

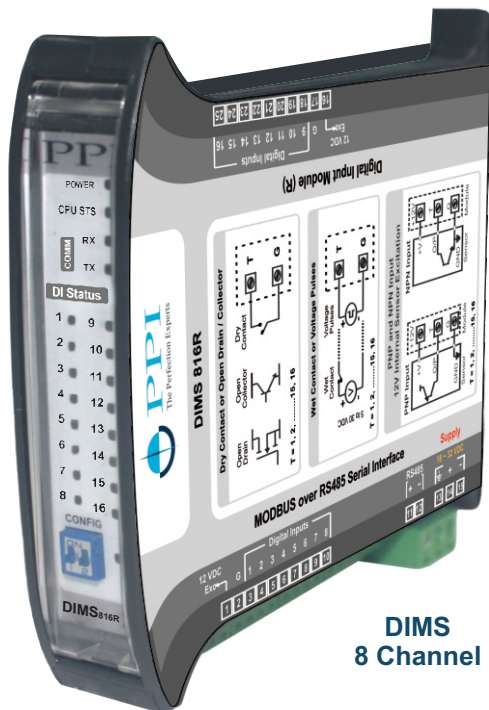
DIMS 816R

8 / 16 Channels
DIN-Rail Mount
MODBUS over Serial

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

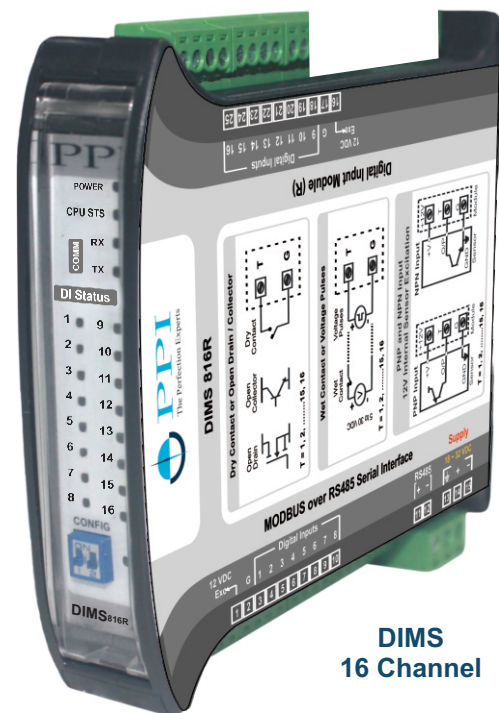
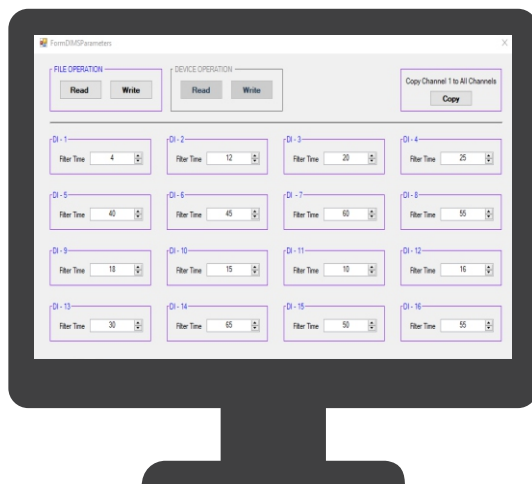
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User Manual



**DIMS
8 Channel**

Configuration Tool



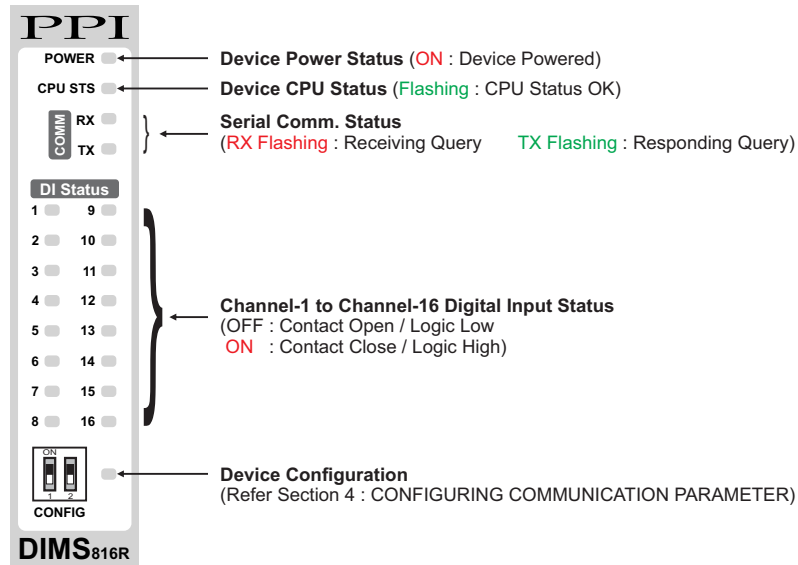
**DIMS
16 Channel**

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Section 1 FRONT PANEL & ELECTRICAL CONNECTIONS

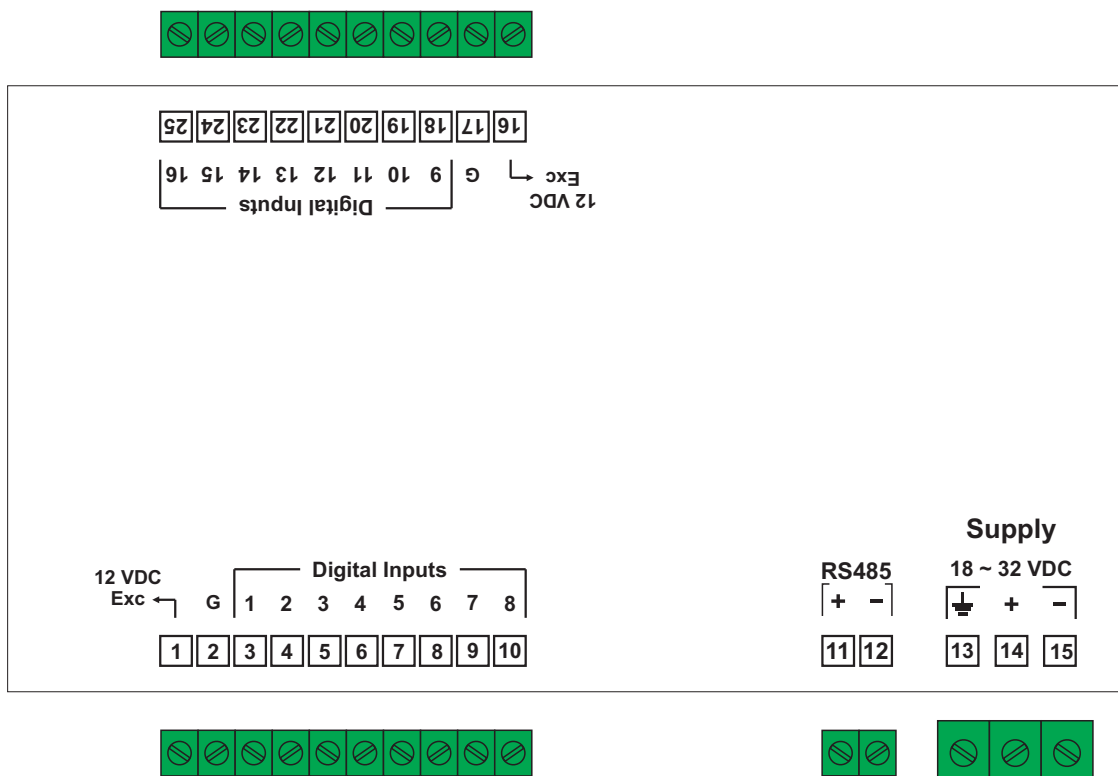
FRONT PANEL



ELECTRICAL CONNECTIONS

The Figure 1.1 illustrates Electrical Connection Diagrams. For 8 Channel Version, the connectors from 16 to 25 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

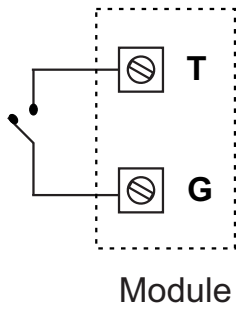
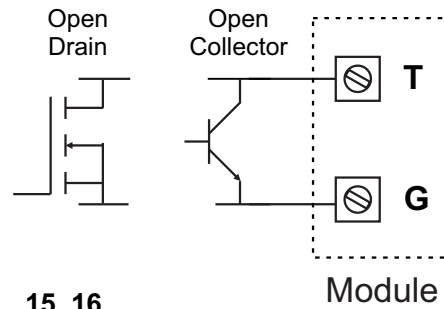


Figure 1.2 (b)

Open Drain / Collector



T = 1, 2,15, 16

Figure 1.2 (c)

Wet Contact

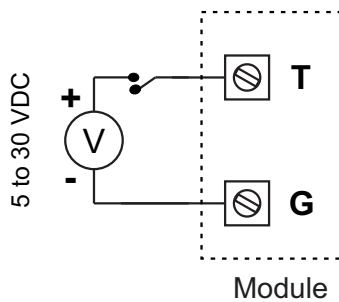
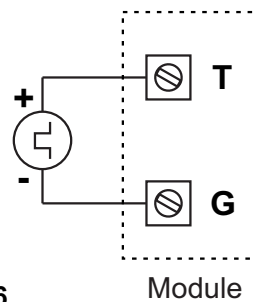


Figure 1.2 (d)

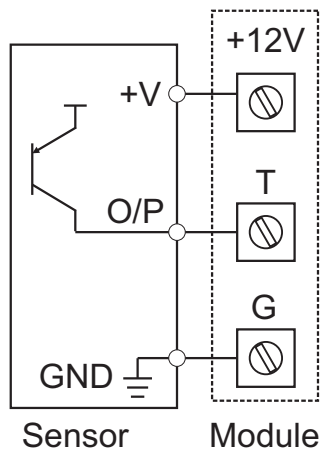
Voltage Level



T = 1, 2,15, 16

Figure 1.2 (e)

PNP Input
(12V Internal Sensor Excitation)

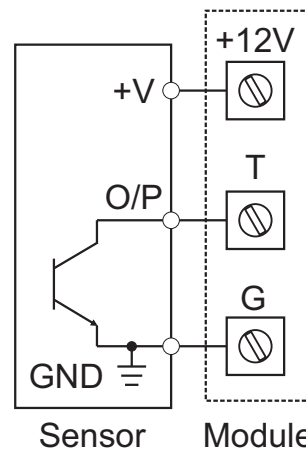


Sensor

Module

Figure 1.2 (f)

NPN Input
(12V Internal Sensor Excitation)



Sensor

Module

T = 1, 2,15, 16

Figure 1.2 (g)

PNP Input
(5 to 30VDC External Sensor Excitation)

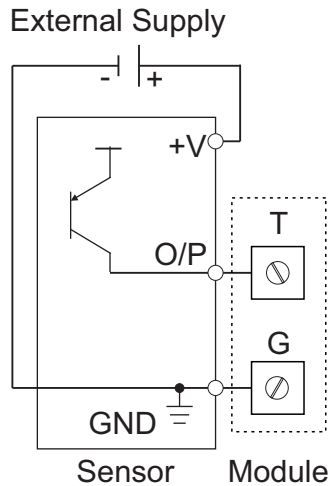
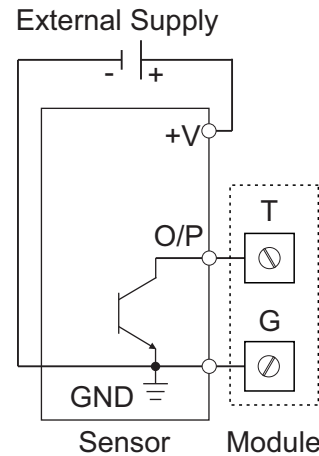


Figure 1.2 (h)

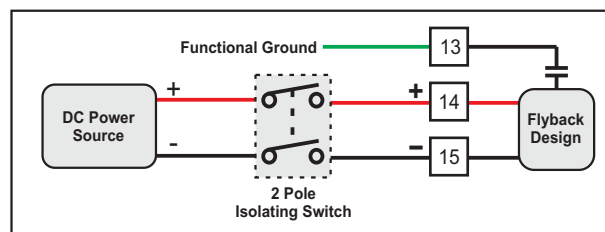
NPN Input
(5 to 30VDC External Sensor Excitation)



T = 1, 2,15, 16

POWER SUPPLY (Terminals 13, 14 & 15)

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 0.5mm² 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.

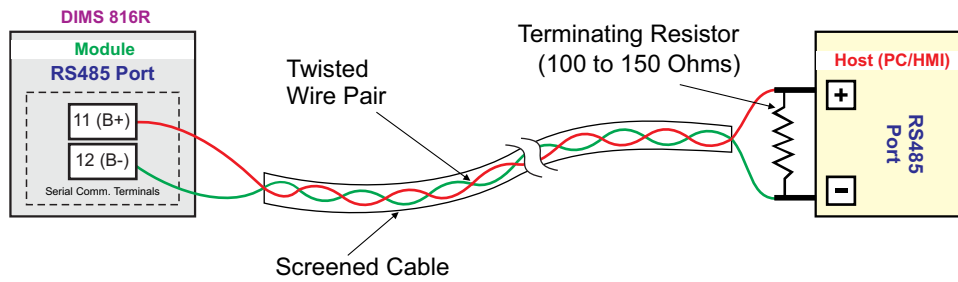
For safety and enhanced electrical noise immunity, it is highly recommended to connect Main Power Supply 'Earth' to terminal 13.

SERIAL COMMUNICATION PORT

The wiring connections for interfacing the Host (PC/HMI) with DIMS 816R 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

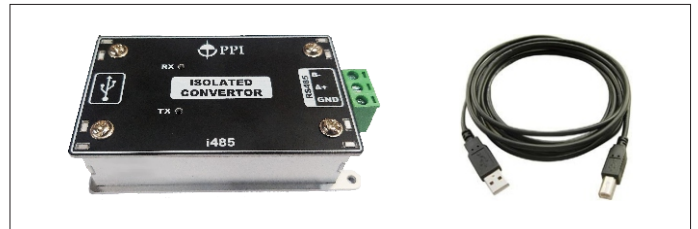


Note

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

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

1. Select Digital Input Type

This parameter selects all the 8 or 16 digital inputs as one of the following types:

- (a) Dry Contact : Potential-Free Contacts / Open Drain / Open Collector
- (b) Wet Contact / Voltage Level : 5 to 30 VDC

Table 2.1

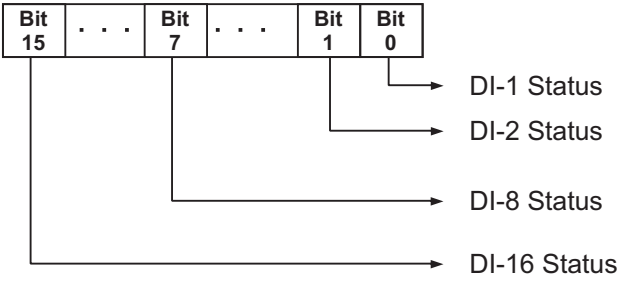
Configuration Parameter (Stored in Non-Volatile memory)

Modbus Data Type	MODBUS Address	Values						
Holding Register <i>Function Code (0x06 & 0x10)</i>	1598	<table border="1"> <thead> <tr> <th>Value</th> <th>DI Type</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Dry (Potential-Free) Open / Close Contact or Open Drain / Collector (Sink)</td> </tr> <tr> <td>1</td> <td>Wet Open / Close Contact or Voltage Level</td> </tr> </tbody> </table> <p>Default : Dry (Potential-Free) Open / Close Contact or Open Drain / Collector (Sink)</p>	Value	DI Type	0	Dry (Potential-Free) Open / Close Contact or Open Drain / Collector (Sink)	1	Wet Open / Close Contact or Voltage Level
Value	DI Type							
0	Dry (Potential-Free) Open / Close Contact or Open Drain / Collector (Sink)							
1	Wet Open / Close Contact or Voltage Level							
Coils <i>Function Code (0x05 & 0x0F)</i>	149	<table border="1"> <thead> <tr> <th>Coil</th> <th>DI Type</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Dry (Potential-Free) Open / Close Contact or Open Drain / Collector (Sink)</td> </tr> <tr> <td>1</td> <td>Wet Open / Close Contact or Voltage Level</td> </tr> </tbody> </table> <p>Default : Dry (Potential-Free) Open / Close Contact or Open Drain / Collector (Sink)</p>	Coil	DI Type	0	Dry (Potential-Free) Open / Close Contact or Open Drain / Collector (Sink)	1	Wet Open / Close Contact or Voltage Level
Coil	DI Type							
0	Dry (Potential-Free) Open / Close Contact or Open Drain / Collector (Sink)							
1	Wet Open / Close Contact or Voltage Level							

2. 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 2.2
Run Time Parameter (Read Only)

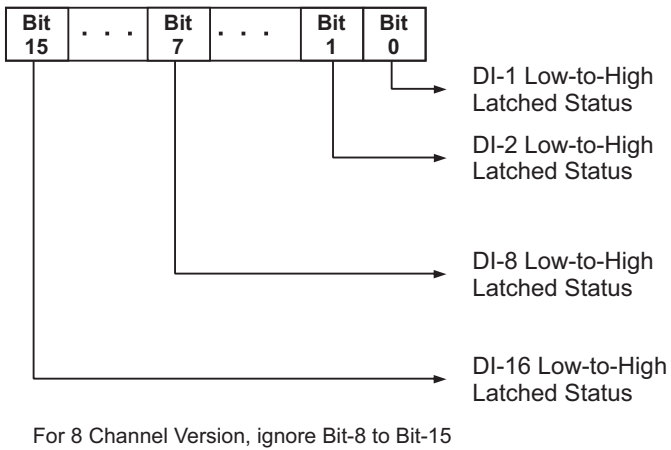
Modbus Data Type	MODBUS Address	Values						
Bit-Mapped Input or Holding Register <i>Function Code (0x03 or 0x04)</i>	1	 <p>For 8 Channel Version, ignore Bit-8 to Bit-15.</p> <table border="1"> <thead> <tr> <th>Bit Value</th> <th>DI Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Contact Open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

3 (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 2.3

Run Time Parameter (Read Only)

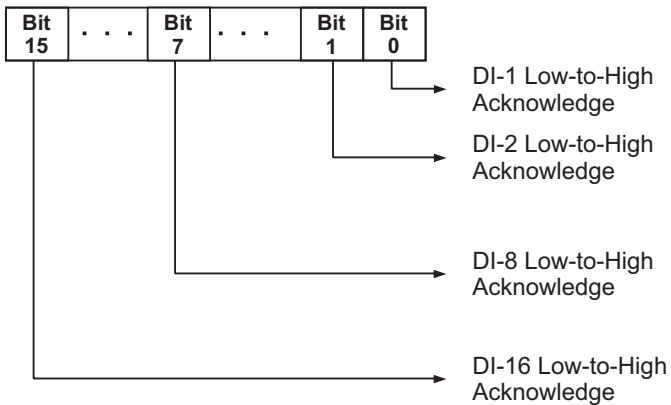
Modbus Data Type	MODBUS Address	Values						
Bit-Mapped Input or Holding Register <i>Function Code (0x03 or 0x04)</i>	2	 <table border="1" data-bbox="842 1272 1452 1393"> <thead> <tr> <th>Bit Value</th> <th>DI Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No 'Low-to-High' Transition</td> </tr> <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							
Discrete Input (Coils) <i>Function Code (0x01 & 0x02)</i>	17 to 24 (8 Channel) 17 to 32 (16 Channel)	<table border="1" data-bbox="842 1467 1452 1590"> <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							

3 (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 2.4

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

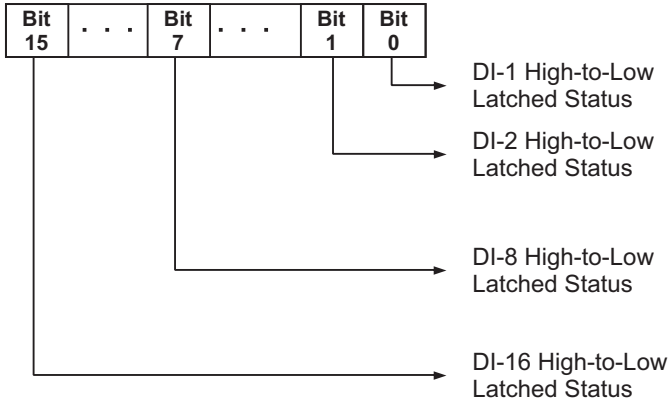
Modbus Data Type	MODBUS Address	Values						
Bit-Mapped Holding Register <i>Function Code (0x06 & 0x10)</i>	102	 <p>For 8 Channel Version, ignore Bit-8 to Bit-15</p> <table border="1"> <thead> <tr> <th>Bit Value</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No Effect</td> </tr> <tr>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

4 (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 2.5

Run Time Parameter (Read Only)

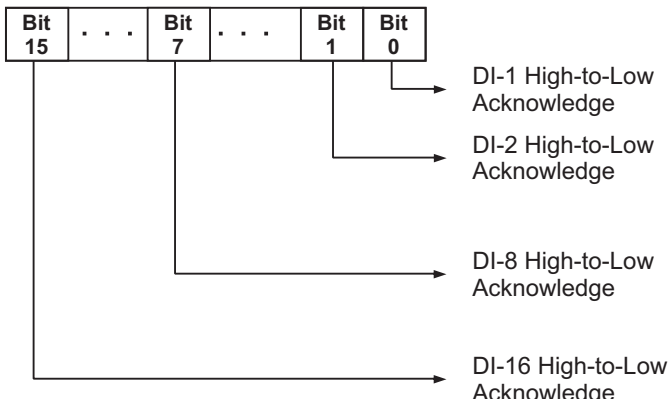
Modbus Data Type	MODBUS Address	Values						
Bit-Mapped Input or Holding Register <i>Function Code (0x03 or 0x04)</i>	3	 <table border="1" data-bbox="842 1310 1452 1429"> <thead> <tr> <th>Bit Value</th> <th>DI Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No 'High-to-Low' Transition</td> </tr> <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							
Discrete Input (Coils) <i>Function Code (0x01 & 0x02)</i>	33 to 40 (8 Channel) 33 to 48 (16 Channel)	<table border="1" data-bbox="842 1512 1452 1630"> <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							

4 (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 2.6

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

Modbus Data Type	MODBUS Address	Values						
Bit-Mapped Holding Register <i>Function Code (0x06 & 0x10)</i>	103	 <p>For 8 Channel Version, 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							
Coils <i>Function Code (0x05 & 0x0F)</i>	133 to 140 (8 Channel) 133 to 148 (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							

5. 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

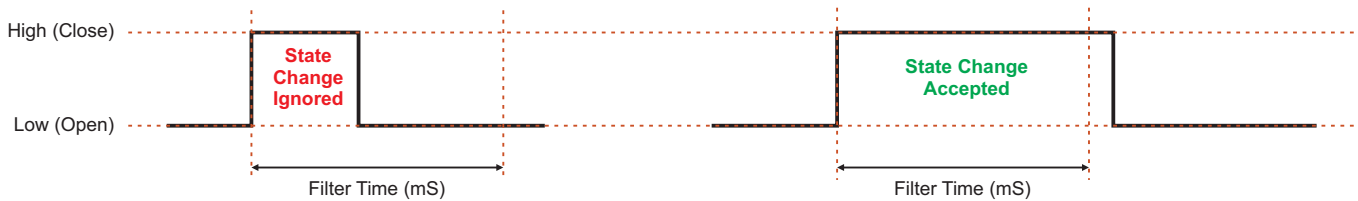


Figure 2.1 (b) : High-to-Low / Close-to-Open State Change

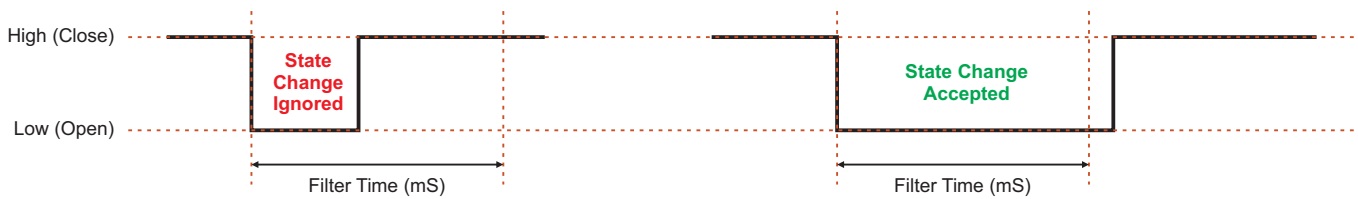


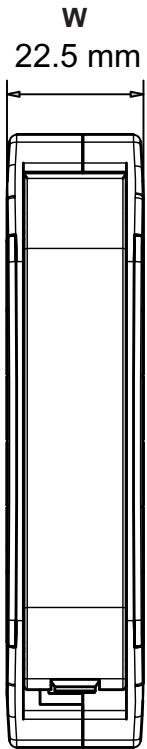
Table 2.7

Configuration Parameter (Stored in Non-Volatile memory)

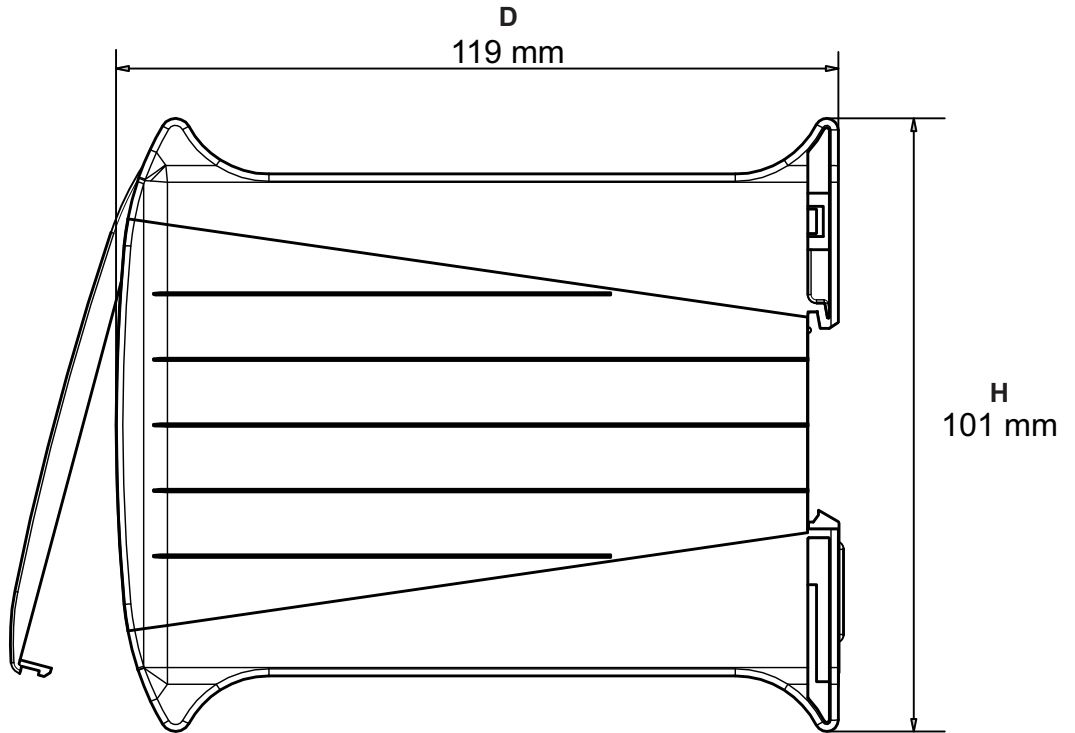
Modbus Data Type	MODBUS Address	Values
Holding Registers <i>Function Code (0x06 & 0x10)</i>	11 to 18 (8 Channel) 11 to 26 (16 Channel)	1 to 30000 mSec (Default : 10 mSec)



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	Parameter	Settings
	Slave ID	1 to 127
	Baud Rate	2400, 4800, 9600, 19200, 38400 bps
	Parity	None (1 or 2 Stop Bits) Even (1 Stop Bit) 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

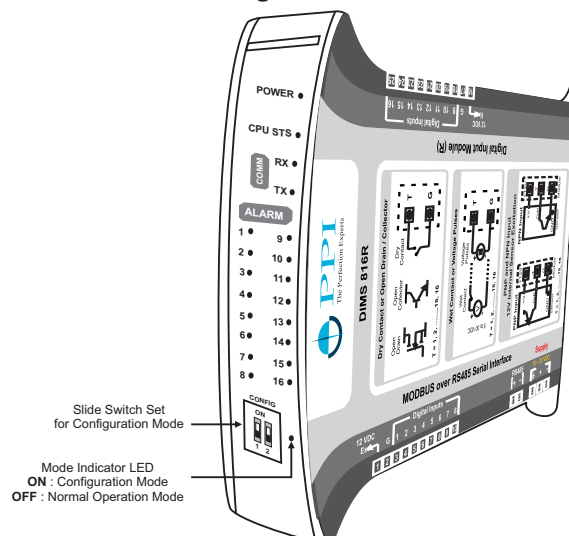
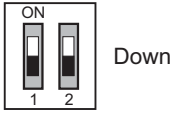
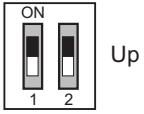


Table 4.2

Switch Position		
Mode Indicator	OFF	ON
Operation Mode	Normal	Configuration
Communication Parameter Values	User Set values for <i>Module Slave ID,</i> <i>Baud Rate & Parity</i>	<i>Module Slave ID : 1</i> <i>Baud Rate : 9600</i> <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



Parameter Description	MODBUS Address	Settings (Default Value)												
Module Slave ID Unique numeric value assigned to the module for identification by the host. Set the value as required by the host.	1	1 to 127 (Default : 1)												
Baud Rate Communication speed in ‘Bits per Second’. 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													
Parity One of the communication error trapping features. 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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