Hydro-View / Hydro-Hub EtherNet/IP Configuration Guide

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Hydronix welcomes comments and suggestions relating to the product and this documentation

ACKNOWLEDGEMENTS

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Revision history

Revision No	Software Version	Date	Description of Change
1.0.0		Sept 2020	First release
1.1.0		August 2021	Updated Connection Diagrams

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Table of Figures

Chapter 1 Introduction

This guide details the installation and configuration of the optional Hydronix Hydro-Hub EtherNet/IP Module. The module enables EtherNet/IP communication between the Hydro-Hub/Hydro-View and a EtherNet/IP Scanner.

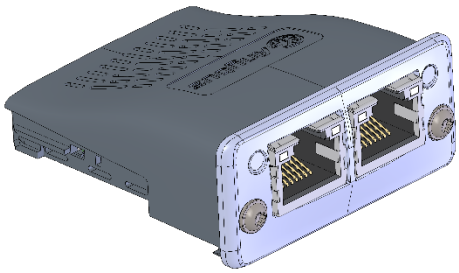

Figure 1: Hydro-Hub EtherNet/IP Module

Using the Hydronix EtherNet/IP module will provide direct access to any Hydronix Sensor connected to the Hydro-Hub/Hydro-View network from the PLC.

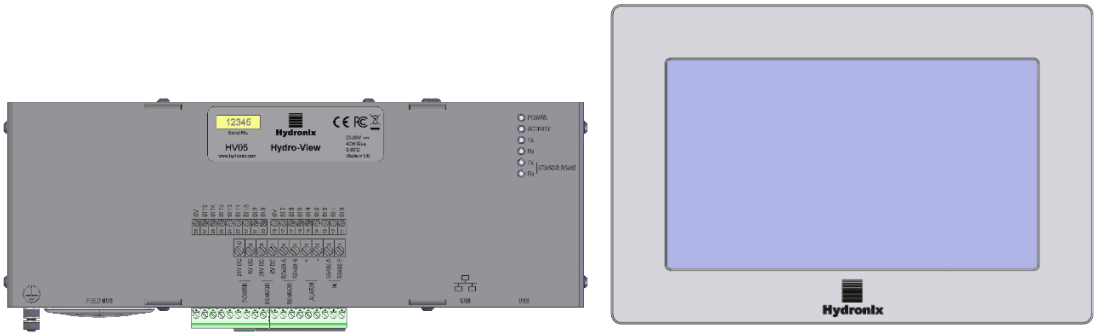

Figure 2: Hydro-Hub (L), Hydro-View (R)

Previous knowledge of EtherNet/IP, Allen-Bradley PLCs, Studio 5000 and RSLinx are required as this document is intended as a basic guide only.

For detailed Hydro-Hub/Hydro-View instructions see the Hydro-Hub/Hydro-View user guide HD0864

All references to a Hydro-Hub EtherNet/IP Module in the guide are valid for the Hydro-Hub and Hydro-View hardware. The electrical connections and configuration of the Hydro-Hub and Hydro-View are identical.

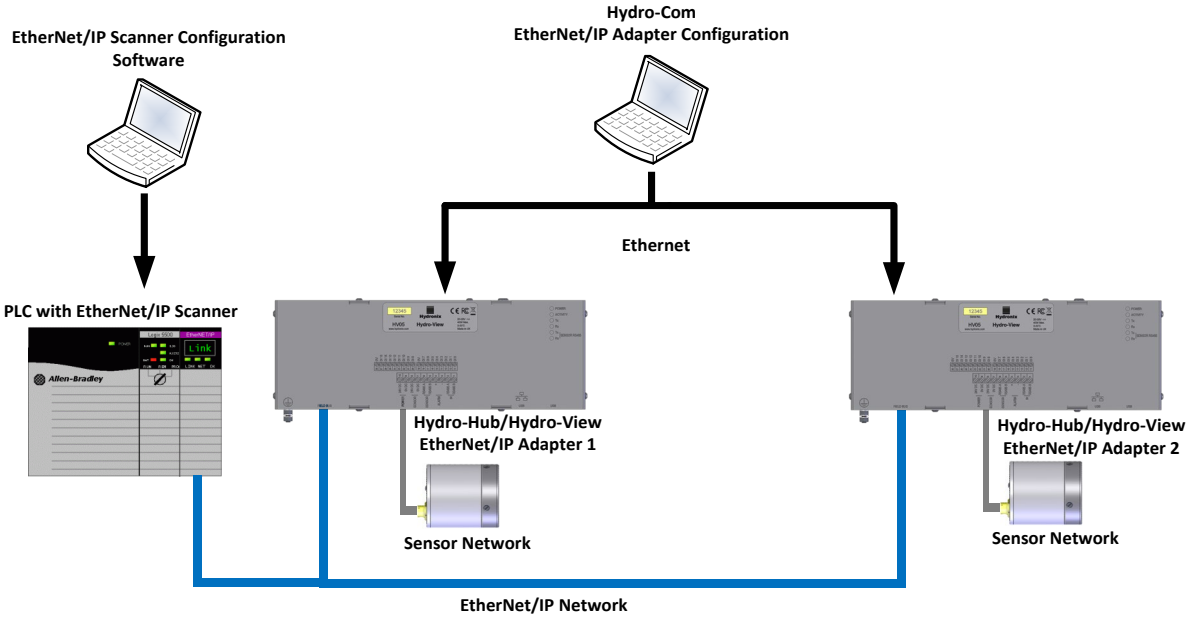

Figure 3: System Overview

1 Hydronix EtherNet/IP Module

To enable EtherNet/IP communication with the Hydro-Hub/Hydro-View the optional Hydronix EtherNet/IP Module must be installed.

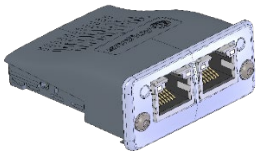

Figure 4: EtherNet/IP Module

1. Switch off the Hydro-Hub/Hydro-View
2. Remove the protection cover from the Hydro-Hub/Hydro-View

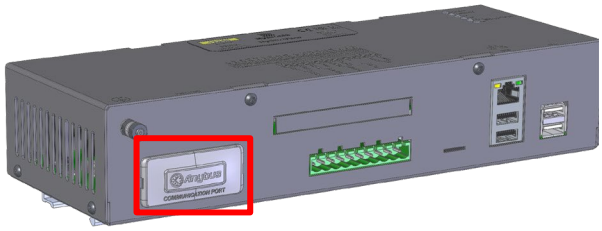

Figure 5: Protection Cover

3. Insert the Hydro-Hub EtherNet/IP Module as show in the Figure 6. Ensure the connector is correctly positioned.

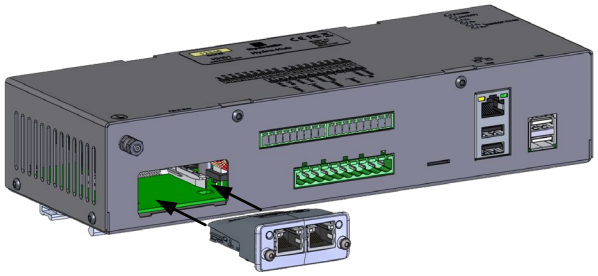

Figure 6: Installing the Hydro-Hub EtherNet/IP Module

4. Tighten the two anti-tamper screws.

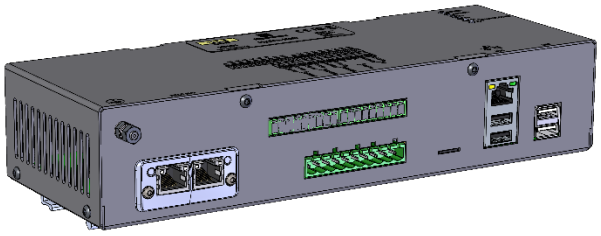

Figure 7: Hydro-Hub EtherNet/IP Module Installed

2 Wiring

The Hydronix EtherNet/IP module supports Star and Ring topologies.

2.1 Star Topology

When using a Star topology, the PLC (controller) and all Hydronix EtherNet/IP Modules are connected to a central network switch.

Figure 8: Star Topology

2.2 Ring Topology

When using a ring topology, the PLC (controller) and all Hydronix EtherNet/IP Modules are connected in a ring

Figure 9: Ring Topology

Note: To enable remote access to the Hydro-Hub/Hydro-View, the main ethernet communication port must also be connected to the network switch (connection not shown).

2.3 Cables

The Hydronix EtherNet/IP Module utilises a RJ45 connector. Suitable cables are:

- Category 5
- Category 5e
- Category 6
- Category 6e

To avoid electrical interference all cabling must be run separately from any mains and motor cabling. A segregation of at least 200mm between the EtherNet/IP cabling and any high voltage/current wiring must be provided.

In situations where the 200mm segregation cannot be provided, for example when cables must cross, ensure they pass at 90° (never parallel).

In areas at risk of lightning strikes, protection should be provided to shield the EtherNet/IP module and the Hydro-View/Hydro-Hub from damage.

Note: For additional EtherNet/IP cabling guidance see the appropriate EtherNet/IP standards documentation.

All wiring must be performed by persons holding the required qualifications for the local area.

The only configuration required in the Hydro-Hub to enable EtherNet/IP communication is the Fieldbus Address. The Fieldbus address must be the fixed I.P address that is targeted by the Scanner initiating the Class 1 connection.

1 Configure the Hydro-Hub Fieldbus Address

Select Settings from the main menu (It is assumed for this step that a user has logged in as an engineer. See HD0864 for details)

Figure 10: Hydro-Hub Settings

Set the Fieldbus Address to the required static I.P address. By default the module is set as 0.0.0.0 which is a dynamic I.P address configuration. When an I.P address is set it will be configured to be static.

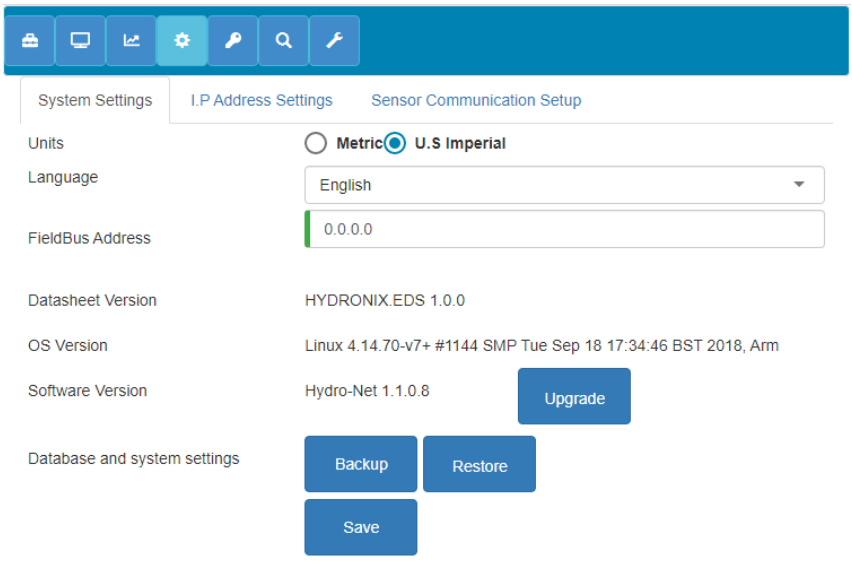

Figure 11: Hydro-Hub EtherNet/IP Address

After the Fieldbus address has been changed the Hydro-Hub must be powered down and then restarted. If the Hydro-Hub is connected to the network and the Scanner is configured correctly both lights on the Hydro-View EtherNet/IP module will be green.

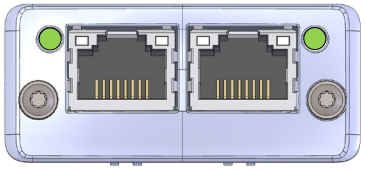

Figure 12: Hydro-Hub EtherNet/IP Module Correctly Configured

The Hydronix EtherNet/IP module must have a class 1 connection established to run. The connection configuration is as shown in Figure 13.

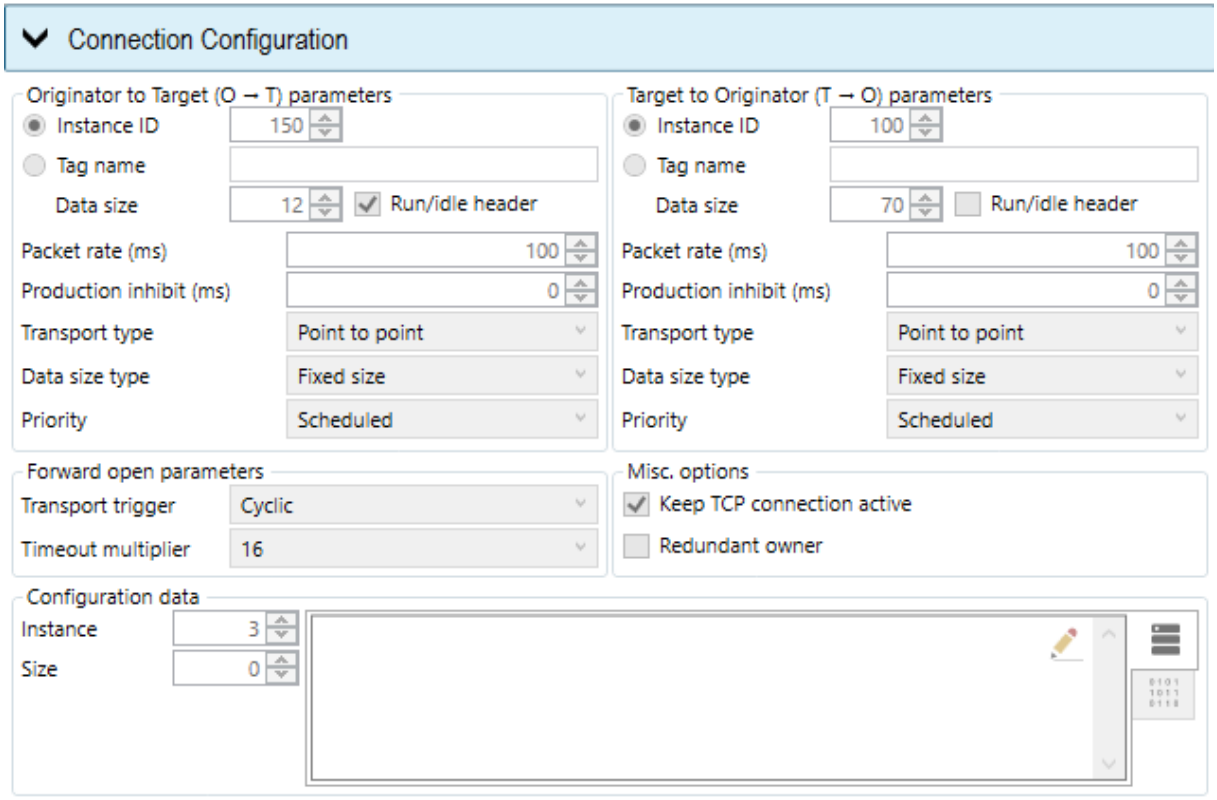

Figure 13: Connection Configuration

The I/O data available using the Hydronix EtherNet/IP module is detailed below (**Table 1**).

Module Name	**Input/ output**	**Data Type**	**Description**	**Data Range**
Sensor Address	Output	Word	Node address of the Connected sensor	1 to16 16#0001 to 16#0010
Update Values	Output	DWord	Configures the Update Mode to enable reading of the Averaging Status and/or the Digital Outputs for each connected sensor	16#0000_0000= None 16#0000_0001=Digital Outputs 16#0000_0002=Averaging Status 16#0000_0003=Both **Sensor Address must be set to 16#0000 for this request to work**
Update Trigger	Output	Word	Update Trigger initiates a sensor update command	The Hydro-Hub will initiate the communication with a sensor whenever the Update Trigger value changes. (Positive Edge)

Activate Averaging	Output	Word	Activate the averaging in a single or multiple connected sensors	Each bit in the 16bit word will active the sensor with the corresponding node address (1-16) **Sensor Address must be set to 16#0000 for this request to work**
Filtered Unscaled F	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Filtered Unscaled Mode F”	
Filtered Unscaled V	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Filtered Unscaled Mode V”	
Filtered Unscaled E	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Filtered Unscaled Mode E”	
Filtered Moisture F	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Filtered Moisture Mode F”	
Filtered Moisture V	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Filtered Moisture Mode V”	
Filtered Moisture E	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Filtered Moisture Mode E”	
Unscaled Average F	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Average Unscaled Mode F”	
Unscaled Average V	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Average Unscaled Mode V”	

Unscaled Average E	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Average Unscaled Mode E”	
Moisture Average F	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Average Moisture Mode F”	
Moisture Average V	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Average Moisture Mode V”	
Moisture Average E	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Average Moisture Mode E”	
Electronics Temp	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Electronic Temperature”	
Resonator Temp	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Resonator Temperature”	
Material Temp	Input	DWord	Floating point Number 2 decimal place precision. Sensor output value “Material Temperature”	
Digital Outputs	Input	Word	Current status of the connected sensor(s) digital output	Each bit in the 16bit word will indicate the digital output status of the sensor with the corresponding node address (1-16)
Averaging Status	Input	Word	Averaging status of the connected sensors	Each bit in the 16bit word will indicate the averaging status of the sensor with the corresponding node address (1-16)
Updated	Input	Word	Updated is incremented when the Hydro-Hub has completed a message transaction	Rolling increment from: 16#0001 to 16#00FF If an error has occurred Updated will be set as: 16#0000

Available Sensors	Input	Word	Current sensors available on the network	Each bit in the 16bit word represents a sensor node address (1-16)
Search Status	Input	Word	Indicates if a search of the sensor network is in progress	0= No search in progress 1= Search in progress
Search Network	Output	Word	Start a search of the network	1= Start Search Increment the Trigger Word to initiate the search

Table 1: Hydronix EtherNet/IP Mapping

1 Example Transactions

To retrieve data from a sensor, a Search Network command must be completed. A search of the network is automatically started when the Hydro-View/Hydro-Hub is switched on. If a new sensor is added to the network a new search, using the Hydro-View/Hydro-Hub, must be performed. Alternatively, the network can be searched using the Search Network command.

1.1 Sensor Live Values

To retrieve the current live values from a sensor the “Sensor Address” value must be set to match the sensor node address. The command is activated by incrementing the “Update Tigger” word. The “Updated” value will be incremented by 1 on completion of the request.

1.2 Current Digital output status

To retrieve the current digital output status the “Sensor Address” output must be set to 0. The “Status Update Value” is set to 16#0000_0001 and the “Trigger” bit is incremented. Each bit of the 16bit “Digital Outputs” input is set to represent a sensor on the network based on the node address. The “Update Status” value will be incremented by 1 on completion of the request.

The following message indicates that the digital outputs on sensors 3, 12 and 16 are active.

1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0

1.3 Current Averaging Status

To retrieve the current “Averaging Status” of the sensors on the network the “Sensor Address” output must be set to 16#0000. “Update Values” is set to 16#0000_0002 and the “Update Trigger” bit is incremented. Each bit of the 16bit “Averaging Status” is set to represent a sensor on the network based on the node address. The “Updated” value will be incremented by 1 on completion of the request.

The following message indicates that sensors 1, 2, 3 and 8 are currently averaging.

0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1

1.4 Activate Averaging

To command a sensor to start averaging the “Sensor Address” output must be set to 16#0000. The averaging for a sensor is configured by setting the appropriate bit in the 16bit “Activate Averaging” output. The “Update Trigger” bit is then incremented. The “Updated” value will be incremented by 1 on completion of the request. The “Activate Averaging” message is sent every time the “Trigger” is incremented and the sensor address is also set to 0.

The following message will start averaging a sensor with a node address of 1.

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

To stop averaging the previously active bit is set to 0 and the “Trigger” bit incremented.

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1.5 Search Network

To initiate a search of the sensor network, set “Search Network” to 1 and increment the “Update Trigger” word. During the search cycle the “Search Status” word will be set to 1. Once the search has completed the “Search Status” word will return to 0.

The available sensors on the network are indicated by the “Available Sensors” word. Each bit in the “Available Sensors” word is set if a sensor is available. Each bit represents a sensor node address (1-16). The LSB represents address 1.

The following message shows there are 5 sensors on the network. The available sensors have node address’: 1, 5, 9, 10 and 16.

1	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1

1 Document Cross Reference

This section lists all of the other documents that are referred to in this User Guide. You may find it beneficial to have a copy available when reading to this guide.

Document Number	Title
HD0864	Hydro-View / Hydro-Hub User Guide

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