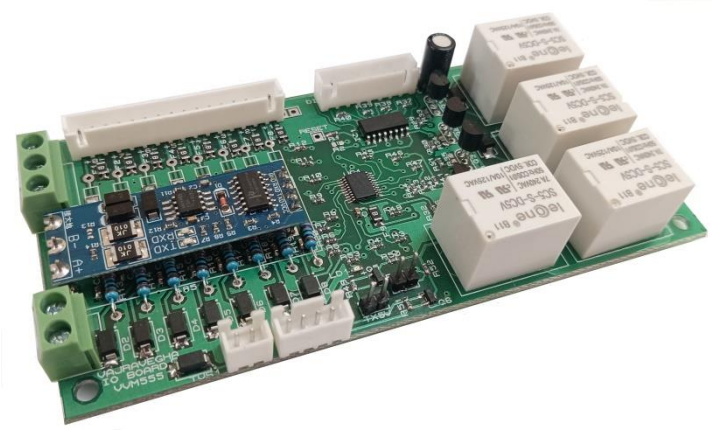
Vajravegha VVM555 Analog and Digital Input Output module

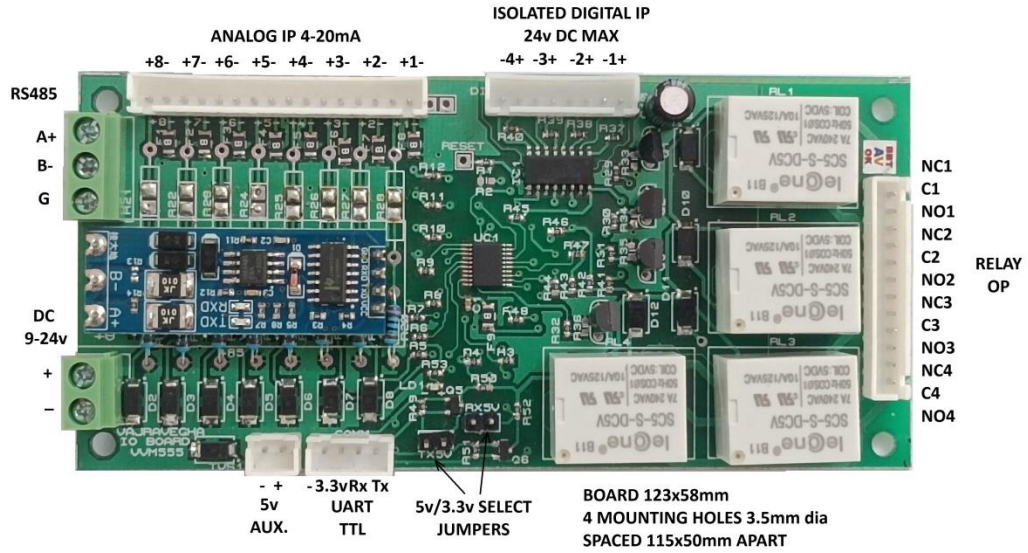
Product ID: VVM555
Version: v1.1



Features:

- 8 channel analog inputs 4-20mA
- 4 channel digital isolated inputs upto 24v DC
- 4 potential free relay outputs upto 240v 7A
- Modbus RTU over RS485 slave at 9600 default baud, supports function code 3 and 6
- Optional JSON format support for Serial UART TTL communication with 3.3v / 5v microcontrollers
- Power supply upto 24v DC, 12-bit ADC for analog measurement, LED indication for Power, Tx and Rx
- Compact PCB size 123x58mm

Description: VVM555 provides economical and precise analog and digital IO solution for industrial automation applications. It is equipped with 8 channel 4-20mA analog inputs, 4 channel digital opto-isolated inputs and 4 relay outputs. It supports Modbus RTU protocol over RS485 to directly provide input values and control relay outputs. Additionally it can provide these readings continuously (non-polling) to any 3.3v/5v embedded system by standard JSON format.



Operation: Connect a power supply (9-24v) to the DC input screw terminal. Connect the output of the 4-20mA analog sensors to the Analog input section of the board with proper polarity. All the analog channels employ common ground. Connect digital sensors to the digital ip section with proper polarity. All the digital inputs are optically isolated and support upto 24v i/p. Potential free contacts of the relay are available at NC (Normally Closed), C (Common) and NO (Normally Open). Connect a Modbus master / Master simulator to the A+ and B- pins of the RS485 screw terminal. 5v regulated DC can also be applied to the auxiliary power supply pins if 9-24v is unavailable. By default the module works as Modbus RTU slave with baud rate 9600 and slave ID 1.

Modbus Register Table

Register	Reading	Read/Write
40001	Analog Input 1 (mA x 100)	R
40002	Analog Input 2 (mA x 100)	R
40003	Analog Input 3 (mA x 100)	R
40004	Analog Input 4 (mA x 100)	R
40005	Analog Input 5 (mA x 100)	R
40006	Analog Input 6 (mA x 100)	R
40007	Analog Input 7 (mA x 100)	R
40008	Analog Input 8 (mA x 100)	R
40009	Digital Input 1 (1: OFF, 0: ON)	R
40010	Digital Input 2 (1: OFF, 0: ON)	R
40011	Digital Input 3 (1: OFF, 0: ON)	R
40012	Digital Input 4 (1: OFF, 0: ON)	R
40013	Relay 1 (0: OFF, 1: ON)	R/W
40014	Relay 2 (0: OFF, 1: ON)	R/W
40015	Relay 3 (0: OFF, 1: ON)	R/W
40016	Relay 4 (0: OFF, 1: ON)	R/W
40017	Baud Rate (1: 9600, 2: 19200) default 9600	R/W
40018	Slave ID (1-247) default 1	R/W

Function code 3 is used to read the data (40001 – 40018) and Function Code 6 (single register write) is used to write the data (40013 – 40018). Analog readings are scaled by 100, so an analog reading of 13.56 mA will be read as 1356 from the corresponding register. Digital Inputs are active low and digital outputs are active high.

The module supports continuous transmission mode as well. This is suited for microcontroller applications. Serial UART TTL is the preferred communication over RS485. To communicate with a 5v controller, short the TX 5v and RX 5v jumpers on the board.

Connection between IO board and controller (5v)

VVM555	MicroController
Minus	Minus
Tx	Rx
Rx	Tx

To communicate with a 3.3v controller, open the TX 5v and RX 5v jumpers, and connect 3.3v power supply line as well from the controller to the IO board. **NOTE: Use either RS485 or TTL UART at a time!**

Connection between IO board and controller (3.3v)

VVM555	MicroController
Minus	Minus
Tx	Rx
Rx	Tx
3.3v (VVM555 does not have on-board 3.3v regulator)	3.3v

To change from Modbus to Serial mode, send **SERIALON** to the Rx pin of the 4 pin UART TTL connector. The data will be continuously transmitted on the Tx pin of the IO board. JSON format is as follows

{“A”:5.67,”B”:0.00,”C”:12.56,“D”:5.67,”E”:0.00,”F”:12.56,”G”:3.33,”H”:9.56,”I”:1,”J”:1,”K”:1,”L”:1,”M”:1,”N”:1,”O”:1,”P”:1}
Where A to H are the 8 analog values (5.67mA, 0mA, 12.56mA, etc)

I to L are the 4 digital inputs 1(OFF) or 0(ON) Active Low

M to P are the 4 relay outputs 0(OFF) and 1(ON) Active high

To write values to the relays, send the following JSON command to the Rx pin of the IO board.

{“a”:0,”b”:0,”c”:1,“d”:1}
Where a to d correspond to the 4 relay channels and 0 or 1 is to turn off / turn on the relay respectively

To change baud rate, send **BAU1** or **BAU2** to the Rx pin, where BAU1 sets the Baud rate to 9600 and BAU2 sets the baud rate to 19200.

To set slave ID, send **SLVXXX** to the Rx pin, where XXX is any number ranging from 001 to 147

To change back from Modbus mode, send **MOD** to the Rx pin