Default IP address	10.0.37.240
Magnetic Heading Accuracy	+/- 1° (with no external magnetic disturbances)
Attitude accuracy (Pitch / Roll)	+/- 0.5°
Rate Gyro Range	+/- 2000 °/s
Accelerometer Range	+/- 16g

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 type of defect.
- Incorrect handling or use of equipment.
- Packing not carried out in an ESD protective way

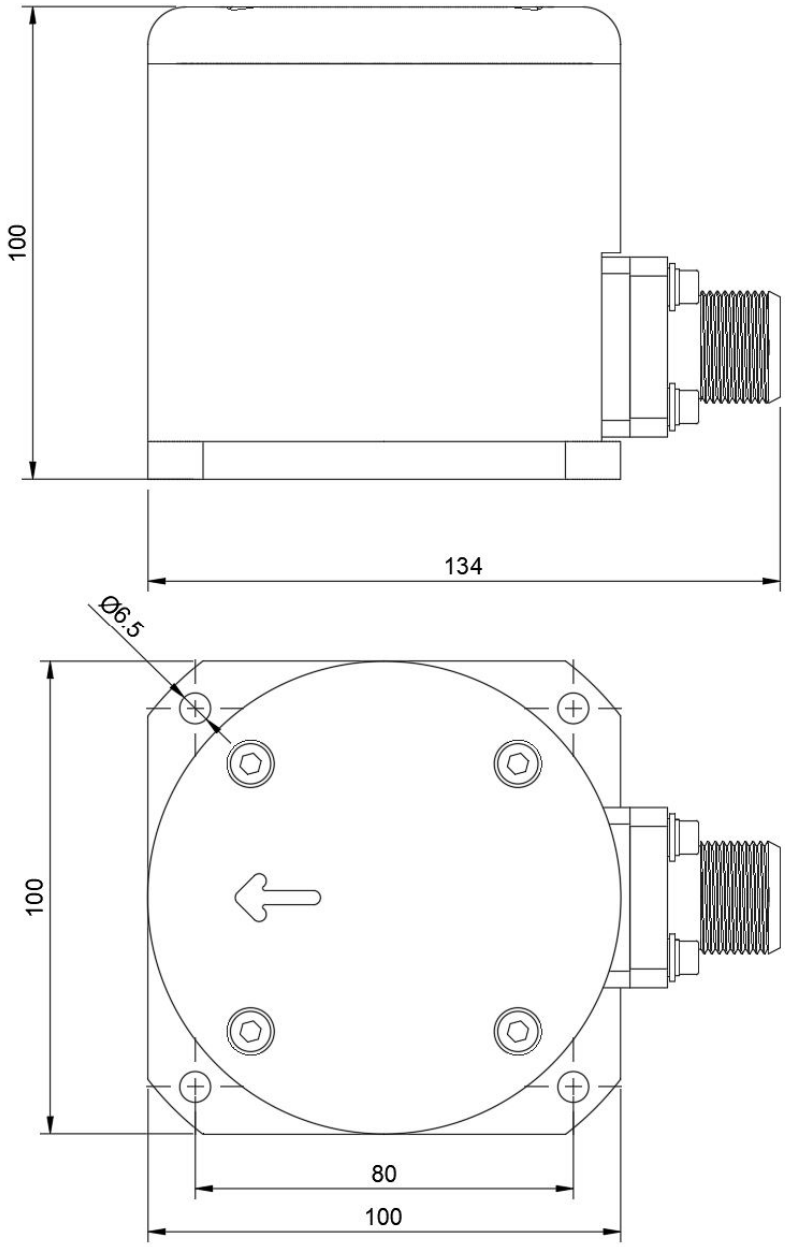
3.4. ORDERING

iCsys Part Number	Description
106601	iCsys Subsea Motion Sensor

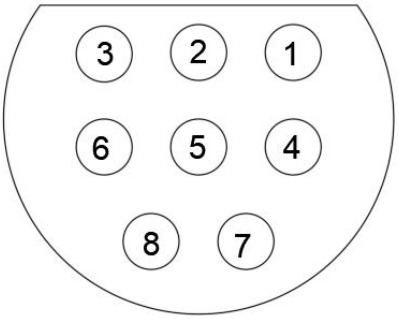
3.5. ACCESSORIES

iCsys Part Number	Description

4. DRAWING



Face view



CONNECTOR: 5506-1508
1: 0V
2: 24VDC
3: NC
4: NC
5: ETHERNET TX+
6: ETHERNET TX-
7: ETHERNET RX+
8: ETHERNET RX-

5. OPERATION

5.1. NORMAL OPERATION

The Subsea Motion Sensor has a web interface that can be accessed by entering the IP address directly in the browser address field. The web page is used to update firmware in the sensor. Configuration of the IP address, port number and Modbus Node ID can also be done through the web interface.

Telnet is used for additional configurations and diagnostics. Open the command prompt and type telnet and IP address to access a menu for configuration. Default IP address is 10.0.37.240. If telnet is not available on the computer then go to Add/remove programs and then windows features. Find and select Telnet Client and click OK to install.

For Ethernet the registers below is accessible through both Modbus TCP (two simultaneous clients) and Modbus UDP.

5.2. SETUP

Use Telnet to configure direction of sensor, the sensor can be placed in steps of 90 degrees offset around the heading axis.

5.3. TROUBLESHOOTING / FAULTFINDING

Preliminary fault isolation Check

- ✓ The electrical connections are correct as described in drawing in chapter 4.

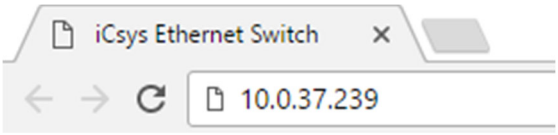
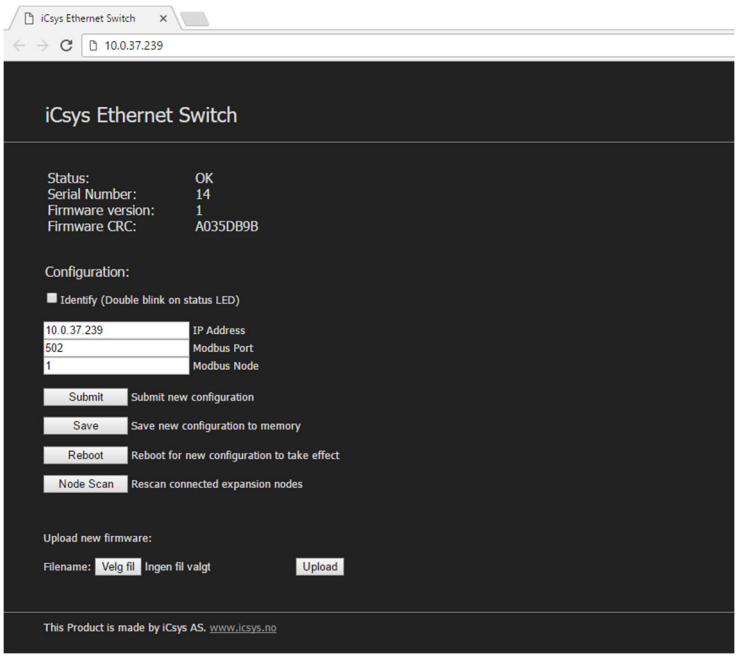
Trouble shooting		
Symptom	**Possible Causes**	**Remedy**
No Network Link	• No power to device	• Be sure power in a range from 10 – 30VDC is provided to the sensor
	• Error in Ethernet wiring	• Verify correct wiring according to pin configuration on connector
	• Wrong port setting at host device	• Verify host device port is either in Auto or at 10Mbps full duplex
No communication	• Wrong IP address being used	• Verify correct IP address being used
Incorrect Heading	• Affected by external interference	• Position the sensor away from magnetic disturbances • Perform Hard and soft iron calibration

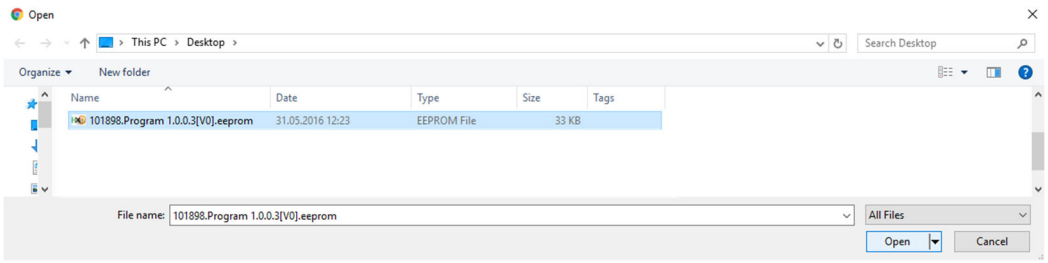
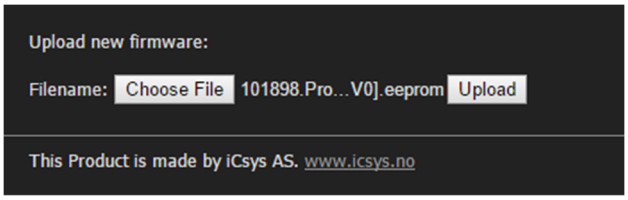
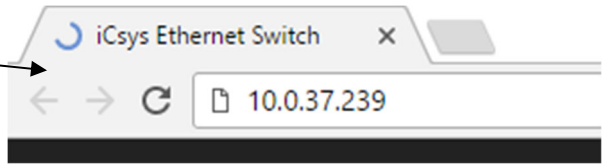
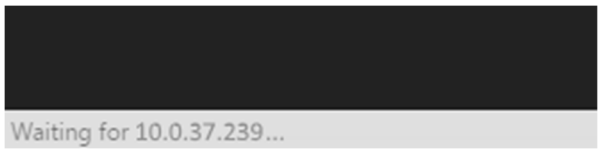
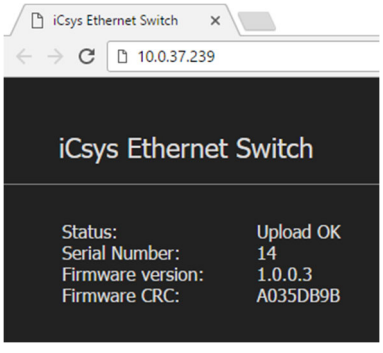
5.4. FIRMWARE UPDATE

Follow this guide to update the firmware in the Subsea Motion Sensor.

CAUTION:

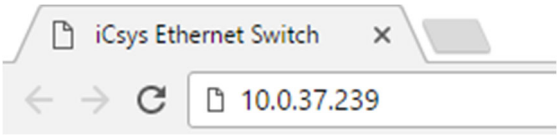
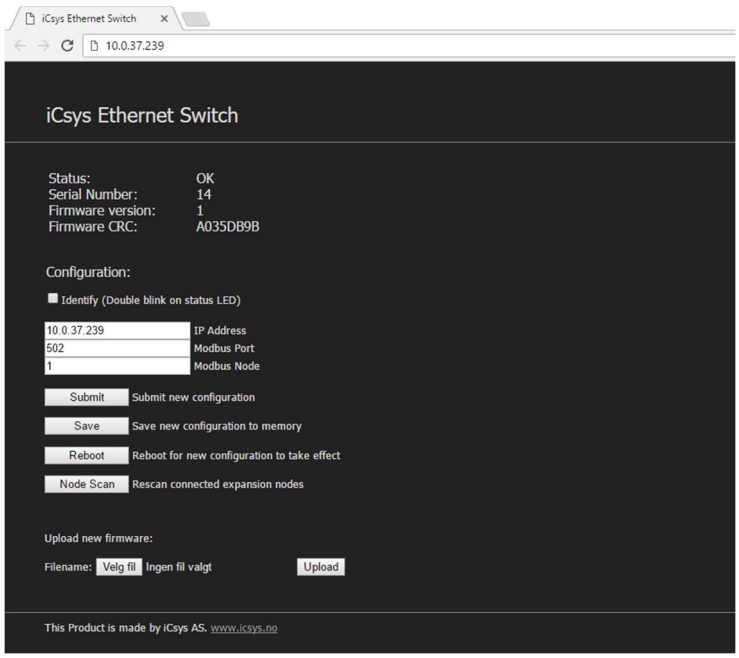
- Do not power down the unit when updating new firmware, this will damage the component that is updating.

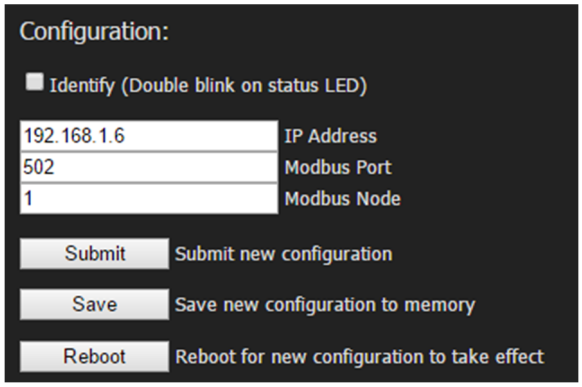
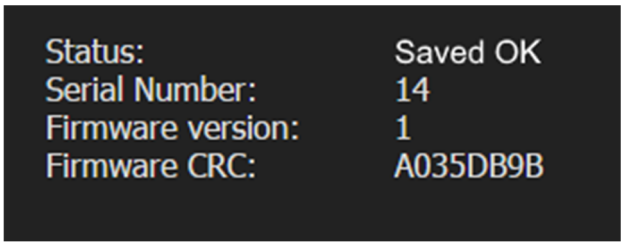
Step	Description	✓
1.	Open web browser, connect to desired unit by typing its IP address. Default IP address of the Subsea Motion Sensor is 10.0.37.240 	☐
2.	When connected, following page will show with info about status, serial number, firmware version, etc. 	☐
3.	To update firmware press “Choose File”	☐

4.	A file dialog will open, choose .eeprom file provided by iCsys AS. Press open. 	☐
5.	When correct .eeprom file is chosen, press upload. 	☐
6.	When firmware is uploaded, the browser will indicate that it is waiting for the page to respond. Top of page   Bottom of page	☐
7.	When uploading is finished, Status will indicate “Upload OK” or “Upload Failed”. If “Upload Failed” is shown or the web page times out, try one more time. 	☐
8.	Press reboot for the new firmware to take effect.	☐

5.5. CHANGING IP ADDRESS

Follow this procedure to change the IP address of the Subsea Motion Sensor.

Step	Description	✓
1.	Open web browser, connect to desired unit by typing its IP address. Default IP address of the Subsea Motion Sensor is 10.0.37.240 	☐
2.	When connected, following page will show with info about status, serial number, firmware version, etc. 	☐

3.	To change IP address, type in the new IP address in the IP address field, also fill in desired Modbus port and node id. 	☐
4.	Press “Submit” and then press “Save” to save the new settings to EEPROM. 	☐
5.	Press “Reboot” for the new settings to take effect.	☐

6. COMMUNICATION PROTOCOL

6.1. MODBUS TCP/UDP

Default IP address	10.0.37.240
Default Modbus Node	1
Modbus port	502

6.2. HEARTBEAT

Heartbeat messages are sent once each second to Multicast IP 255.255.255.255 port 65000. These messages can be detected to see IP address if unknown.

6.3. DATA TYPES

The following table describes the data types used on iCsys boards. For 32bit values two Modbus registers is used where the first is the most significant.

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

7. REGISTERS

7.1. READ REGISTERS

7.1.1. HEADER

Address	Description	Note	Data Type
0	PCB Type	Subsea Motion Sensor Type = 26	UINT16
1	Serial Number		UINT16
2	Firmware Version		UINT16
3	Status	Not in Use	UINT16
4	Modbus Port		UINT16
5	Reserved		UINT16
6	Reserved		UINT16
7	Slave Address	Modbus Slave Address	UINT16
8	Heartbeat	1Hz counter. Rolls over to zero after 65535	UINT16
9	Reserved		UINT16

7.1.2. INPUTS

Address	Description	Note	Data Type
10	Heading	Unit = 0.1°	UINT16
11	Roll	Unit = 0.1°	UINT16
12	Pitch	Unit = 0.1°	UINT16
13	Temperature	Unit = 0.1°C	UINT16
14	Roll Rate		UINT16
15	Pitch Rate		UINT16
16	Heading Rate		UINT16
17	Calibration Status	0 = Calibrated compensation not activated 1 = Compensation Activated >1 = Calibration ongoing and number of seconds left	UINT16

7.2. WRITE REGISTERS

7.2.1. OUTPUTS

Address	Description	Note	Data Type
100	Calibration Trigger	Write the value of 2 to this register to trigger start of Hard & Soft Iron Calibration. During calibration period of 90seconds, make a turn of 360 degrees. Read current countdown value in input register 17.	UINT16