

## ENVIROMUX® Series

# ENVIROMUX-DI16DO(R)16

## Digital Input/Output Expander

### Installation Manual



ENVIROMUX-DI16DO16 (Front and Rear View)



ENVIROMUX-DI16DOR16 (Rear View)

The ENVIROMUX-DI16DO(R)16 Digital Input/Output Expander enables the connection of up to 16 additional digital sensors and output devices using just one RJ45 Sensor port on an ENVIROMUX-2D, ENVIROMUX-5D, or ENVIROMUX-16D Server Environment Monitoring System (SYSTEM).

The ENVIROMUX-DI16DO16 includes digital outputs with an open-collector design for the control of up to 16 relays, solenoids, LEDs, and other devices that operate at voltages between 0-24VDC (maximum 500mA).

The ENVIROMUX-DI16DOR16 includes digital outputs with a normally-open SPST relay design for the control of up to 16 different devices that operate at a maximum 125VAC (0.5A maximum) or maximum 30VDC (1.0A maximum).

### Features

The ENVIROMUX-DI16DO16 and ENVIROMUX-DI16DOR16 have many features in common, and several differences, detailed below:

#### Features in common:

- Interfaces with the SYSTEM via the RJ45 Sensor Port
- Digital inputs:
  - 16 screw terminal pairs for connecting dry contact devices
    - One screw terminal pair for tachometer; 0 to 255 Hz
  - Accepts 26 to 16AWG wire
  - Potential free
  - Voltage range: 0 to +36VDC
  - Over-voltage surge protected
- Supports 18-24AWG CAT5/5e/6 cable up to 500 ft. (152.4 m)

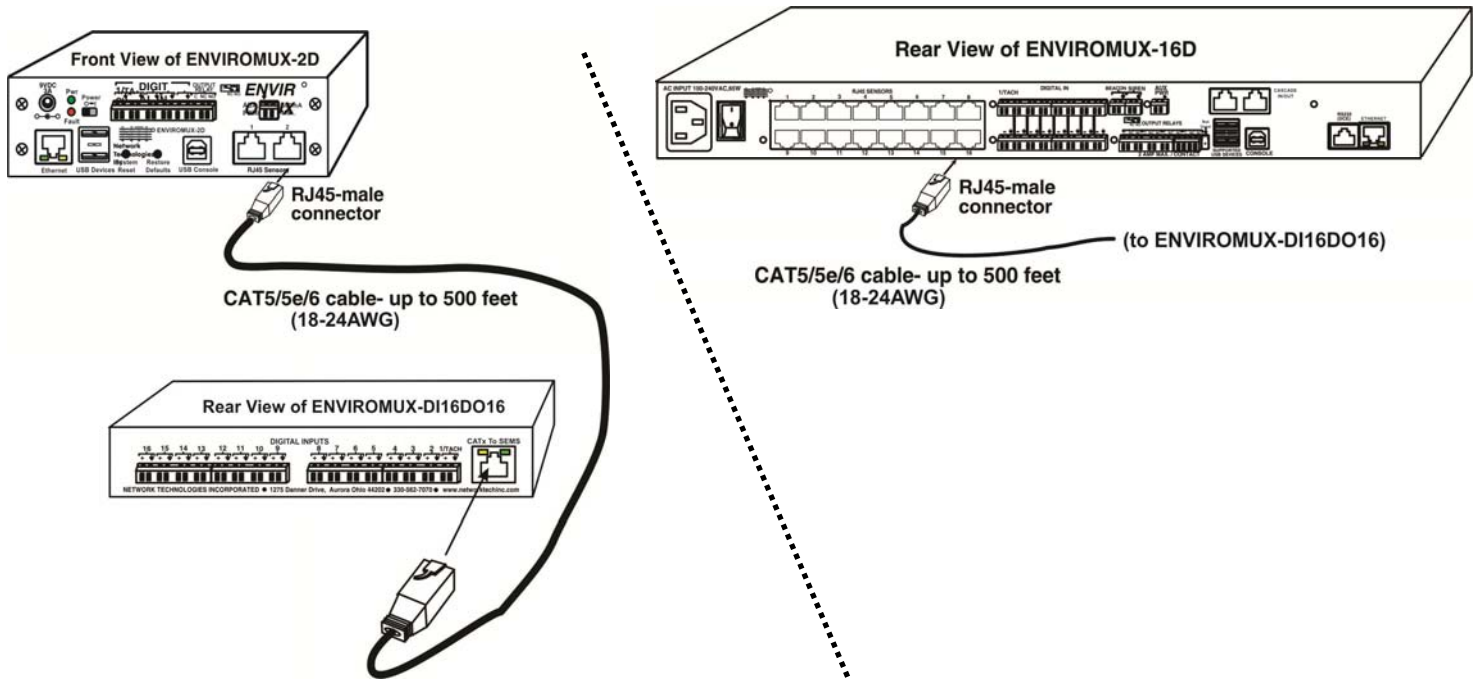
#### Feature differences:

Feature	ENVIROMUX-DI16DO16	ENVIROMUX-DI16DOR16
<b>Digital outputs</b>	<ul style="list-style-type: none"> <li>• 16 screw terminal pairs for open-collector outputs</li> <li>• Accepts 26 to 16AWG wire</li> <li>• Rated sink current: 500mA per output</li> <li>• +5VDC, 22kΩ pull-ups</li> <li>• Voltage range: 0 to +24VDC</li> <li>• Over-voltage surge protected</li> </ul>	<ul style="list-style-type: none"> <li>• 16 screw terminal pairs for normally-open relay contact outputs</li> <li>• Accepts 26 to 16AWG wire</li> <li>• Potential free</li> <li>• Rated switching load: 0.5A @ 125 VAC, 1.0A @ ±30VDC</li> <li>• Fused</li> </ul>
<b>Power supply</b>	Requires 75mA at 5VDC (Powered by SYSTEM)	Includes 120VAC or 240VAC at 50 or 60Hz-5VDC/3.0A AC Adapter
<b>Dimensions (WxDxH)</b>	6.49x3.10x1.08 in (165x79x27 mm)	6.49x3.10x1.78 in (165x79x45 mm)

**Note:** No external earth ground connection is necessary.

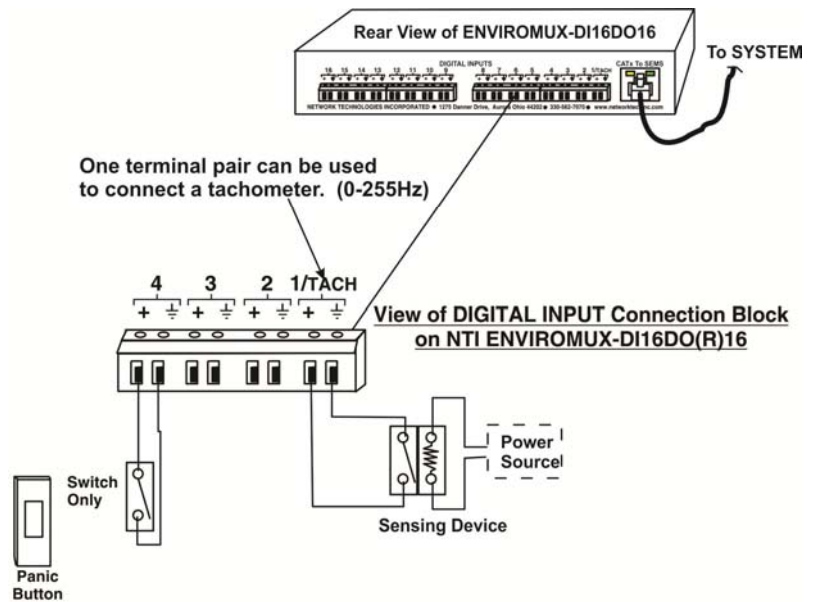
## Installation

1. Connect the Expander to the SYSTEM using up to 500 feet (152.4 m) of 18-24AWG CAT5, 5e, or 6 cable.

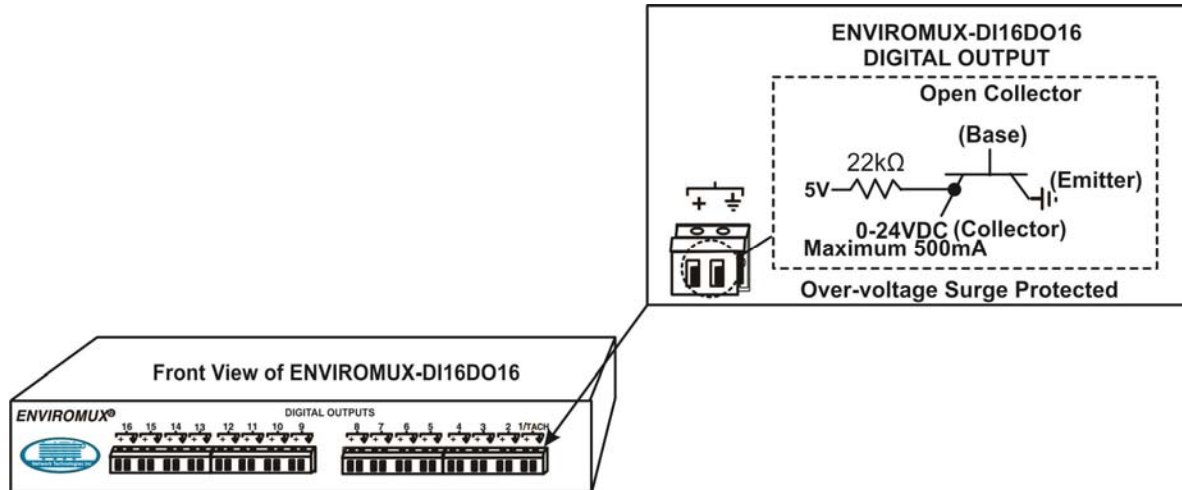


2. Dry contact sensors can then be connected to the Expander using 26-16AWG wire. Up to 16 sensors can be connected. Two-wire switch-only type sensors can be connected to the plus (+) and ground ( $\frac{-}{\perp}$ ) terminals of each of 16 sets of terminals.

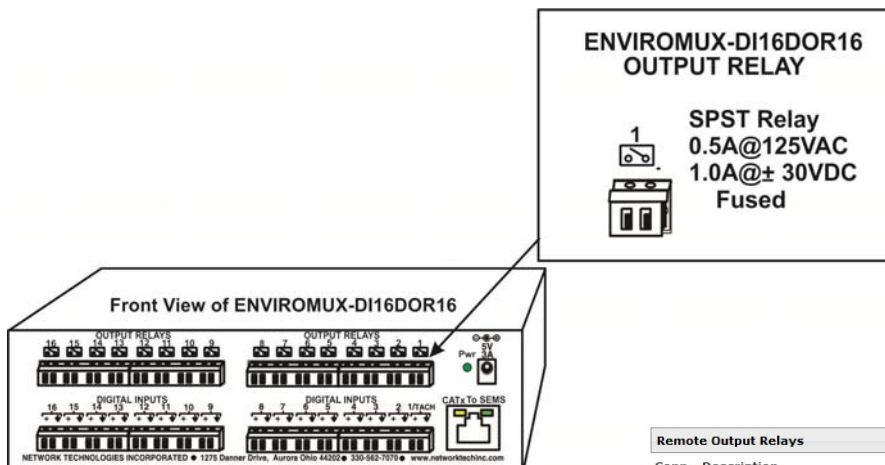
Terminal pair 1 is specially designed for connection of a tachometer/anemometer with a range of 0-255Hz (like the ENVIROMUX-WSS Wind Speed Sensor).



3a. Digital Outputs on the ENVIROMUX-DI16DO16 have an open-collector design for the control of up to 16 relays, solenoids, LEDs, and other devices that operate at voltages between 0-24VDC (maximum 500mA). Devices connected to Digital Outputs will display in the “Remote Output Relay” list in the SYSTEM web interface for assignment to sensor alert responses.



3b. Output Relays on the ENVIROMUX-DI16DOR16 have a normally-open SPST relay design for the control of up to 16 different devices that operate at maximum 125VAC (0.5A maximum) or maximum 30VDC (1.0A maximum). Devices connected to Output Relays will display in the “Remote Output Relay” list in the SYSTEM web interface for assignment to sensor alert responses.



View of “Remote Output Relay” list on the web interface Summary Page (Output Relays from two ENVIROMUX-DI16DO16 are shown)

Remote Output Relays				
Conn.	Description	Type	Value	Action
1.1	<a href="#">Conn #1 Output Relay #1</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.2	<a href="#">Conn #1 Output Relay #2</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.3	<a href="#">Conn #1 Output Relay #3</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.4	<a href="#">Conn #1 Output Relay #4</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.5	<a href="#">Conn #1 Output Relay #5</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.6	<a href="#">Conn #1 Output Relay #6</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.7	<a href="#">Conn #1 Output Relay #7</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.8	<a href="#">Conn #1 Output Relay #8</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.9	<a href="#">Conn #1 Output Relay #9</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.10	<a href="#">Conn #1 Output Relay #10</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.11	<a href="#">Conn #1 Output Relay #11</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.12	<a href="#">Conn #1 Output Relay #12</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.13	<a href="#">Conn #1 Output Relay #13</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.14	<a href="#">Conn #1 Output Relay #14</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.15	<a href="#">Conn #1 Output Relay #15</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
1.16	<a href="#">Conn #1 Output Relay #16</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.1	<a href="#">Conn #2 Output Relay #1</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.2	<a href="#">Conn #2 Output Relay #2</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.3	<a href="#">Conn #2 Output Relay #3</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.4	<a href="#">Conn #2 Output Relay #4</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.5	<a href="#">Conn #2 Output Relay #5</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.6	<a href="#">Conn #2 Output Relay #6</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.7	<a href="#">Conn #2 Output Relay #7</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.8	<a href="#">Conn #2 Output Relay #8</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.9	<a href="#">Conn #2 Output Relay #9</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.10	<a href="#">Conn #2 Output Relay #10</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.11	<a href="#">Conn #2 Output Relay #11</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.12	<a href="#">Conn #2 Output Relay #12</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.13	<a href="#">Conn #2 Output Relay #13</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.14	<a href="#">Conn #2 Output Relay #14</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.15	<a href="#">Conn #2 Output Relay #15</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>
2.16	<a href="#">Conn #2 Output Relay #16</a>	Output Relay	Inactive	<a href="#">View</a> <a href="#">Edit</a>



## Web Interface- Summary Page

The Summary Page of the SYSTEM will display sensors connected to the ENVIROMUX-DI16DO(R)16 in a separate list labeled "Remote Digital Inputs". (The image below demonstrates the summary page with **two** ENVIROMUX-DI16DO16 Digital Expanders connected.)

The SYSTEM will also recognize the number 1 connector set on the ENVIROMUX-DI16DO(R)16 as a possible tachometer connector, displaying its status under "Sensors". If a tachometer is being connected, configure the sensor as such. If a water sensor or dry-contact sensor is going to be connected to connection 1 (Connection "1.1" or "2.1" below), ignore the listing under "Sensors" and configure the listing under "Remote Digital Inputs". Do not configure both.

To configure Input #1 for connection to tachometer

### Summary

#### Sensors

Conn.	Description	Type	Value	Status	Action
1	<a href="#">Sensor #1.1</a>	Wind Speed	0.0MPH	Normal	<a href="#">View</a> <a href="#">Edit</a> <a href="#">Delete</a>
2	<a href="#">Sensor #2.1</a>	DIO	0Hz	Normal	<a href="#">View</a> <a href="#">Edit</a> <a href="#">Delete</a>

#### Digital Inputs

Conn.	Description	Type	Value	Status	Action
1	<a href="#">Relay Output Test</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2	<a href="#">Conn #2 Digital Input #11</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
3	<a href="#">Digital Input #3</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
4	<a href="#">Digital Input #4</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
5	<a href="#">Digital Input #5</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>

#### IP Devices

Num.	Description	Type	Value	Status	Action
------	-------------	------	-------	--------	--------

#### Output Relays

Conn.	Description	Type	Value	Status	Action
1	<a href="#">Output Relay #1</a>	Output Relay	Inactive		<a href="#">View</a> <a href="#">Edit</a>

#### Remote Digital Inputs

Conn.	Description	Type	Value	Status	Action
1.1	<a href="#">Conn #1 Digital Input #1</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.2	<a href="#">Conn #1 Digital Input #2</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.3	<a href="#">Conn #1 Digital Input #3</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.4	<a href="#">Conn #1 Digital Input #4</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.5	<a href="#">Conn #1 Digital Input #5</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.6	<a href="#">Conn #1 Digital Input #6</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.7	<a href="#">Conn #1 Digital Input #7</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.8	<a href="#">Conn #1 Digital Input #8</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.9	<a href="#">Conn #1 Digital Input #9</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.10	<a href="#">Conn #1 Digital Input #10</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.11	<a href="#">Conn #1 Digital Input #11</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.12	<a href="#">Conn #1 Digital Input #12</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.13	<a href="#">Conn #1 Digital Input #13</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.14	<a href="#">Conn #1 Digital Input #14</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.15	<a href="#">Conn #1 Digital Input #15</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
1.16	<a href="#">Conn #1 Digital Input #16</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.1	<a href="#">Conn #2 Digital Input #1</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.2	<a href="#">Conn #2 Digital Input #2</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.3	<a href="#">Conn #2 Digital Input #3</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.4	<a href="#">Conn #2 Digital Input #4</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.5	<a href="#">Conn #2 Digital Input #5</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.6	<a href="#">Conn #2 Digital Input #6</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.7	<a href="#">Conn #2 Digital Input #7</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.8	<a href="#">Conn #2 Digital Input #8</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.9	<a href="#">Conn #2 Digital Input #9</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.10	<a href="#">Conn #2 Digital Input #10</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.11	<a href="#">Conn #2 Digital Input #11</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.12	<a href="#">Conn #2 Digital Input #12</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.13	<a href="#">Conn #2 Digital Input #13</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.14	<a href="#">Conn #2 Digital Input #14</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.15	<a href="#">Conn #2 Digital Input #15</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>
2.16	<a href="#">Conn #2 Digital Input #16</a>	Digital Input	Open	Normal	<a href="#">View</a> <a href="#">Edit</a>

Remote Connections

First Expander

Second Expander

When configuring the Remote Digital Inputs for connection to a water sensors or dry-contact sensors, configure them just as you would any other Digital Input as described in the manual for the SYSTEM.

When configuring the use of Remote Output Relays, configure them also as described for Output Relays in the manual for the SYSTEM.

To view the status of a tachometer connected to Digital In #1, Click on the Sensor description or click on “View”

To view status, click either link

Sensors					
Conn.	Description	Type	Value	Status	Action
1	<a href="#">Sensor #1.1</a>	Wind Speed	0.0MPH	Normal	<a href="#">View</a> <a href="#">Edit</a> <a href="#">Delete</a>
2	<a href="#">Sensor #2.1</a>	DIO	0Hz	Normal	<a href="#">View</a> <a href="#">Edit</a> <a href="#">Delete</a>

The status page for the sensor will open, displaying the default value of the sensor with a 0-255Hz range of sensing operation.

**Type: DIO Connector: 2**

0Hz

**Status: Normal**

Handle Alert: Dismiss Apply Changes

Last alert was at:	Never	N/A
Lowest Reading:	11-07-2012 01:25:26 PM	0.0
Highest Reading:	11-07-2012 03:19:31 PM	13.0

[Clear Records](#)

Configure

24 Hours Last Week Last Month Clear Graph Data

Click here to open configuration page

To configure the sensor for specific use, click on “Configure” to open a page with variable values (see image on next page).

Most of the sensor settings are the same as any other sensor configuration (detailed in the SYSTEM manual) but there are some differences:

Sensor Settings	Description
Associate Sensor	Select if the Type “DIO” should be replaced by the sensor type to be entered in the next box.
Associated Sensor Type	Enter the “Type” of sensor that should be displayed on the summary page and in all alert communications received regarding this sensor
Associated Sensor Unit	Enter between 1 and 3 alphabetical characters. (Ex. MPH for Miles Per Hour) These characters will be used by the ENVIROMUX to represent the unit of measure reported by the attached sensor. Leaving it empty will result in an empty string in the reported data. For example, a value will be reported on the status page, but no unit of measure will be displayed.
SNMP Associated Type ID	Enter ID value from MIB file if SNMP traps will be used for alert notifications for this sensor (for more on this, see “SNMP Custom Type ID” on next page)
Min. Associated Level	The minimum range of the units to be associated with the cycle count measured from the attached sensor.  (Ex. the ENVIROMUX-WSS associates one rotation within 1 second to be a wind speed of 2.5MPH. With a maximum operating range of 255Hz (or cycles), the maximum wind speed measurement will be 637.5MPH (255Hz X 2.5MPH).)
Max. Associated Level	The maximum range of the units to be associated with the current reading measured from the attached sensor.

**SNMP Custom Type ID:** Use this field if SNMP traps will be used for alert notifications. The Type ID corresponds with a value defined in the MIB file under “extSensorType” (default value is 32567 for type “Custom”). Place the desired number in this box that represents the type of sensor to be reported in the MIB browser or SNMP trap.

To define a new type of sensor;

1. open the MIB file,
2. locate the section titled “extSensorType”,
3. assign a description and a number not already in use (in the “SYNTAX” field) to associate with it ,
4. enter the number for the newly defined extSensorType in the SNMP Custom Type ID box.

If the Type ID is left blank, the value “0” will be assigned, which will be reported in the browser and SNMP trap as type “undefined”.

### Sensor #2.1 Configuration (Type: DIO)

<input type="checkbox"/> <b>Sensor Settings</b>	
<b>Description</b>	<input type="text" value="Sensor #2.1"/> <small>Descriptive name for the sensor</small>
<b>Group</b>	<input type="text" value="1"/> <small>Select which group the sensor belongs to</small>
<b>Min. Level</b>	<input type="text" value="0.0"/> <small>Min. supported value for the sensor</small>
<b>Max. Level</b>	<input type="text" value="255.0"/> <small>Max. supported value for the sensor</small>
<b>Associate Sensor</b>	<input type="checkbox"/> Associate sensor to a customized sensor type
<b>Associated Sensor Type</b>	<input type="text"/> <small>Type of the associated sensor</small>
<b>Associated Sensor Unit</b>	<input type="text"/> <small>Measurement unit for the associated sensor</small>
<b>SNMP Associated Type ID</b>	<input type="text" value="32767"/> <small>ID value for SNMP type of associated sensor</small>
<b>Min. Associated Level</b>	<input type="text" value="0.000000"/> <small>Sensor expected value corresponding to 0 Hz</small>
<b>Max. Associated Level</b>	<input type="text" value="100.000000"/> <small>Sensor expected value corresponding to 255Hz</small>
<b>Min. Non-Critical Threshold</b>	<input type="text" value="0.0"/> <small>Min. threshold below which indicates an non-critical alert condition</small>
<b>Max. Non-Critical Threshold</b>	<input type="text" value="200.0"/> <small>Max. threshold above which indicates an non-critical alert condition</small>
<b>Min. Critical Threshold</b>	<input type="text" value="0.0"/> <small>Min. threshold below which indicates an alert condition</small>
<b>Max. Critical Threshold</b>	<input type="text" value="200.0"/> <small>Max. threshold above which indicates an alert condition</small>
<b>Refresh Rate</b>	<input type="text" value="10"/> <input type="text" value="Sec"/>
<small>The refresh rate at which the sensor view is updated</small>	
<input type="checkbox"/> <b>Non-Critical Alert Settings</b>	
<input type="checkbox"/> <b>Critical Alert Settings</b>	
<input type="checkbox"/> <b>Data Logging</b>	
<input type="button" value="Save"/>	
<b>Alert Simulation</b>	
<input type="button" value="Simulate Alert"/> <input type="button" value="Clear Alert"/>	

**Default configuration page for tachometer**

## Sensor #1.1 Configuration (Type: Wind Speed)

Sensor Settings	
Description	Sensor #1.1 Descriptive name for the sensor
Group	1 Select which group the sensor belongs to
Min. Level	0.0 Min. supported value for the sensor
Max. Level	255.0 Max. supported value for the sensor
Associate Sensor	<input checked="" type="checkbox"/> Associate sensor to a customized sensor type
Associated Sensor Type	Wind Speed Type of the associated sensor
Associated Sensor Unit	MPH Measurement unit for the associated sensor
SNMP Associated Type ID	32767 ID value for SNMP type of associated sensor
Min. Associated Level	0.000000 Sensor expected value corresponding to 0 Hz
Max. Associated Level	637.500000 Sensor expected value corresponding to 255Hz
Min. Non-Critical Threshold	0.0 Min. threshold below which indicates a non-critical alert condition
Max. Non-Critical Threshold	200.0 Max. threshold above which indicates a non-critical alert condition
Min. Critical Threshold	0.0 Min. threshold below which indicates an alert condition
Max. Critical Threshold	200.0 Max. threshold above which indicates an alert condition
Refresh Rate	10 Sec The refresh rate at which the sensor view is updated
Non-Critical Alert Settings	
Critical Alert Settings	
Data Logging	
Save	
Alert Simulation	
Simulate Alert Clear Alert	

Check this box if you enter data in the next 5 boxes

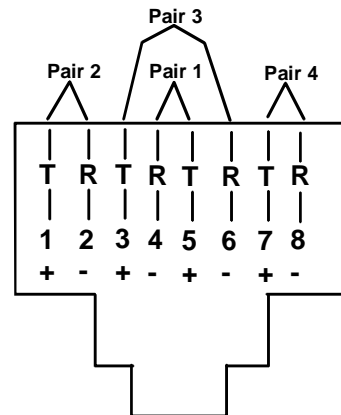
255Hz (cycles) x 2.5MPH per rotation in 1 second (cycle)

### Configuration of tachometer as a wind speed sensor (ENVIROMUX-WSS)

## CAT5 Cable

The CAT5 connection cable between the SYSTEM and the ENVIROMUX-DI16DO(R)16 is terminated with RJ45 connectors and must be wired according to the EIA/TIA 568 B industry standard. Wiring is as per the table and drawing below.

Pin	Wire Color	Pair
1	White/Orange	2
2	Orange	2
3	White/Green	3
4	Blue	1
5	White/Blue	1
6	Green	3
7	White/Brown	4
8	Brown	4



(View Looking into RJ45 Socket)

### TRADEMARK

ENVIROMUX is a registered trademark of Network Technologies Inc in the U.S. and other countries.

### COPYRIGHT

Copyright © 2012,2017 by Network Technologies Inc. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written consent of Network Technologies Inc, 1275 Danner Drive, Aurora, Ohio 44202.

### CHANGES

The material in this guide is for information only and is subject to change without notice. Network Technologies Inc reserves the right to make changes in the product design without reservation and without notification to its users.

MAN168 REV 11/10/2017