



# SPARK

Drives & Automation

## MODBUS Analog Expander

*2x Analog Inputs, 4x Analog Outputs, 6x NPN Outputs*

MODBUS Analog Expander is a useful module for Automation Panel builders and Machine manufacturers. This module consists of two Analog Inputs, six NPN outputs, four Analog Outputs. This module is designed with a high performance microcontroller, RS232 & RS485 for MODBUS RTU. Our module functions as a MODBUS RTU Slave, which receives input read / output write command over MODBUS and perform the function accordingly. Module configuration (Slave ID, Baud Rate, etc.,) can be done using RS232 and IO Read/Write can be done via RS232/RS485.



### Features

- ✓ Standard 24V operation.
- ✓ 1 x RS232, 1 x RS485 with MODBUS RTU.
- ✓ Can be interfaced easily to PLC or HMI.
- ✓ 2x Analog Inputs - PNP type
- ✓ 4x Analog Outputs - 0...10VDC
- ✓ 6x Digital Outputs - NPN type with Protection diodes
- ✓ 45mm DIN Rail casing with CombiCon connectors

### Mechanical Characteristics

Operating temperature	:	0...+65 (°C)
Size (l*b*h)	:	100*45*50 mm
Housing	:	DIN Rail ABS Plastic Enclosure
Weight	:	70grams.



# SPARK

Drives & Automation

## Connector Info

Pin numbers mentioned are from left to right.

### TOP SIDE CONNECTOR

PIN#	CONNECTION
<b>SUPPLY CONNECTION</b>	
24+	24V DC Supply
24-	Ground 0V
<b>ANALOG INPUT</b>	
AIP1	Analog Input1
AIP2	Analog Input2
<b>RS485 INTERFACE</b>	
D+	RS485 D+
D-	RS485 D-
<b>RS232 INTERFACE</b>	
Tx	RS232 Tx
Rx	RS232 Rx
GND	Ground - 0V
Res	Reserve / Unused

### BOTTOM SIDE CONNECTOR

PIN#	CONNECTION
<b>DIGITAL OUTPUTS</b>	
DOP1	Digital Output1
DOP2	Digital Output2
DOP3	Digital Output3
DOP4	Digital Output4
DOP5	Digital Output5
DOP6	Digital Output6
<b>ANALOG OUTPUTS</b>	
AOP1	Analog Output1
AOP2	Analog Output2
AOP3	Analog Output3
AOP4	Analog Output4

## Communication Parameters for RS-485 & RS-232:

Parameter	RS232	RS485	
		Default	Configurable
Protocol	MODBUS - RTU Slave (Hex)	MODBUS - RTU Slave (Hex)	No
Slave Number	1	1	Yes
Baud Rate	9600	9600	Yes
Data bits	8	8	No
Parity	None	None	No
Stop Bits	2	2	Yes
Retry Count	2	2	No
Time Out	1000ms	1000ms	No

NOTE: The Parameters for RS232 is always cannot be changed. To change Configurable Parameters for RS485 refer the Register Section below.

## Data Registers:

Hex Address	Function	Type	Port
0001H	Digital Output ON Register	Write	RS232 & RS485
0002H	Digital Output OFF Register	Write	
0003H	Digital Output Status Register	Read	
0004H	Analogue Input 1 Register	Read	
0005H	Analogue Input 2 Register	Read	
0006H	Analogue Output 1 Register	Read / Write	
0007H	Analogue Output 2 Register	Read / Write	
0008H	Analogue Output 3 Register	Read / Write	
0009H	Analogue Output 4 Register	Read / Write	
000AH	Analogue Output OFF Register	Write	



## RS485 Configuration Registers:

Hex Address	Function	Type	Port
07D0H	Slave Address of RS485	Read / Write	RS232
07D1H	Baud Rate of RS485	Read / Write	
07D2H	Stop Bits of RS485	Read / Write	

NOTE: The above registers can read by RS485, but can't write through the same.

## Functions of Data Registers:

- 0001H (40002) - Digital Output ON Register: This is a 16-bit Write only register. By writing to this register, corresponding output can be Turned ON. The current On/Off Status of outputs can be read from Status register. For example, If PLC writes 0001H in this register, then Output1 is turned ON. Again if PLC writes 0006H, Output2 and Output3 are turned ON along with Output1.
- 0002H (40003) - Digital Output OFF Register: This is a 16-bit Write only register. By writing to this register, corresponding output can be Turned OFF. The current On/Off Status of outputs can be read from Status register. For example, If PLC writes 0001H in this register, then Output1 is turned OFF. Again if PLC writes 0006H, Output2 and Output3 are turned OFF.
- 0003H (40004) - Digital Output Status Register: This is an Unsigned 16-bit Read only register. This register value indicates the Current ON/OFF Status of Digital Outputs. Eg: If the value of this register is 000AH, it indicates Output4 and Output2 are in ON State and all other Outputs are in OFF state.
- 0004H (40005) - Analogue Input 1 Register: This is an unsigned 16-bit Read only register. This register value gives equivalent digital count (0 to 1000) of Analog Input1. Eg: If AIP1 is 5.2Vdc, then the value of this register will be 520d or 0280H.
- 0005H (40006) - Analogue Input 2 Register: This is an unsigned 16-bit Read only register. This register value gives equivalent digital count (0 to 1000) of Analog Input2. Eg: If AIP2 is 7Vdc, then the value of this register will be 700d or 02BCH.
- 0006H (40007) - Analogue Output 1 Register: This is an unsigned 16-bit Read / Write register, used to controlling the output voltage of AOP1. PLC or any MODBUS master can write a value from 0 to 1000 in this register will produce 0 to 10Vdc on AOP1 accordingly. Eg: If PLC writes 500d or 01F4H in this register, then output of AOP1 is 5Vdc.
- 0007H (40008) - Analogue Output 2 Register: This is an unsigned 16-bit Read / Write register, used to controlling the output voltage of AOP2. PLC or any MODBUS master can write a value from 0 to 1000 in this register will produce 0 to 10Vdc on AOP2 accordingly. Eg: If PLC writes 900d or 0348H in this register, then output of AOP2 is 9Vdc.
- 0008H (40009) - Analogue Output 3 Register: This is an unsigned 16-bit Read / Write register, used to controlling the output voltage of AOP3. PLC or any MODBUS master can write a value from 0 to 1000 in this register will produce 0 to 10Vdc on AOP3 accordingly. Eg: If PLC writes 100d or 0064H in this register, then output of AOP3 is 1Vdc.



- 0009H (40010) – Analogue Output 4 Register: This is an unsigned 16-bit Read / Write register, used to controlling the output voltage of AOP4. PLC or any MODBUS master can write a value from 0 to 1000 in this register will produce 0 to 10Vdc on AOP4 accordingly.  
Eg: If PLC writes 250d or 00FAH in this register, then output of AOP4 is 2.5Vdc.
- 000AH (40011) – Analogue Output OFF Register: This is an unsigned 16-bit Write only register. The value write to this register can be Turned OFF the AOP's for corresponding bits in this register in mean time the values in Analogue Output registers get cleared accordingly. The value in Analogue Output Off register also will be cleared once it's processed.  
Eg: If PLC writes 0001H in this register, then AOP1 is turned OFF (i.e. voltage reduced to 0). If PLC writes 0004H in this register, then AOP3 is turned OFF (i.e. voltage reduced to 0).

### Functions of RS485 Configuration Registers:

- 07D0H (42001) – Slave Address of RS485: This register has default '1'. The values written to this register will change the Slave Address of RS485 com-port and this will retained until next change. This register can read by either RS232 & RS485 and write by RS232 only.
- 07D1H (42002) – Baud Rate of RS485: This register has default '0'. The values written to this register with the corresponding Baud Rate of RS485 which is shown in below and this will retained until next change. This register can read by either RS232 & RS485 and write by RS232 only.
  - '0' – 9600 bps(Default)
  - '1' – 14400 bps
  - '2' – 19200 bps
  - '3' – 38400 bps
  - '4' – 56000 bps
  - '5' – 57600 bps
  - '6' – 115200 bps
- 07D2H (42003) – Stop Bits of RS485: This register has default '0'. The values written to this register with the corresponding Stop Bits of RS485 which is shown in below and this will retained until next change. This register can read by either RS232 & RS485 and write by RS232 only.
  - '0' – 2 Stop Bits(Default)
  - '1' – 1 Stop Bits



# SPARK

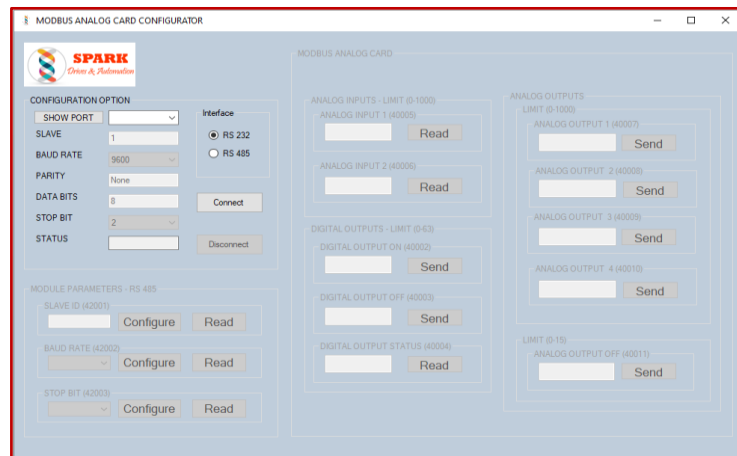
Drives & Automation

## Configurator Tool:

PC based Configurator tool is available for Module configuration (Slave ID, Baud rate, Stop bits etc.).

Voltage at Analog Inputs can be displayed, Digital Outputs can be switched on/off and Voltage at Analog Outputs can be set using this tool.

This greatly reduces the initial testing efforts and time.





**SPARK**  
*Drives & Automation*

**sales@sparkdna.in, +91 99428 66766**

#44, Marvel Parambariam, Kalapatti Road, Saravanampatti,  
Coimbatore, Tamilnadu, India 641035.