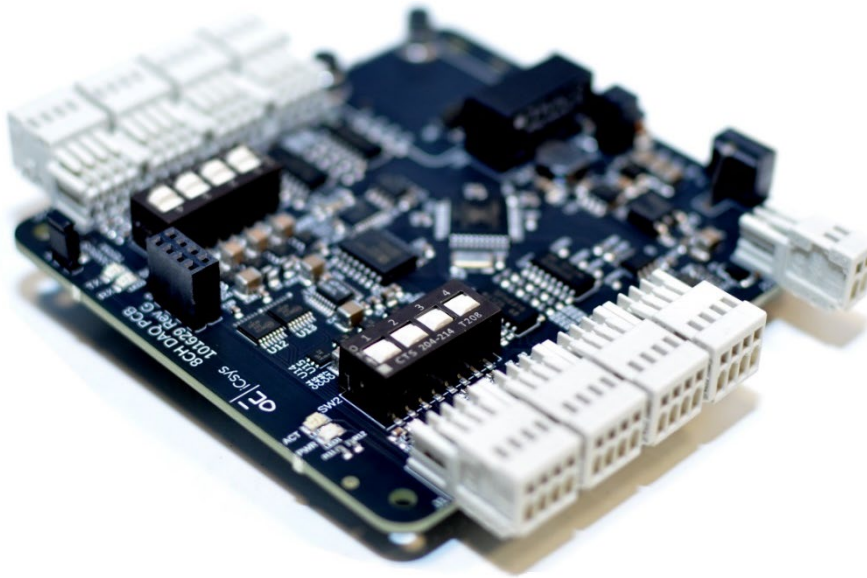




USER MANUAL



Equipment Description	PCB CS 8CH DAQ
Ixys Part Number:	101629

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Published	Revision number	Revision reason	Revised by
24.01.2018	A	Issued for release	VHA
15.09.2022	B	Updated drawing	VHA
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02.01.2023	D	Change Encoder configuration registers	VHA
22.05.2023	E	Added Counter Per Min Values	VHA
26.10.2023	F	Added single/dual pulse counter input selection	VHA
Prepared		Checked	Approved
VHA		EAP	SHA

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1. INTRODUCTION

1.1. GENERAL NOTES

This document outlines and defines the installation, operation and maintenance procedures for the Ixys PCB CS 8CH DAQ. 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 PCB CS 8CH DAQ supplied by Ixys 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 Read Only Memory

1.4. SUPPLIER CONTACT INFORMATION

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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 8CH DAQ PCB is a printed circuit board with multiple analog and digital inputs for connection of analog and digital sensors. The board can be set up in two modes, slave or master.

Configuration is possible through Web interface and by Modbus RTU/UDP/TCP.

3.2. TECHNICAL DATA

General	
Manufacturer	Ixys AS
Description	PCB CS 8CH DAQ
Weight	~150g
Dimensions	96 x 90 x 13mm (PC104 format)

Electrical Data	
Supply Voltage	20 – 30 VDC
Power Consumption	~5W

Cable Connectors	
Power Supply	Wago 733-102
Input Ports	Wago 733-104

Other	
Default IP address	10.0.37.247
Recommended spacers under PCB	15mm

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

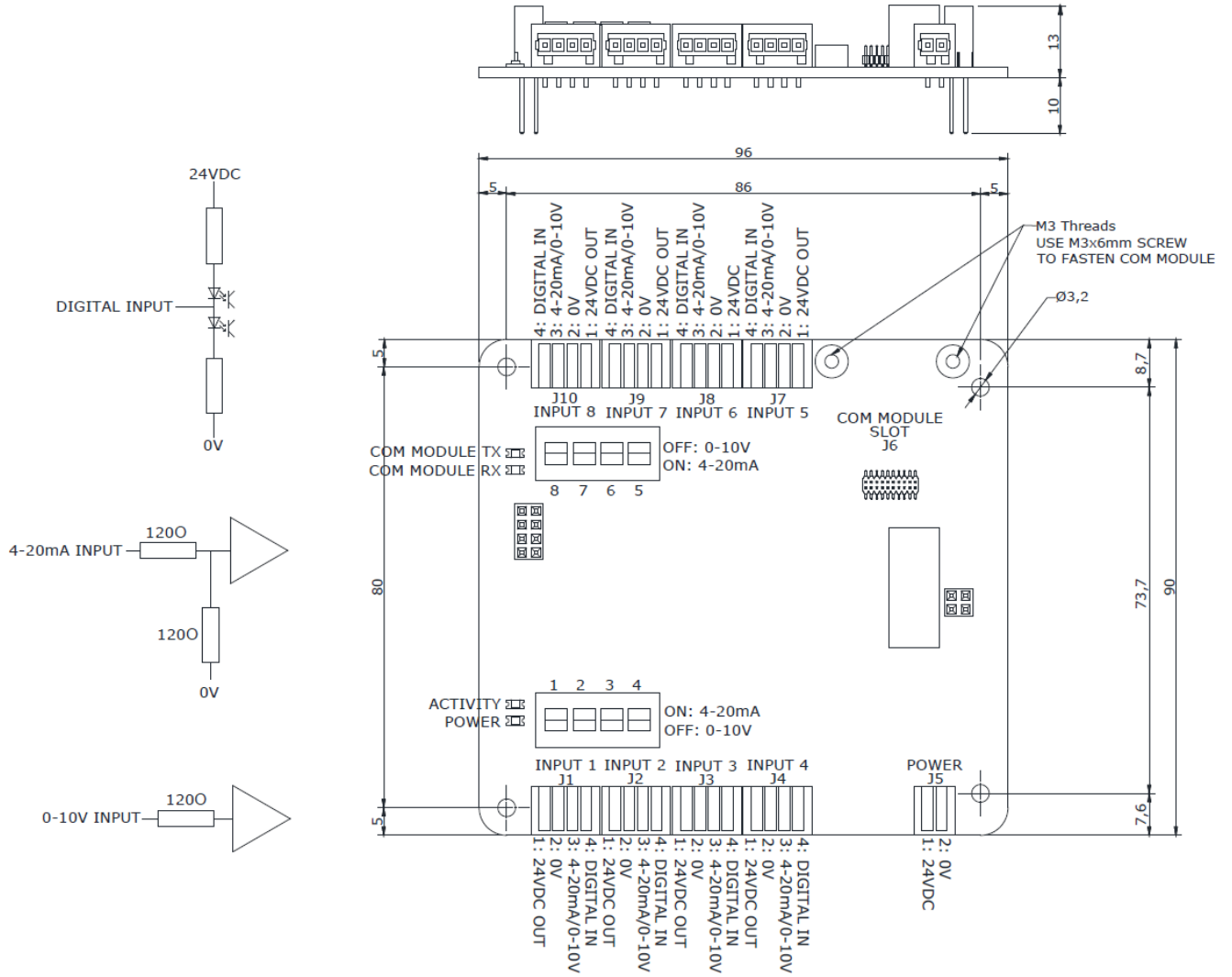
3.4. ORDERING

Ixys Part Number	Description
101629	PCB CS 8CH DAQ

3.5. ACCESSORIES

Ixys Part Number	Description
100040	Connector – 2 Way Cable contact Wago 733-102
100086	Connector – 4 Way Cable contact Wago 733-104
100713	Ethernet module
100141	RS485 module
100140	RS232 module

4. DRAWING



5. OPERATION

5.1. NORMAL OPERATION

Master Mode: Communication modules can be selected for direct communication. Through stack connectors, the board can share power and data bus with other Ixys CS range boards. The attached Ixys CS expansion IO boards will automatically be discovered by the board and the Modbus register list will add registers for the IOs on the connected boards. Node selector switch must be set to zero for the board to be set in Master mode.

Slave Mode: The board can be attached to another Ixys CS-range board configured as master. The board will then share power and communication with the master board and all inputs will be presented in the master board Modbus registers. Node selector switch must be set higher than zero for the board to be configured as slave.

5.2. SETUP

DIP Switches can be used to select 4-20mA or 0-10v analog input, ref. PCB drawing.

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 communication with PCB	<ul style="list-style-type: none"> • No power to board. • Wrong IP address being used. 	<ul style="list-style-type: none"> • Be sure power in a range from 8 – 30VDC is provided to the board. • Verify correct IP address being used.
Unstable detection and communication with attached IO boards	<ul style="list-style-type: none"> • No termination on CAN-Bus between the boards. 	<ul style="list-style-type: none"> • Add 120-ohm resistor between CAN-High and CAN-Low in 8pin stack connector.

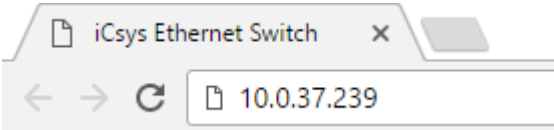
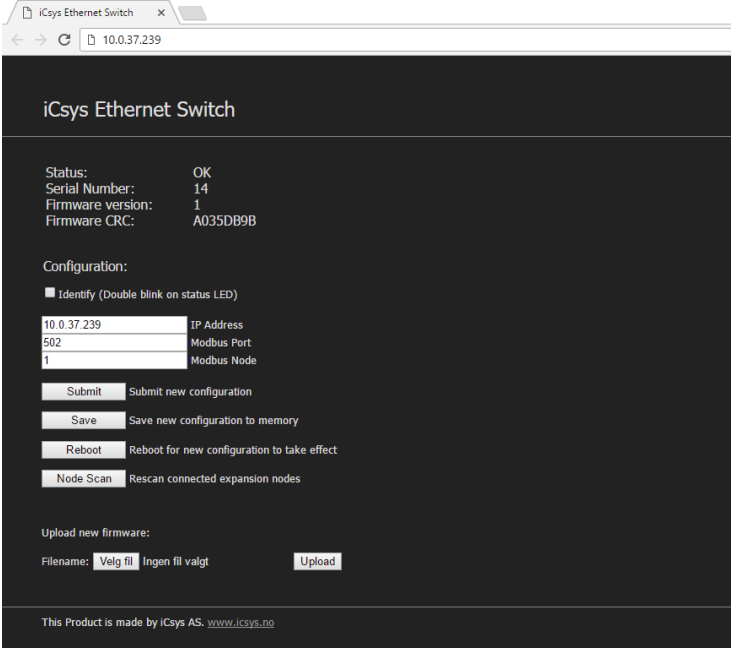
5.4. FIRMWARE UPDATE

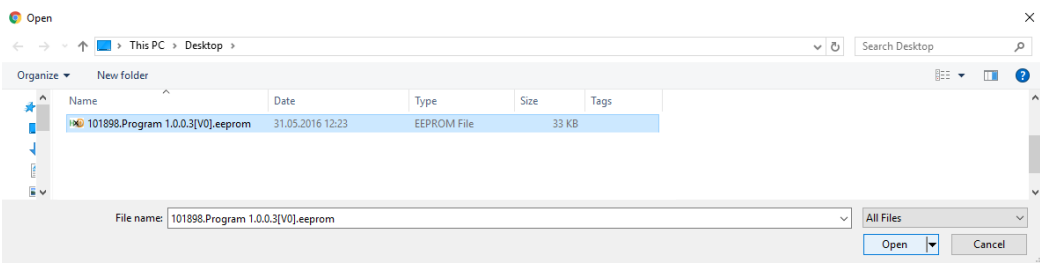
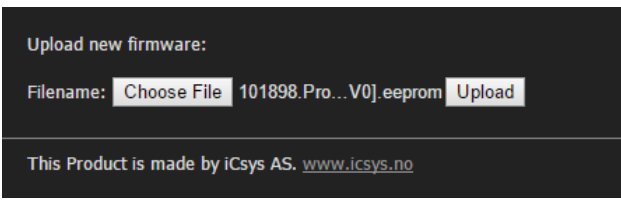
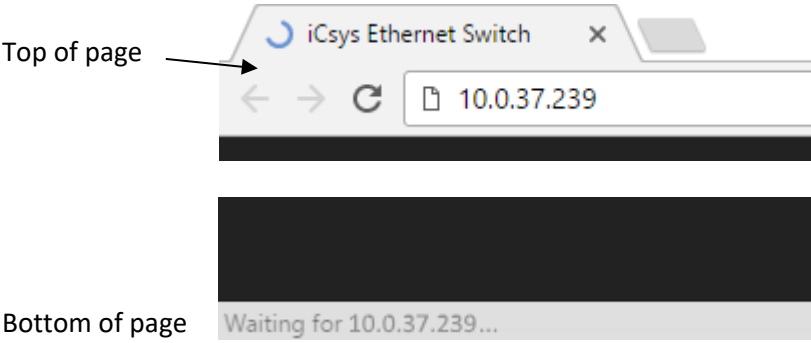
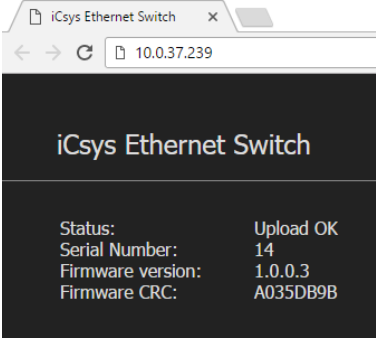
Follow this guide to update the firmware in the 8CH DAQ PCB (images are shown for Ethernet switch, but only the text is different).



CAUTION:

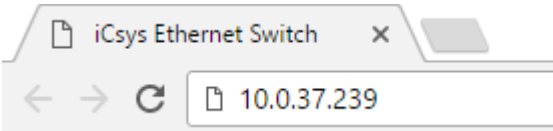
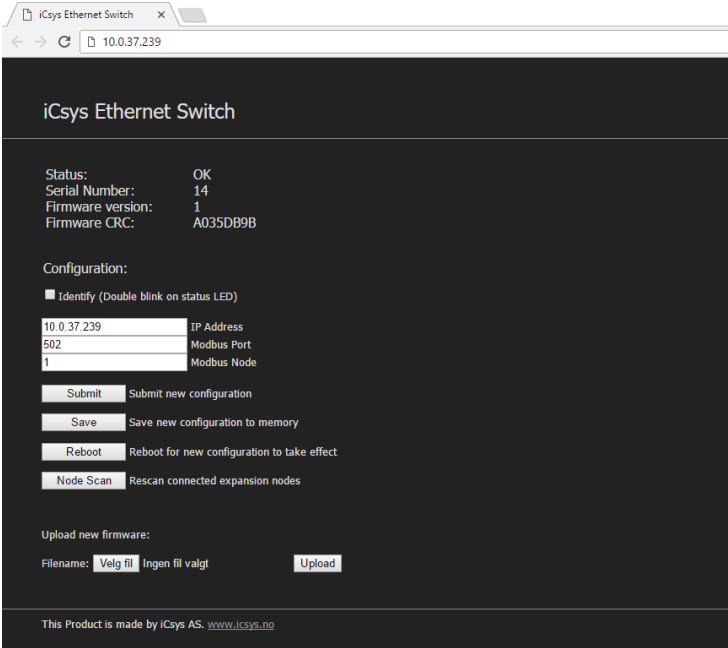
- Do not power down the board when updating new firmware, this will damage the component that is updating.

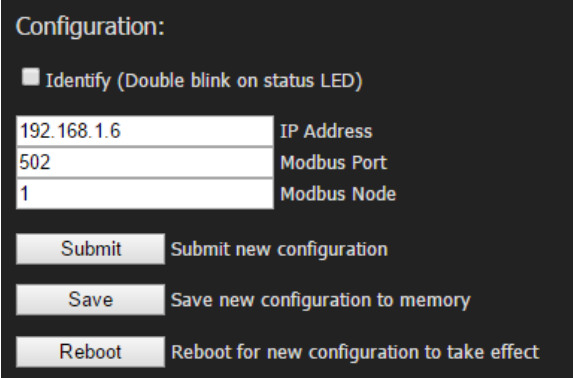
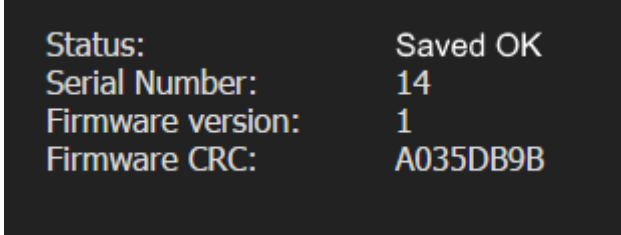
Step	Description	✓
1.	Open web browser, connect to desired 8CH DAQ PCB by typing its IP address. Default IP address is 10.0.37.247 	<input type="checkbox"/>
2.	When connected, following page will show with info about status, serial number, firmware version, etc. More features will be added here by future development. 	<input type="checkbox"/>
3.	To update firmware press “Choose File”	<input type="checkbox"/>

<p>4.</p>	<p>A file dialog will open, choose .eeprom file provided by Ixys AS. Press open.</p> 	<input type="checkbox"/>
<p>5.</p>	<p>When correct .eeprom file is chosen, press upload.</p> 	<input type="checkbox"/>
<p>6.</p>	<p>When firmware is uploaded, the browser will indicate that it is waiting for the page to respond.</p> 	<input type="checkbox"/>
<p>7.</p>	<p>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.</p> 	<input type="checkbox"/>
<p>8.</p>	<p>Press reboot for the new firmware to take effect.</p>	<input type="checkbox"/>

5.5. CHANGING IP ADDRESS

Follow this procedure to change the IP address of the 8CH DAQ PCB (images are shown for Ethernet switch, but only the text is different)..

Step	Description	✓
1.	<p>Open web browser, connect to desired 8CH DAQ PCB by typing its IP address. Default IP address is 10.0.37.247</p> 	<input type="checkbox"/>
2.	<p>When connected, following page will show with info about status, serial number, firmware version, etc. More features will be added here by future development.</p> 	<input type="checkbox"/>

<p>3.</p>	<p>To change IP address, type in the new IP address in the IP address field, also fill in desired Modbus port and node id.</p> 	<input type="checkbox"/>
<p>4.</p>	<p>Press "Submit" and then press "Save" to save the new settings to EEPROM.</p> 	<input type="checkbox"/>
<p>5.</p>	<p>Press "Reboot" for the new settings to take effect.</p>	<input type="checkbox"/>

6. REGISTERS

6.1. DATA TYPES

The following table describes the data types used on Ixys 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

6.2. READ REGISTERS

6.2.1. HEADER

Address	Description	Note	Data Type
0	PCB Type		UINT16
1	Serial Number		UINT16
2	Firmware Version		UINT16
3	Status	Bit2 = Water Alarm	UINT16
4	Modbus Port		UINT16
5	Supply Voltage	Unit = 0.1V	UINT16
6	Timeout (ms before Com Fail)	Timeout not implemented in current version	UINT16
7	Slave Address	Modbus Slave Address	UINT16
8	IP address octet 0 & 1		UINT16
9	IP address octet 2 & 3		UINT16

6.2.2. INPUTS

Address	Description	Note	Data Type
10	Input 1	Raw 16bit ADC value where 12500 = ~4mA and 62700 = ~20mA	UINT16
11-17	Input 2 - 8		UINT16
18	Digital Input States High	Bit 0 = Digital input 1 pulled high, Bit 1 = Input 2 ...	UINT16
19	Digital Input States Low	Bit 0 = Digital input 1 pulled low, Bit 1 = Input 2 ...	UINT16
20	Spare		UINT16
21	Spare		UINT16
22	Counter 1 Total LSB	Total number of pulses counted by the two digital pulse counters	INT32
23	Counter 1 Total MSB		
24	Counter 2 Total LSB		INT32
25	Counter 2 Total MSB		
26	Counter 1 Per Minute LSB	Calculated number of pulses per minute. Value returns to zero after 3seconds with no pulse.	REAL32
27	Counter 1 Per Minute MSB		
28	Counter 2 Per Minute LSB		REAL32
29	Counter 2 Per Minute MSB		
30-499	Additional IO board Inputs	See Expansion PCB Register Document: ICS-SW-PRT-0005	

6.3. WRITE REGISTERS

6.3.1. OUTPUTS

- All Outputs are none volatile

Address	Description	Note	Data Type
500-799	Additional IO board Outputs	See Expansion PCB Register Document: ICS-SW-PRT-0005	

6.4. READ/WRITE REGISTERS

6.4.1. SETTINGS

Settings registers are stored to nonvolatile memory when changed.

Address	Description	Default	Note	Data Type
1490	Encoder #1 Type	0	0 = NPN 1 = PNP	UINT16
1491	Encoder #1 Reserved	0		UINT16
1492	Encoder #1 Single/Dual	1	0 = Single Input (uses only input #1) 1 = Dual Input	UINT16
1493	Encoder #1 Input No #1	0	Default to 0 for Digital Input 1 as source	UINT16
1494	Encoder #1 Input No #2	1	Default to 1 for Digital Input 2 as source	UINT16
1495	Encoder #2 Type	0	0 = NPN 1 = PNP	UINT16
1496	Encoder #2 Reserved	0		UINT16
1497	Encoder #2 Single/Dual	1	0 = Single Input (uses only input #1) 1 = Dual Input	UINT16
1498	Encoder #2 Input No #1	2	Default to 2 for Digital Input 3 as source	UINT16
1499	Encoder #2 Input No #2	3	Default to 3 for Digital Input 4 as source	UINT16

6.4.2. IO BOARDS

Enter the IP address in a web browser and press the “Node Scan” button on the web page to detect attached nodes and add registers for the IO’s on the attached nodes. Press the “Save” button to store the Node list to non-volatile memory. A node scan takes ten seconds. Node 0 is the 8CH DAQ PCB itself.

Maximum number of external nodes is 18. Registers for Node 19 are for Nodes outside range (1-18) or duplicate Node numbers. See 6.3.3 for more information.

Address	Description	Note	Data Type
1400-1418	Node 0 – 18 Type	Type number of node	UINT16
1420-1438	Node 0 – 18 Serial Number	Resets to zero if lost connection with Node	UINT16
1440-1458	Node 0 – 18 Inputs/Outputs	Byte 0 = Number of Input words Byte 1 = Number of Output words Zero until “Node Scan” Performed in web page	UINT16
1460-1478	Node 0 – 18 Firmware Version		UINT16

6.4.3. IO BOARD SETTING CHANGE

Registers for read and write of setting parameters in the attached IO boards. Write to registers 1481-1486 first and then run command by increasing register 1487 by one. Completion of command will be indicated by register 1488 set equal to register 1487.

Address	Description	Note	Data Type
1480	Setting Write Command	Set to 1 to prepare write command	UINT16
1481	Setting Read Command	Set to 1 to prepare read command	UINT16
1482	Setting Type	Type number used for Read/Write Command	UINT16
1483	Setting Node-ID	Node-ID used for Read/Write Command	UINT16
1484	Setting Serial	Serial number used for Read/Write Command	UINT16
1485	Setting Index	Setting Index used for Read/Write Command (see table in 6.3.4)	UINT16
1486	Setting Value	Value used for Write Command or feedback from Read command	UINT16
1487	Setting Trigger	Write or read command is performed when this is unequal to 1488	UINT16
1488	Setting Completion	Write or read command is completed when this is equal to 1487	UINT16

6.4.4. DETECTION OF NEW NODE

When a new node with Node-ID outside the range of 1-18 or same Node-ID as existing node, the following registers will be populated with information needed to program a new Node-ID by setting change (Ref.: 6.3.2) of index 0. Be aware that any Ixys boards with jumpers or rotary hex switch set to any Node-ID above 0 will be overridden at power reset to the physically set Node-ID.

Address	Description	Note	Data Type
1419	New Unknown Node - Type	Type number of New Node detected with node ID outside range (1-18) or equal to existing Node in list	UINT16
1459	New Unknown Node – Node-ID	Node-ID of New Node detected with node ID outside range (1-18) or equal to existing Node in list	UINT16
1439	New Unknown Node - Serial	Serial number of New Node detected with node ID outside range (1-18) or equal to existing Node in list	UINT16
1479	New Unknown Node - Version	Firmware Version of New Node detected with node ID outside range (1-18) or equal to existing Node in list	UINT16

6.4.5. STANDARD SETTING INDEXES

For board specific settings, please see Expansion PCB Register Document: ICS-SW-PRT-0005.

Index	Description	Note
0	Node-ID	Change Node-ID here if not set by jumpers or rotary hex switch on board
1	Serial Number	Do not change unless told by Ixys
2	Interval	Interval in milliseconds between transmitted CAN-Messages from the Node. This is overridden by the network switch