

# ENVIROMUX® Series

## E-DI16DO16 E-DI16DOR16-V2 Digital Input/Output Expander Installation Manual



E-DI16DO16 (Front and Rear View)



E-DI16DOR16-V2 (Rear View)

The E-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 E-2D, E-5D, or E-16D Server Environment Monitoring System (SYSTEM).  
 The E-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 E-DI16DOR16-xx 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 E-16D supports up to sixteen E-DI16DO16 or E-DI16DOR16-V2, the E-5D supports up to five (of either expander), and the E-2D supports up to two (of either expander).  
 The E-DI16DO16 and E-DI16DOR16-xx 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	E-DI16DO16	E-DI16DOR16-V2
<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> <li>• Outputs are galvanically isolated to 1kV</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)	6.49x3.15x1.71 in (165x80x44 mm)

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

#### Options:

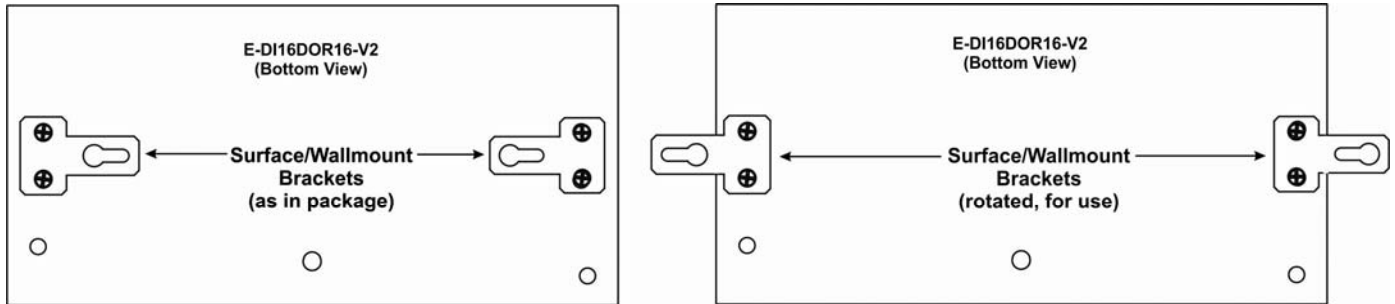
- E-DI16DOR16 with Standard desktop case- (Order E-DI16DOR16-V2)
- E-DI16DOR16 with Rackmounting Brackets- (Order E-DI16DOR16-V2R)
- Dual E-DI16DOR16 with Rackmounting Brackets (Order E-DI16DOR16-V22R)

## MOUNTING

The E-DI16DOR16-V2 comes with surface/wall mount tabs on the bottom of the case. These are easily removed and rotated for attachment to any flat surface. It also includes mounting holes for the installation of rack ear brackets. To mount in a rack as a single unit, order E-DI16DOR16-**V2R** to receive hardware for single unit mounting. To mount in a rack as a dual unit, order E-DI16DOR16-**V22R** to receive hardware for dual unit mounting.

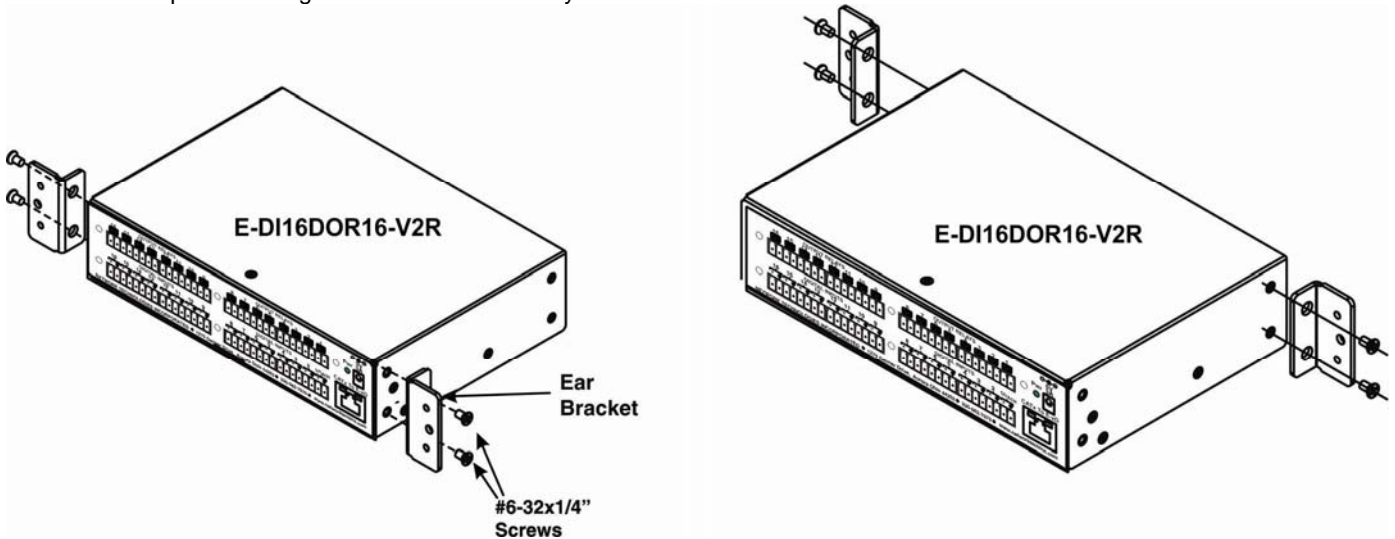
**Follow the instructions below for assembly and installation.**

To mount to a wall or other flat surface, remove the screws that secure the mounting tabs, rotate the tabs 180 degrees, and reinstall the screws.

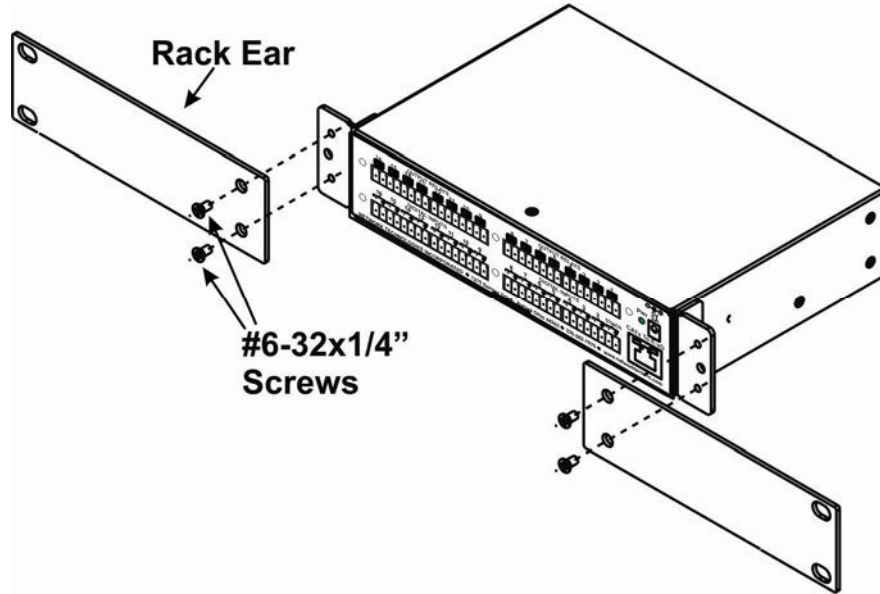


If the Expander will be mounted as a single or a double, brackets will need to be attached to the case to enable mounting ears or a connector plate to be attached.

1. Attach the ear brackets to the Expander. The holes in the brackets should line up with pre-threaded holes in the sides of the Expander. Tighten the screws securely.



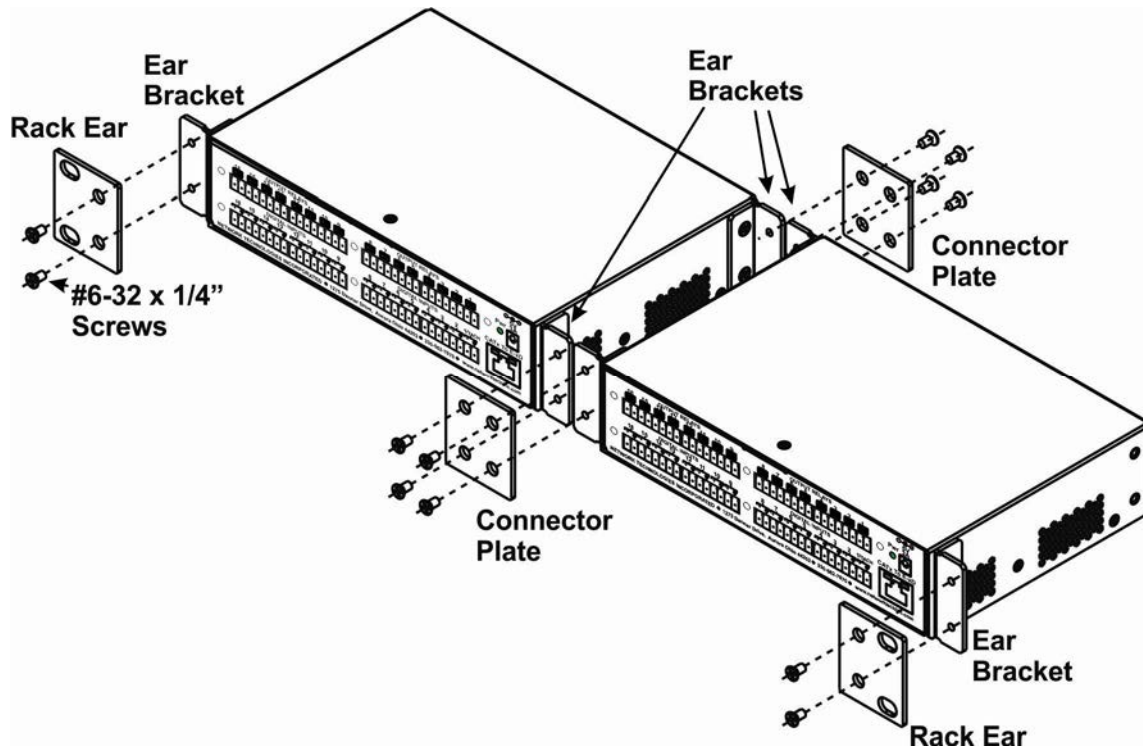
2. To mount a single Expander in a rack (E-DI16DOR16-V2R), attach the rack mounting ears to the ear brackets using the #6-32 x 1/4" screws provided. Tighten all screws securely.



- 3. Install 4 cage nuts (provided) to the rack in locations that line up with the holes in the mounting ears on the Expander.
- 4. Secure the Expander to the rack using the four #10-32x3/4" screws (not included). Be sure to tighten all mounting screws securely.

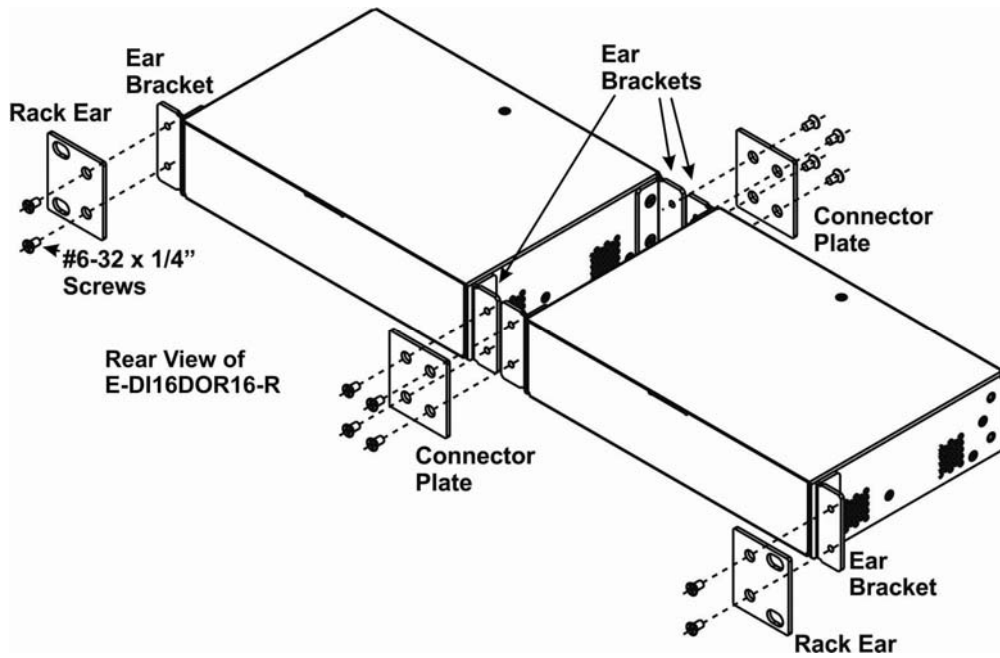
### Dual-Expander mounting

To mount a dual Expander in a rack (E-DI16DOR16-V22R), attach the rack ears to the far left side of the left Expander and right side of the right Expander using the #6-32 x 1/4" screws provided. Install ear brackets in the rear where the two cases will meet. Then install connector plates to join the two Expanders in the front and rear.

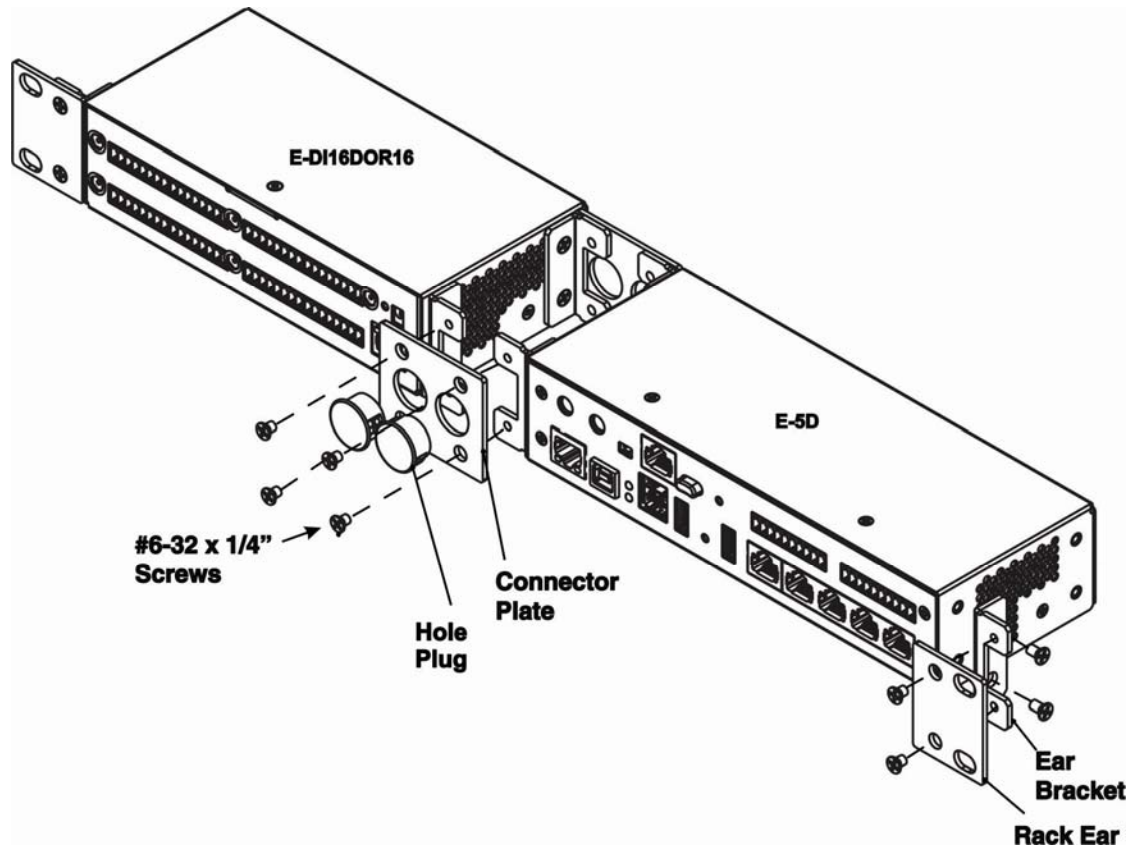


## Reversible Mounting Assembly

If the Expanders will have the cable connections coming from the rear, the ears and ear brackets can instead be applied to the back of the Expanders so that the Expanders can be mounted facing the rear. (Install these before attaching the connector plate to the front.) Once the ear brackets are applied, the ears and connector plates can be attached.

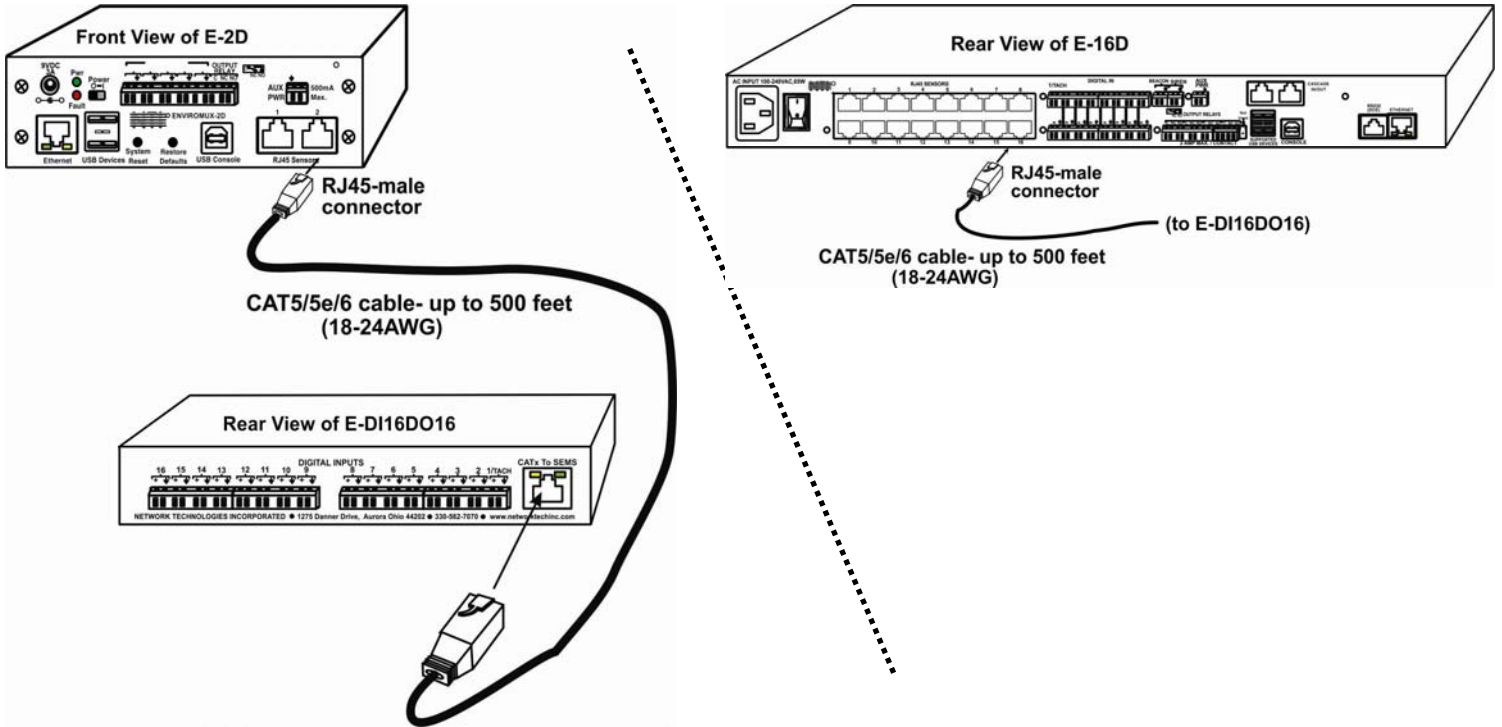


**E-RK1-5DDI16DOR16 Mounting Kit** For mounting E-DI16DOR16-V2 and E-5D side by side in 1RU. (E-RK1-2DDI16DOR16 Mounting Kit assembles in similar fashion.)



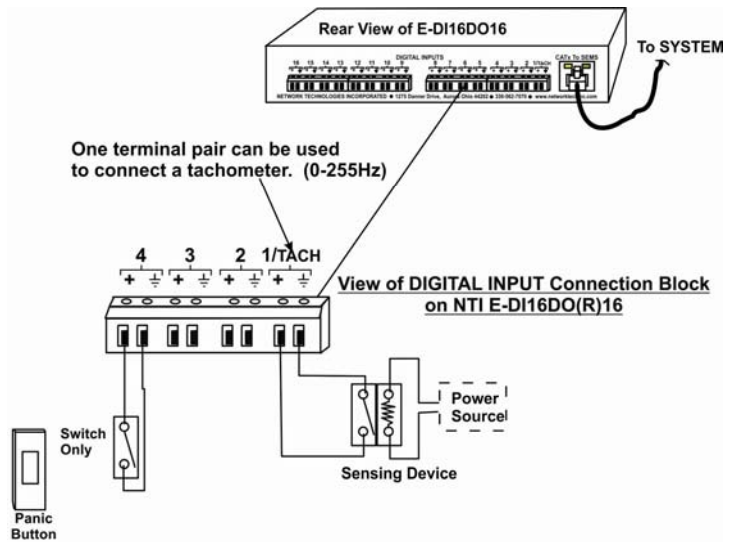
## Installation

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

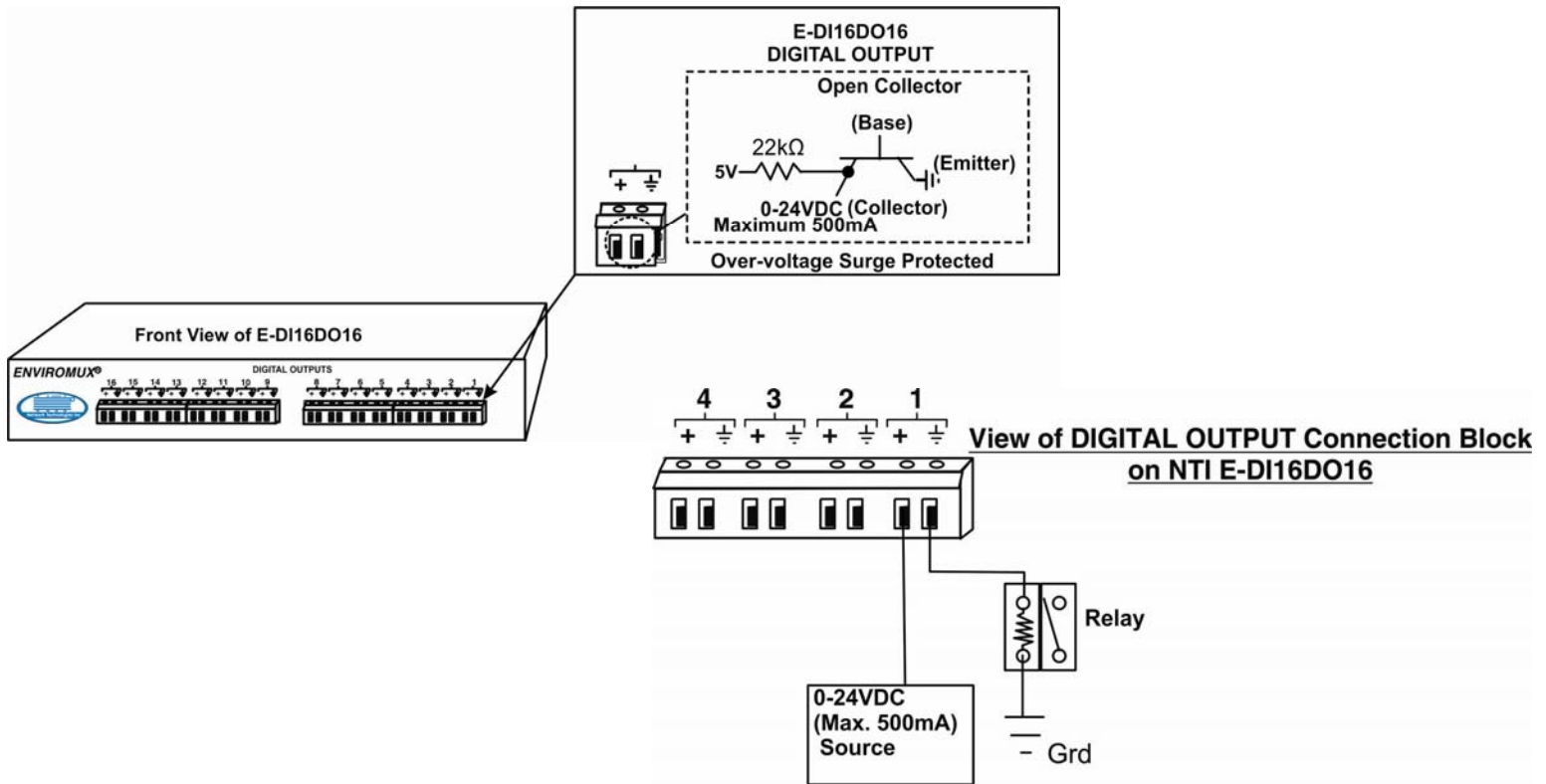


2. Dry contact sensors can then be connected to the Expander using 26-16AWG wire. Up to 16 sensors can be connected. Two-wire switch-only type sensors can be connected to the plus (+) and ground ( $\perp$ ) terminals of each of 16 sets of terminals.

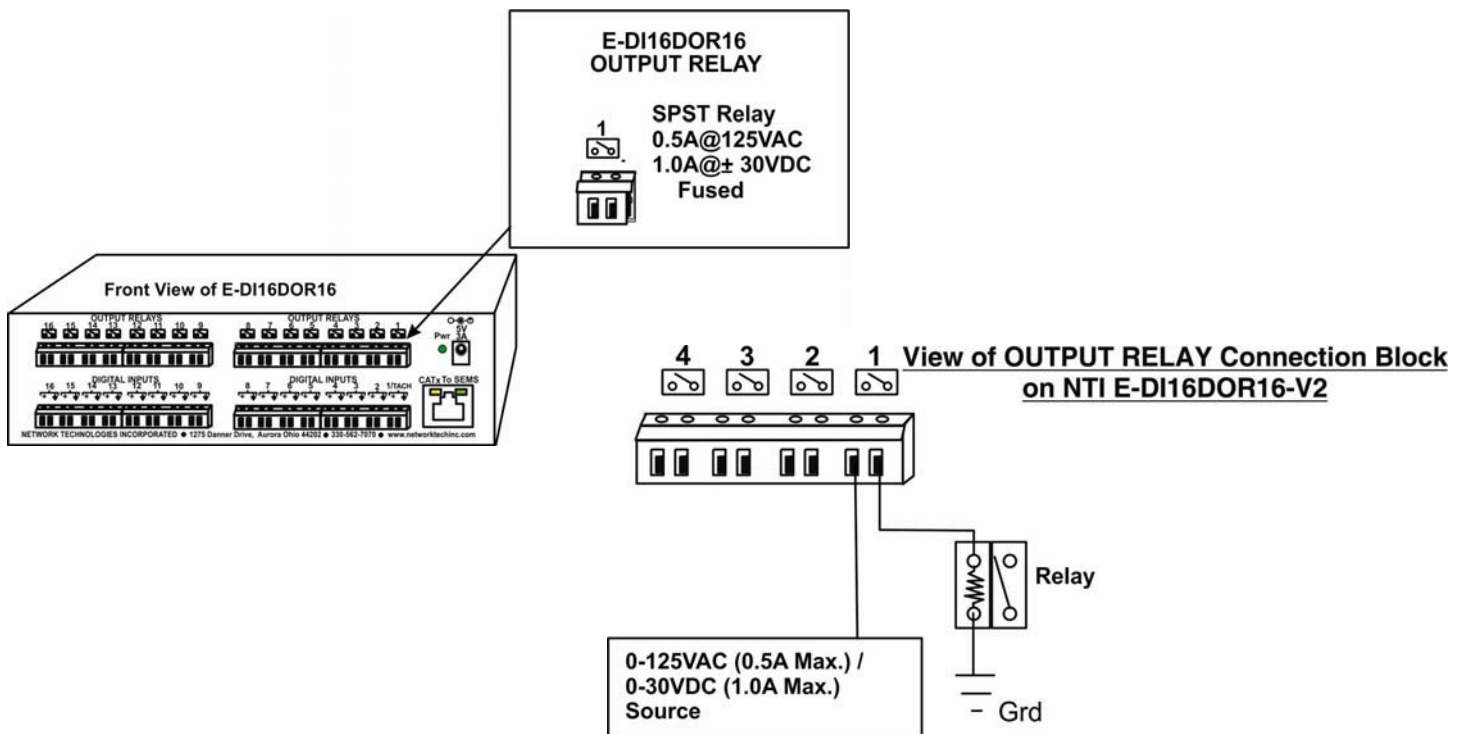
Terminal pair 1 is specially designed for connection of a tachometer/anemometer with a range of 0-255Hz (like the E-WSS Wind Speed Sensor).



3a. Digital Outputs on the E-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 "Sensors" list on the summary page as Type "Remote Digital Outputs" in the SYSTEM web interface for assignment to sensor alert responses.



3b. Output Relays on the E-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 "Sensors" list on the summary page as Type "Remote Digital Outputs" in the SYSTEM web interface for assignment to sensor alert responses.



## Web Interface- Summary Page

The Summary Page of the SYSTEM will display sensors connected to the E-DI16DO(R)16.

The SYSTEM will also recognize the number 1 connector set on the E-DI16DO(R)16 as a possible tachometer connector, displaying a total number of sensors for the E-DI16DO(R)16 as 17. The first two sensors will, by default, be Type "Tach" and "Remote Digital Input" providing the option to configure the first connector set as either type of sensor.

If a tachometer is being connected (connection "3.1" below), configure the sensor as such. If a water sensor or dry-contact sensor is going to be connected to connection 1 (connection "3.2" below), ignore the first sensor listing and configure the Digital Input. **Do not configure both ("3.1" and "3.2" in configuration below). If you configure both, the tach configuration will be ignored.**

Sensors						
Conn.	Description	Type	Value	Status	Action	
1.1	<a href="#">E-16DEL-1 STHS-99 Port 1 Temperature</a>	Temperature/Humidity	81.7°F	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
1.2	<a href="#">E-16DEL-1 STHS-99 Port 1 Humidity</a>	Temperature/Humidity	18%	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
1.3	<a href="#">E-16DEL-1 STHS-99 Port 1 Dew Point</a>	Dew Point	33.8°F	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
2.1	<a href="#">E-16DEL-1 16LS Port 2 Light</a>	Light	36.2lx	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3.1	<a href="#">E-16DEL-1 Port 3 DIO Wind Speed</a>	Wind Speed	0.0MPH	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3.2	<a href="#">16DEL-1 Port 3 Digital Input 1</a>	Remote Digital Input	Open	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3.3	<a href="#">16DEL-1 Port 3 Digital Input 2</a>	Remote Digital Input	Open	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3.5	<a href="#">16DEL-1 Port 3 Digital Input 4</a>	Remote Digital Input	Open	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3.7	<a href="#">16DEL-1 Port 3 Digital Input 6</a>	Remote Digital Input	Open	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3.9	<a href="#">16DEL-1 Port 3 Digital Input 8</a>	Remote Digital Input	Open	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3.11	<a href="#">16DEL-1 Port 3 Digital Input 10</a>	Remote Digital Input	Open	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3.16	<a href="#">16DEL-1 Port 3 Digital Input 15</a>	Remote Digital Input	Open	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3.17	<a href="#">16DEL-1 Port 3 Digital Input 16</a>	Remote Digital Input	Open	Normal	<a href="#">View</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3.18	<a href="#">16DEL-1 Port 3 Output Relay 1</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.19	<a href="#">16DEL-1 Port 3 Output Relay 2</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.20	<a href="#">16DEL-1 Port 3 Output Relay 3</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.21	<a href="#">16DEL-1 Port 3 Output Relay 4</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.22	<a href="#">16DEL-1 Port 3 Output Relay 5</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.23	<a href="#">16DEL-1 Port 3 Output Relay 6</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.24	<a href="#">16DEL-1 Port 3 Output Relay 7</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.25	<a href="#">16DEL-1 Port 3 Output Relay 8</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.26	<a href="#">16DEL-1 Port 3 Output Relay 9</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.27	<a href="#">16DEL-1 Port 3 Output Relay 10</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.28	<a href="#">16DEL-1 Port 3 Output Relay 11</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.29	<a href="#">16DEL-1 Port 3 Output Relay 12</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.30	<a href="#">16DEL-1 Port 3 Output Relay 13</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.31	<a href="#">16DEL-1 Port 3 Output Relay 14</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.32	<a href="#">16DEL-1 Port 3 Output Relay 15</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>
3.33	<a href="#">16DEL-1 Port 3 Output Relay 16</a>	Output Relay	Inactive		<a href="#">View</a>	<a href="#">Edit</a>

17 sensors,  
16 output  
relays

see note  
below

View of E-DI16DO16 sensors and output relays list on the web interface Summary Page

**Notes:**

If you configure the Tachometer, and want to change that connection for use with a contact sensor, **do not "Delete" the Tach sensor from the listing, or all sensors and output relays configured for that E-DI16DO(R)16 will be deleted. The ENVIROMUX will automatically clear all sensors for that expander and reload the defaults. Instead, simply use "Add Sensor" and add the digital input for that connection ("3.2" in the configuration above). Upon doing so, the Tach input configuration will be ignored.**

**Conversely, if you had a contact sensor configured and want to change that digital input to a Tach sensor, be sure to delete the contact sensor ("3.2" in the configuration above) first.**

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 Output Relays, configure them also as described for Output Relays in the manual for the SYSTEM. To view the status of a connected tachometer, Click on the Sensor description or click on “View”

To view status, click either link

3.1	<a href="#">E-16DEL-1 Port 3 DIO Wind Speed</a>	Wind Speed	0.0MPH	Normal	<a href="#">View</a> <a href="#">Edit</a> <a href="#">Delete</a>
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The status page for the sensor will open, displaying the default value of the sensor with a 0-255Hz range of sensing operation.

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 E-WSS associates one rotation within 1 second to be a wind speed of 2.5MPH. With an 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 allExternalSensorsType” (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 “allExternalSensorsType”,
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 allExternalSensorsType 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 Settings	
Description	Sensor #2.1 <small>Descriptive name for the sensor</small>
Group	1 <small>Select which group the sensor belongs to</small>
Min. Level	0.0 <small>Min. supported value for the sensor</small>
Max. Level	255.0 <small>Max. supported value for the sensor</small>
Associate Sensor	<input type="checkbox"/> Associate sensor to a customized sensor type
Associated Sensor Type	<input type="text"/> <small>Type of the associated sensor</small>
Associated Sensor Unit	<input type="text"/> <small>Measurement unit for the associated sensor</small>
SNMP Associated Type ID	32767 <small>ID value for SNMP type of associated sensor</small>
Min. Associated Level	0.000000 <small>Sensor expected value corresponding to 0 Hz</small>
Max. Associated Level	100.000000 <small>Sensor expected value corresponding to 255Hz</small>
Min. Non-Critical Threshold	0.0 <small>Min. threshold below which indicates a non-critical alert condition</small>
Max. Non-Critical Threshold	200.0 <small>Max. threshold above which indicates a non-critical alert condition</small>
Min. Critical Threshold	0.0 <small>Min. threshold below which indicates an alert condition</small>
Max. Critical Threshold	200.0 <small>Max. threshold above which indicates an alert condition</small>
Refresh Rate	10 <input type="text"/> Sec <input type="button" value="v"/> <small>The refresh rate at which the sensor view is updated</small>
<input type="checkbox"/> Non-Critical Alert Settings <input type="checkbox"/> Critical Alert Settings <input type="checkbox"/> Data Logging	
<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 <small>Descriptive name for the sensor</small>
Group	1 <small>Select which group the sensor belongs to</small>
Min. Level	0.0 <small>Min. supported value for the sensor</small>
Max. Level	255.0 <small>Max. supported value for the sensor</small>
Associate Sensor	<input checked="" type="checkbox"/> Associate sensor to a customized sensor type
Associated Sensor Type	Wind Speed <small>Type of the associated sensor</small>
Associated Sensor Unit	MPH <small>Measurement unit for the associated sensor</small>
SNMP Associated Type ID	32767 <small>ID value for SNMP type of associated sensor</small>
Min. Associated Level	0.000000 <small>Sensor expected value corresponding to 0 Hz</small>
Max. Associated Level	637.500000 <small>Sensor expected value corresponding to 255Hz</small>
Min. Non-Critical Threshold	0.0 <small>Min. threshold below which indicates a non-critical alert condition</small>
Max. Non-Critical Threshold	200.0 <small>Max. threshold above which indicates a non-critical alert condition</small>
Min. Critical Threshold	0.0 <small>Min. threshold below which indicates an alert condition</small>
Max. Critical Threshold	200.0 <small>Max. threshold above which indicates an alert condition</small>
Refresh Rate	10 Sec <small>The refresh rate at which the sensor view is updated</small>
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

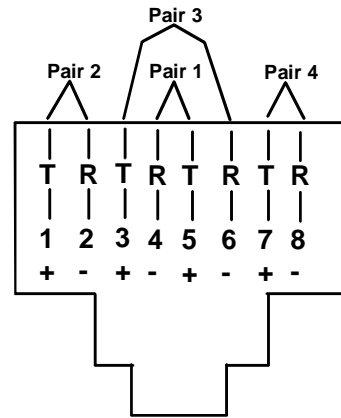
255Hz (cycles) x 2.5MPH per rotation in 1 second (cycle)

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

## CATx Cable

The CATx connection cable between the SYSTEM and the Expander 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)

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