

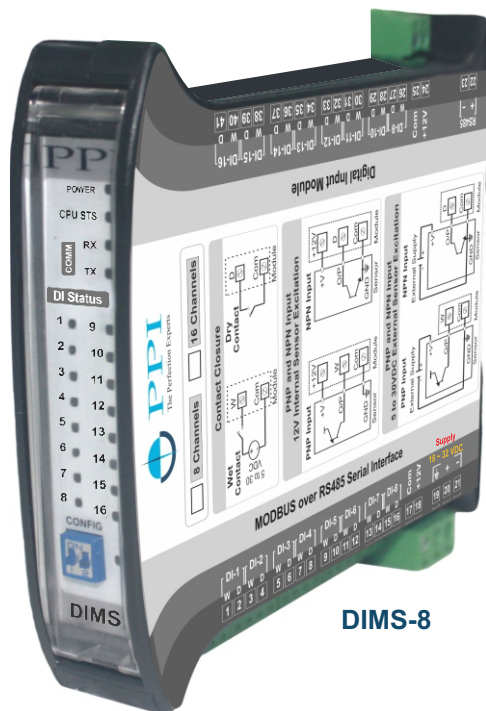
## DIMS-8 / DIMS-16

8/ 16 Channels  
DIN-Rail Mount  
MODBUS over Serial

Process Precision Instruments  
Vasai Road (E), Dist. Palghar - 401210,  
Maharashtra, India

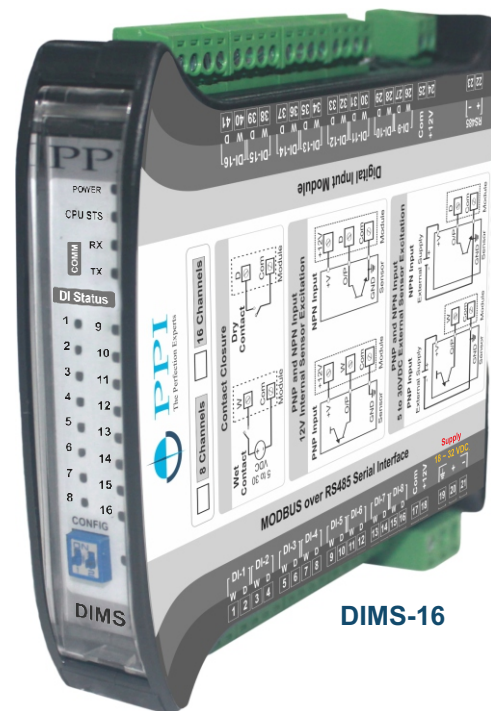
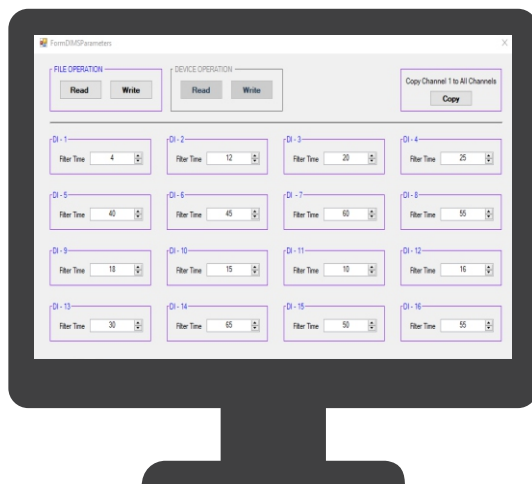
www.ppiindia.net

# User Manual



DIMS-8

## Configuration Tool



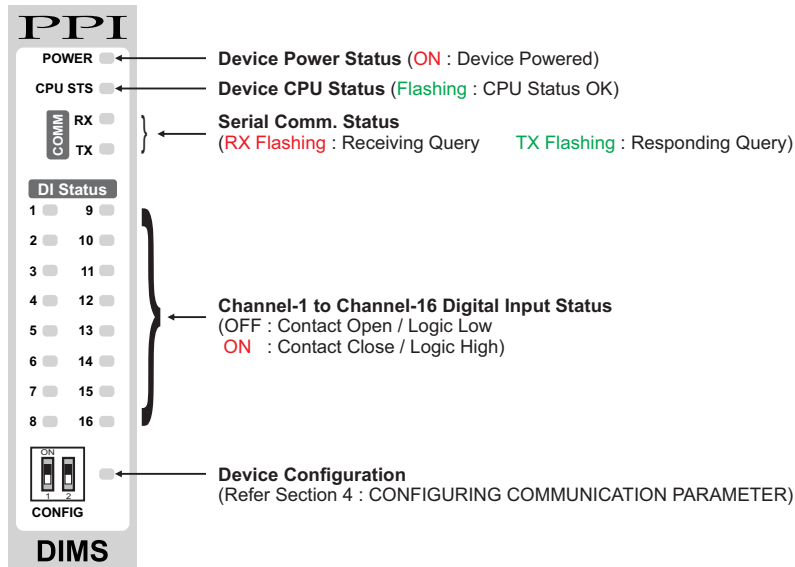
DIMS-16

## CONTENTS

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## Section 1 FRONT PANEL & ELECTRICAL CONNECTIONS

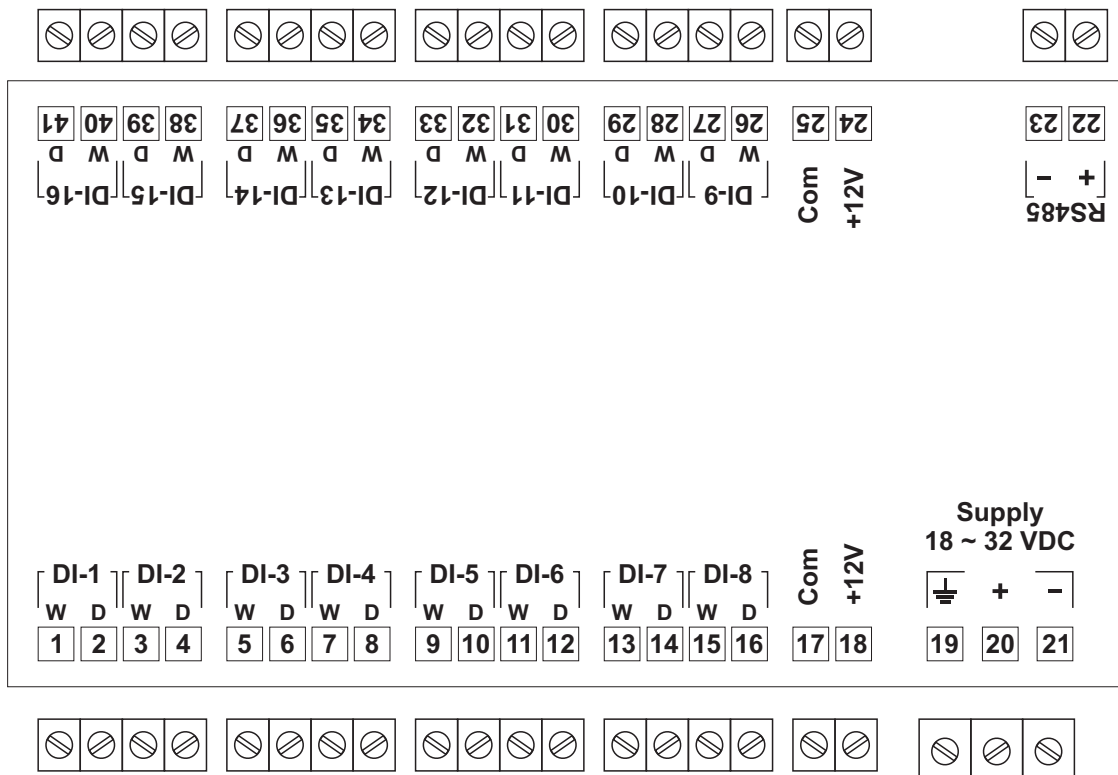
### FRONT PANEL



### ELECTRICAL CONNECTIONS

The Figure 1.1 illustrates Electrical Connection Diagrams. For 8 Channel Version, the connectors from 24 to 41 are not fitted.

Figure 1.1 : 8 / 16 Channel Module

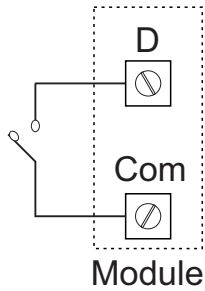


## DIGITAL INPUT CHANNELS

Each of the 8 or 16 input channels are identical from wiring connection viewpoint. The descriptions below apply to all the channels with no deviations. Refer Figures 1.2 (a) to 1.2 (f) below for different Input Types.

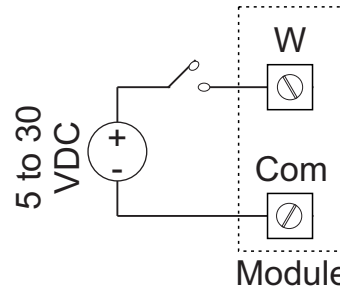
**Figure 1.2 (a)**

Dry Contact



**Figure 1.2 (b)**

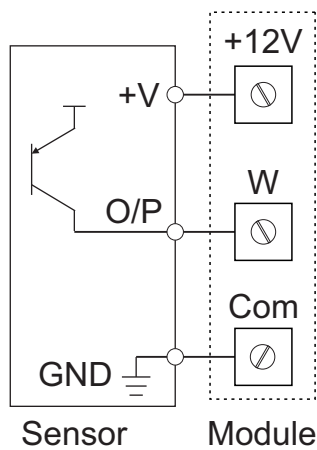
Voltage Level



**Figure 1.2 (c)**

PNP Input

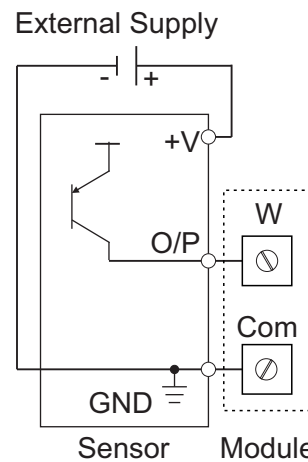
(12V Internal Sensor Excitation)



**Figure 1.2 (d)**

PNP Input

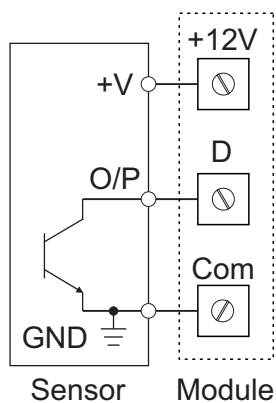
(5 to 30VDC External Sensor Excitation)



**Figure 1.2 (e)**

NPN Input

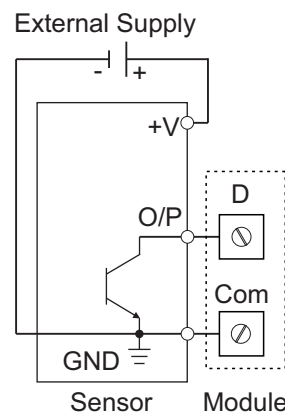
(12V Internal Sensor Excitation)



**Figure 1.2 (f)**

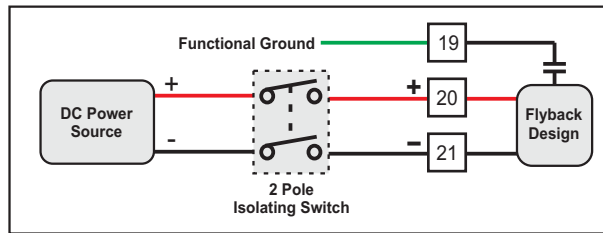
NPN Input

(5 to 30VDC External Sensor Excitation)



## POWER SUPPLY (Terminals 19, 20 & 21)

Figure 1.3



As standard, the Module is supplied with power connections suited for 18 to 32 VDC power source. The accuracy / performance of the Module is not affected by the variations in the supply within specified limits of 18 to 32 VDC. Use well-insulated copper conductor wire of the size not smaller than 0.5mm<sup>2</sup> for power supply connections ensuring proper polarity as shown in Figure 1.3. The Module is not provided with power switch. If necessary, mount separately.

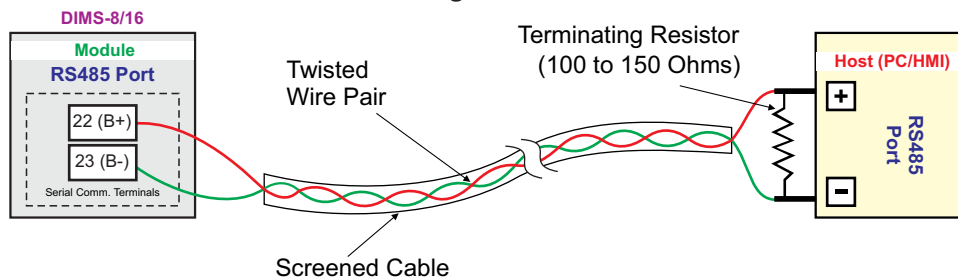
**For safety and enhanced electrical noise immunity, it is highly recommended to connect Main Power Supply 'Earth' to terminal 19.**

## SERIAL COMMUNICATION PORT

The wiring connections for interfacing the Host (PC/HMI) with DIMS is shown in the figure 1.4.

For reliable noise free communication, use a pair of twisted wires inside screened cable. The wire should have less than 100 ohms / km nominal DC resistance (Typically 24 AWG or thicker). Connect the terminating resistor (Typically 100 to 150 ohm) at one end to improve noise immunity.

Figure 1.4

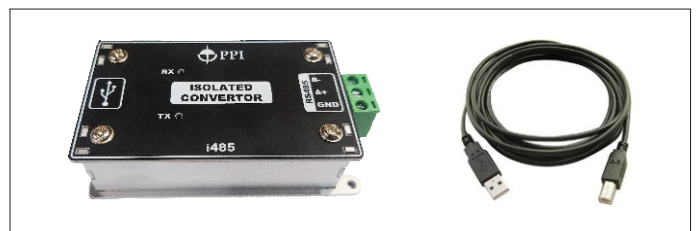


### Note

In case of non-availability of RS485 port on Host PC, use appropriate **Serial Protocol Converter** to match the available serial port on the host like "USB to RS485" and "RS232 to RS485" (Refer few images below). Please ensure that the appropriate **Device Driver** for the selected converter is installed on the Host PC.



RS232 to RS485



USB to RS485

## Section 2 PARAMETERS

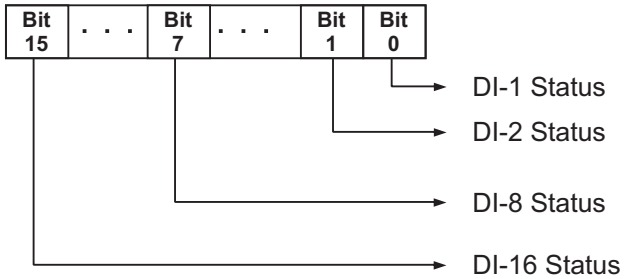
The communication parameter settings and the data packet format have been discussed in *Section 4 : Configuring Communication Parameters*.

For user convenience, most parameters are accessible both as Bit-Mapped Modbus Registers & Discrete Input Coils.

### 1. Instantaneous Digital Input Status (Read-Only Parameters)

These parameters reflect the current DI Status at the time of reading the Bit-Mapped Modbus Register / Coils.

**Table 2.1**  
**Run Time Parameter (Read Only)**

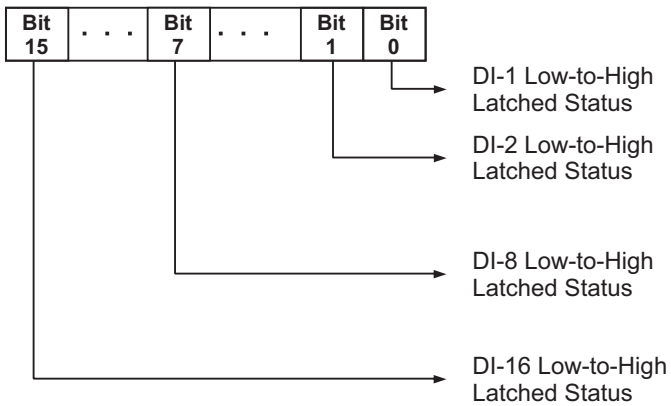
| Modbus Data Type   | MODBUS Address                                       | Values   |            |           |   |                          |   |                            |
|--|--|--|------------|-----------|---|--------------------------|---|----------------------------|
| <b>Bit-Mapped Input or Holding Register</b><br><i>Function Code (0x03 or 0x04)</i> | 1  |  <p>For 8 Channel Version (DIMS-8), ignore Bit-8 to Bit-15</p> <table border="1"> <thead> <tr> <th>Bit Value</th> <th>DI Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Contact Open / Logic Low</td> </tr> <tr> <td>1</td> <td>Contact Close / Logic High</td> </tr> </tbody> </table> | Bit Value  | DI Status | 0 | Contact Open / Logic Low | 1 | Contact Close / Logic High |
| Bit Value  | DI Status  |  |            |           |   |                          |   |                            |
| 0  | Contact Open / Logic Low                             |  |            |           |   |                          |   |                            |
| 1  | Contact Close / Logic High                           |  |            |           |   |                          |   |                            |
| <b>Discrete Input (Coils)</b><br><i>Function Code (0x01 &amp; 0x02)</i>            | 1 to 8<br>(8 Channel)<br><br>1 to 16<br>(16 Channel) | <table border="1"> <thead> <tr> <th>Coil Value</th> <th>DI Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Contact Open / Logic Low</td> </tr> <tr> <td>1</td> <td>Contact Close / Logic High</td> </tr> </tbody> </table>  | Coil Value | DI Status | 0 | Contact Open / Logic Low | 1 | Contact Close / Logic High |
| Coil Value   | DI Status  |  |            |           |   |                          |   |                            |
| 0  | Contact Open / Logic Low                             |  |            |           |   |                          |   |                            |
| 1  | Contact Close / Logic High                           |  |            |           |   |                          |   |                            |

## 2 (a). Low-to-High Latched Digital Input Status (Read-Only Parameters)

This parameter value is set to 1 upon detecting the change in status from 'Open-to-Close' for a Dry / Wet Contact Closure input or from 'Low-to-High' logic level for PNP / NPN Sensor Input. This value is latched until acknowledged by writing to 'Low-to-High Acknowledge Command' Register / Coil.

Table 2.2

Run Time Parameter (Read Only)

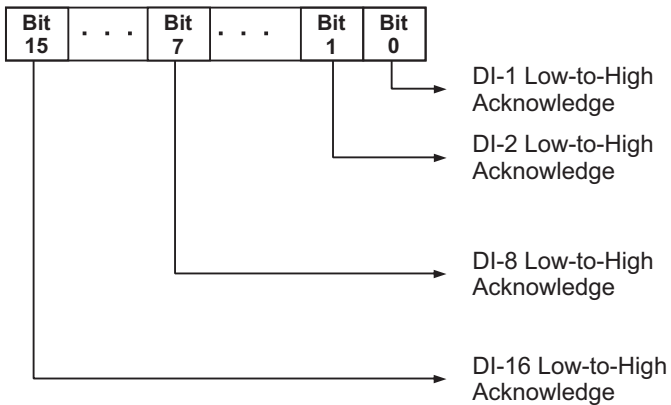
| Modbus Data Type   | MODBUS Address  | Values   |            |           |   |                             |   |                                   |
|--|---|--|------------|-----------|---|-----------------------------|---|-----------------------------------|
| <b>Bit-Mapped Input or Holding Register</b><br><i>Function Code (0x03 or 0x04)</i> | 2   |  <p>For 8 Channel Version (DIMS-8), ignore Bit-8 to Bit-15</p> <table border="1"> <thead> <tr> <th>Bit Value</th> <th>DI Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No 'Low-to-High' Transition</td> </tr> <tr> <td>1</td> <td>'Low-to-High' Transition Detected</td> </tr> </tbody> </table> | Bit Value  | DI Status | 0 | No 'Low-to-High' Transition | 1 | 'Low-to-High' Transition Detected |
| Bit Value  | DI Status   |  |            |           |   |                             |   |                                   |
| 0  | No 'Low-to-High' Transition                             |  |            |           |   |                             |   |                                   |
| 1  | 'Low-to-High' Transition Detected                       |  |            |           |   |                             |   |                                   |
| <b>Discrete Input (Coils)</b><br><i>Function Code (0x01 &amp; 0x02)</i>            | 17 to 24<br>(8 Channel)<br><br>17 to 32<br>(16 Channel) | <table border="1"> <thead> <tr> <th>Coil Value</th> <th>DI Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No 'Low-to-High' Transition</td> </tr> <tr> <td>1</td> <td>'Low-to-High' Transition Detected</td> </tr> </tbody> </table>  | Coil Value | DI Status | 0 | No 'Low-to-High' Transition | 1 | 'Low-to-High' Transition Detected |
| Coil Value   | DI Status   |  |            |           |   |                             |   |                                   |
| 0  | No 'Low-to-High' Transition                             |  |            |           |   |                             |   |                                   |
| 1  | 'Low-to-High' Transition Detected                       |  |            |           |   |                             |   |                                   |

## 2 (b). Low-to-High Acknowledge Command

This parameter is used to acknowledge the 'Low-to-High' latched status by writing the value '1'. Reading this parameter always returns the value '0'.

Table 2.3

Run Time Parameter (Not Stored in non-volatile memory)

| Modbus Data Type   | MODBUS Address  | Values   |            |        |   |           |   |                              |
|--|---|--|------------|--------|---|-----------|---|------------------------------|
| <b>Bit-Mapped Holding Register</b><br><i>Function Code (0x06 &amp; 0x10)</i> | 102   |  <p>For 8 Channel Version (DIMS-8), ignore Bit-8 to Bit-15</p> <table border="1"> <thead> <tr> <th>Bit Value</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No Effect</td> </tr> <tr> <td>1</td> <td>'Low-to-High' Status Cleared</td> </tr> </tbody> </table> | Bit Value  | Result | 0 | No Effect | 1 | 'Low-to-High' Status Cleared |
| Bit Value  | Result  |  |            |        |   |           |   |                              |
| 0  | No Effect   |  |            |        |   |           |   |                              |
| 1  | 'Low-to-High' Status Cleared                                |  |            |        |   |           |   |                              |
| <b>Coils</b><br><i>Function Code (0x05 &amp; 0x0F)</i>                       | 117 to 124<br>(8 Channel)<br><br>117 to 132<br>(16 Channel) | <table border="1"> <thead> <tr> <th>Coil Value</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No Effect</td> </tr> <tr> <td>1</td> <td>'Low-to-High' Status Cleared</td> </tr> </tbody> </table>  | Coil Value | Result | 0 | No Effect | 1 | 'Low-to-High' Status Cleared |
| Coil Value   | Result  |  |            |        |   |           |   |                              |
| 0  | No Effect   |  |            |        |   |           |   |                              |
| 1  | 'Low-to-High' Status Cleared                                |  |            |        |   |           |   |                              |

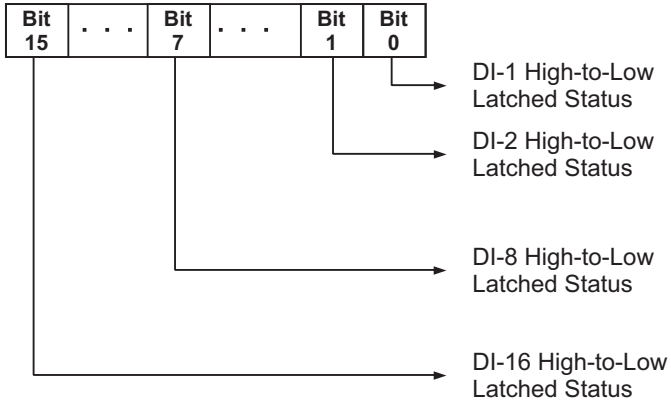


### 3 (a). High-to-Low Latched Digital Input Status (Read-Only Parameters)

This parameter value is set to 1 upon detecting the change in status from 'Close-to-Open' for a Dry / Wet Contact Closure input or from 'High-to-Low' logic level for PNP / NPN Sensor Input. This value is latched until acknowledged by writing to 'High-to-Low Acknowledge Command' Register / Coil.

**Table 2.4**

**Run Time Parameter (Read Only)**

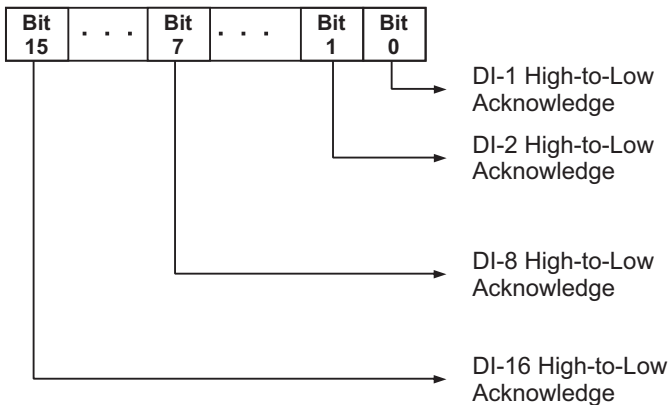
| Modbus Data Type   | MODBUS Address  | Values  |            |           |   |                             |   |                                   |
|--|---|---|------------|-----------|---|-----------------------------|---|-----------------------------------|
| <b>Bit-Mapped Input or Holding Register</b><br><i>Function Code (0x03 or 0x04)</i> | 3   |  <p>DI-1 High-to-Low Latched Status<br/> DI-2 High-to-Low Latched Status<br/> DI-8 High-to-Low Latched Status<br/> DI-16 High-to-Low Latched Status</p> <p>For 8 Channel Version (DIMS-8), ignore Bit-8 to Bit-15</p> <table border="1"> <thead> <tr> <th>Bit Value</th> <th>DI Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No 'High-to-Low' Transition</td> </tr> <tr> <td>1</td> <td>'High-to-Low' Transition Detected</td> </tr> </tbody> </table> | Bit Value  | DI Status | 0 | No 'High-to-Low' Transition | 1 | 'High-to-Low' Transition Detected |
| Bit Value  | DI Status   |   |            |           |   |                             |   |                                   |
| 0  | No 'High-to-Low' Transition                             |   |            |           |   |                             |   |                                   |
| 1  | 'High-to-Low' Transition Detected                       |   |            |           |   |                             |   |                                   |
| <b>Discrete Input (Coils)</b><br><i>Function Code (0x01 &amp; 0x02)</i>            | 33 to 40<br>(8 Channel)<br><br>33 to 48<br>(16 Channel) | <table border="1"> <thead> <tr> <th>Coil Value</th> <th>DI Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No 'High-to-Low' Transition</td> </tr> <tr> <td>1</td> <td>'High-to-Low' Transition Detected</td> </tr> </tbody> </table>   | Coil Value | DI Status | 0 | No 'High-to-Low' Transition | 1 | 'High-to-Low' Transition Detected |
| Coil Value   | DI Status   |   |            |           |   |                             |   |                                   |
| 0  | No 'High-to-Low' Transition                             |   |            |           |   |                             |   |                                   |
| 1  | 'High-to-Low' Transition Detected                       |   |            |           |   |                             |   |                                   |

## 3 (b). High-to-Low Acknowledge Command

This parameter is used to acknowledge the 'High-to-Low' latched status by writing the value '1'. Reading this parameter always returns the value '0'.

**Table 2.5**

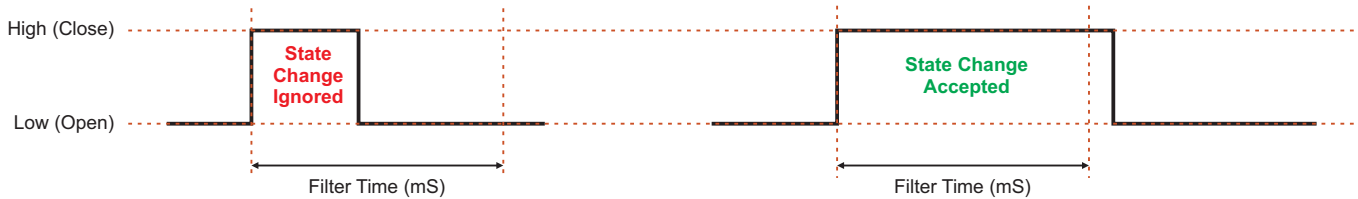
*Run Time Parameter (Not Stored in non-volatile memory)*

| Modbus Data Type   | MODBUS Address  | Values   |            |        |   |           |   |                              |
|--|---|--|------------|--------|---|-----------|---|------------------------------|
| <b>Bit-Mapped Holding Register</b><br><i>Function Code (0x06 &amp; 0x10)</i> | 103   |  <p>For 8 Channel Version (DIMS-8), ignore Bit-8 to Bit-15</p> <table border="1"> <thead> <tr> <th>Bit Value</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No Effect</td> </tr> <tr> <td>1</td> <td>'High-to-Low' Status Cleared</td> </tr> </tbody> </table> | Bit Value  | Result | 0 | No Effect | 1 | 'High-to-Low' Status Cleared |
| Bit Value  | Result  |  |            |        |   |           |   |                              |
| 0  | No Effect   |  |            |        |   |           |   |                              |
| 1  | 'High-to-Low' Status Cleared                                |  |            |        |   |           |   |                              |
| <b>Discrete Input (Coils)</b><br><i>Function Code (0x05 &amp; 0x0F)</i>      | 133 to 140<br>(8 Channel)<br><br>133 to 148<br>(16 Channel) | <table border="1"> <thead> <tr> <th>Coil Value</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No Effect</td> </tr> <tr> <td>1</td> <td>'High-to-Low' Status Cleared</td> </tr> </tbody> </table>  | Coil Value | Result | 0 | No Effect | 1 | 'High-to-Low' Status Cleared |
| Coil Value   | Result  |  |            |        |   |           |   |                              |
| 0  | No Effect   |  |            |        |   |           |   |                              |
| 1  | 'High-to-Low' Status Cleared                                |  |            |        |   |           |   |                              |

## 4. Digital Filter

This parameter helps remove any unwarranted signal noise on PNP / NPN Sensor Inputs or mechanical de-bounce on Dry / Wet Contact Closure Inputs. As illustrated in Figure 2.1 (a) & 2.1 (b) any state change (transition) is accepted only if the changed state is held constant for the time period (in milli-Second) set for the Digital Filter parameter.

**Figure 2.1 (a) : Low-to-High / Open-to-Close State Change**



**Figure 2.1 (b) : High-to-Low / Close-to-Open State Change**

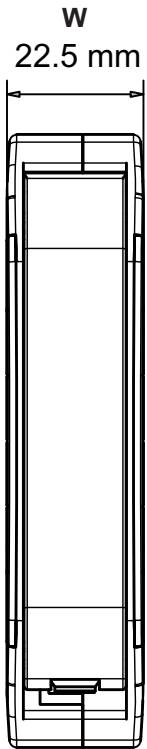


**Table 2.6**  
**Configuration Parameter (Stored in Non-Volatile memory)**

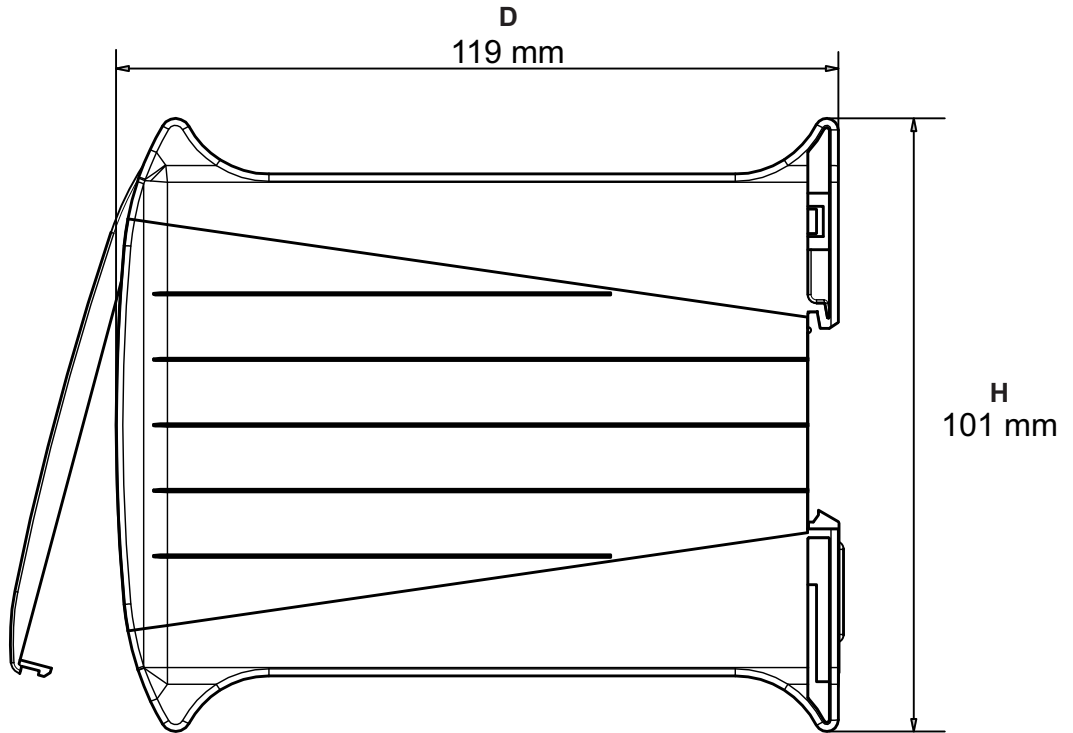
| Modbus Data Type   | MODBUS Address  | Values                                 |
|--|---|--|
| <b>Holding Registers</b><br><i>Function Code (0x06 &amp; 0x10)</i> | 11 to 18<br>(8 Channel)<br><br>11 to 26<br>(16 Channel) | 1 to 30000 mSec<br>(Default : 10 mSec) |



## Section 3 MECHANICAL DIMENSIONS



Front View



Side View

|            |          |
|------------|----------|
| Width (W)  | 22.5 mm  |
| Height (H) | 101.0 mm |
| Depth (D)  | 119.0 mm |



## Section 4

### CONFIGURING COMMUNICATION PARAMETERS

The Module supports industry standard **MODBUS RTU over Serial** Protocol for configuration & Operation.

The Serial Communication Port specification are shown in Table 4.1 below.

**Table 4.1**

|                            |   |  |
|----------------------------|---|--|
| Port                       | RS485, 2-wire, Half duplex, Start-stop synchronized |  |
| Protocol                   | Modbus RTU  |  |
| Communication Parameters   | <b>Parameter</b>                                    | <b>Settings</b>  |
|                            | Slave ID  | 1 to 127   |
|                            | Baud Rate   | 2400, 4800, 9600, 19200, 38400 bps                               |
|                            | Parity  | None (1 or 2 Stop Bits)<br>Even (1 Stop Bit)<br>odd (1 Stop Bit) |
| Max. No. of Units per Loop | 31  |  |
| Maximum Distance           | 1200 Meters   |  |

The Module is shipped from the factory with the following default values for the Communication Parameters.

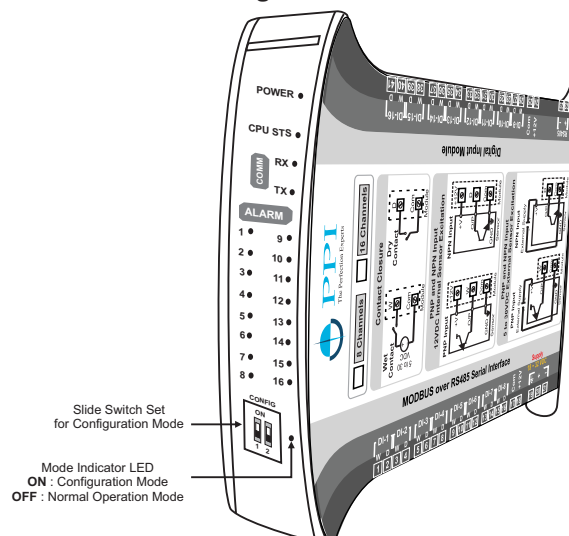
|              |                      |               |
|--------------|----------------------|---------------|
| Slave ID : 1 | Baud Rate : 9600 bps | Parity : Even |
|--------------|----------------------|---------------|

The above parameters can be altered to match with the Host (Master) parameters by putting the Module in **Configuration Mode**. In Configuration Mode, the Module always communicates with the host with the **fixed** communication parameter values (Slave ID : 1, Baud Rate : 9600 & Parity : None) regardless of the actual set values. The user set values are applicable only when the Module is put back in the **Normal Operation Mode**.

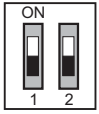
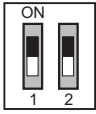
A Slide Switch Set is provided on the Module, as shown in the Figure 4.1, to select between the Configuration and Normal Operation modes. The Table 4.2 shows the Switch Positions and the respective mode.

*It is important to note that the switch position is detected only upon power-up. Select the desired Mode while the Module is OFF. That is changing the switch position while the Module is powered does not have any effect on the Mode.*

**Figure 4.1**



**Table 4.2**

|                                       |  |  |
|---------------------------------------|--|--|
| <b>Switch Position</b>                |  Down |  Up |
| <b>Mode Indicator</b>                 | OFF  | ON   |
| <b>Operation Mode</b>                 | Normal   | Configuration  |
| <b>Communication Parameter Values</b> | User Set values for<br><i>Module Slave ID,</i><br><i>Baud Rate &amp; Parity</i>        | <i>Module Slave ID : 1</i><br><i>Baud Rate : 9600</i><br><i>Parity : None</i>          |

The Communication Parameters values can be altered by using the MODBUS RTU protocol while the Module is in Configuration Mode. Set the host (Master) Baud Rate to “9600 bps” and Parity to “None”. The MODBUS Addresses and Settings for the Module communication parameters are listed in the Table 4.3 below.





**Table 4.3**

| <b>Parameter Description</b>  | <b>MODBUS Address</b> | <b>Settings (Default Value)</b>   |       |           |   |          |   |          |   |          |   |           |   |           |
|---|-----------------------|---|-------|-----------|---|----------|---|----------|---|----------|---|-----------|---|-----------|
| <b>Module Slave ID</b><br>Unique numeric value assigned to the module for identification by the host.<br><br>Set the value as required by the host. | 1                     | 1 to 127<br>(Default : 1)   |       |           |   |          |   |          |   |          |   |           |   |           |
| <b>Baud Rate</b><br>Communication speed in ‘Bits per Second’.<br><br>Set the value to match with the host baud rate.                                | 2                     | <table border="1"> <thead> <tr> <th>Value</th> <th>Baud Rate</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>2400 bps</td> </tr> <tr> <td>1</td> <td>4800 bps</td> </tr> <tr> <td>2</td> <td>9600 bps</td> </tr> <tr> <td>3</td> <td>19200 bps</td> </tr> <tr> <td>4</td> <td>38400 bps</td> </tr> </tbody> </table> (Default : 9600 bps) | Value | Baud Rate | 0 | 2400 bps | 1 | 4800 bps | 2 | 9600 bps | 3 | 19200 bps | 4 | 38400 bps |
| Value   | Baud Rate             |   |       |           |   |          |   |          |   |          |   |           |   |           |
| 0   | 2400 bps              |   |       |           |   |          |   |          |   |          |   |           |   |           |
| 1   | 4800 bps              |   |       |           |   |          |   |          |   |          |   |           |   |           |
| 2   | 9600 bps              |   |       |           |   |          |   |          |   |          |   |           |   |           |
| 3   | 19200 bps             |   |       |           |   |          |   |          |   |          |   |           |   |           |
| 4   | 38400 bps             |   |       |           |   |          |   |          |   |          |   |           |   |           |
| <b>Parity</b><br>One of the communication error trapping features.<br><br>Set the data packet parity as implemented by the host protocol.           | 3                     | <table border="1"> <thead> <tr> <th>Value</th> <th>Parity</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>None</td> </tr> <tr> <td>1</td> <td>Even</td> </tr> <tr> <td>2</td> <td>Odd</td> </tr> </tbody> </table> (Default : Even)   | Value | Parity    | 0 | None     | 1 | Even     | 2 | Odd      |   |           |   |           |
| Value   | Parity                |   |       |           |   |          |   |          |   |          |   |           |   |           |
| 0   | None                  |   |       |           |   |          |   |          |   |          |   |           |   |           |
| 1   | Even                  |   |       |           |   |          |   |          |   |          |   |           |   |           |
| 2   | Odd                   |   |       |           |   |          |   |          |   |          |   |           |   |           |



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## Process Precision Instruments (An ISO 9001 : 2008 Company)

 101, Diamond Industrial Estate, Navghar, Vasai Road (E), Dist. Palghar - 401210, Maharashtra, India  
 Sales : 8208199048 / 8208141446 Support : 07498799226 / 08767395333  
 [sales@ppiindia.net](mailto:sales@ppiindia.net)  [www.ppiindia.net](http://www.ppiindia.net)