

# Sparr Electronics Limited



## User Manual

# Addressable Mini I/O

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Manual Revision	Revision Date	List of Updates
00	23/09/2016	
01	14/08/2017	1. Contact Information

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## 1. Overview

- Addressable RS 485 to RS 232 Converter.
- Users can easily add/remove a Serial Port in their RS485 network to talk to RS232 based Serial Devices with the added feature of addressability.
- Power and Data Isolated RS485 port gives protection to the unit and also the connected RS232 device from the RS485 network.
- Unit address can be set by 8 way DIP switch allowing 255 addresses.
- Baud Rate and other RS232/RS485 port parameters are set by writing in to Modbus Registers.
- Address 0 of the DIP switch loads known defaults to the RS232/RS485 ports ensure configurability at all times
- Supports 2 Digital Inputs, 4 Analog Inputs & 2 Outputs.

## 2. Applications

- Industrial Control and Automation.
- Environmental Monitoring and Control.
- Plant Automation.
- Energy Monitoring and Management.
- Building Management Systems – BMS.
- Remote Data Logging.
- Enabling MODBUS capability for non MODBUS devices.
- ATM Management.
- Mobile Tower Management.

### 3. Technical Specifications

<b>Interface</b>	
Serial	RS 232, RS 485
<b>RS 485</b>	
Maximum number of drivers	256
Maximum cable	1220 m
Signal Isolation	Provides Optical Isolation Signals
Power Isolation	>3000 Isolation between RS 485 and RS 232
ESD Protection	+ / – 15KV
<b>Connectors</b>	
RS 232, Digital, Analog	DB 25 pin male
Serial RS 485	RS 485 3-pin Screw type Connector
<b>Serial</b>	
Baud Rate	600 to 115200 bps
Data Bits	8
Stop Bits	1 or 2
Parity	None, Even, Odd
Flow Control	None, Xon / Xoff
ID Setting	8 way DIP switch from 01 to 255. 0 is for default loading
Supported Protocol	MODBUS
Analog Inputs	4 Inputs. 0 to 12 V DC
Input Type (Optional)	Single ended, 4 to 20 ma on 4 Inputs with 10 bit resolution OR Single Ended, Differential on 2 Inputs with 16 bit
Isolated Digital Inputs	2 Inputs. 5 to 12 V DC. Isolation of 3750 V RMS
Digital Output	2 Open Collector outputs with a maximum of 12 V DC. Freewheeling Diode protected.
<b>Power</b>	5 to 24 V DC, 100 mA
<b>Indicators (LED)</b>	
Power	Red
TxD	Yellow
RxD	Green
<b>Environmental</b>	
Operating	0 °C to 70 °C
Storage	-40 °C to 85 °C
<b>Packaging</b>	
Dimensions (LxWxH)	140mm(L) x 130mm(W) x 31mm(H)
Weight, Warranty	50g, 12 Months

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## 4. Connection Details

### 1) DB 25 Pin Male Connector Pin Outs

Pin Number	Signal
1	Ground
2	RS232 TXD
3	RS232 RXD
4	RS232 RTS
5	RS232 CTS
6	Ground
7	Ground
8	4 – 20 ma input 3
9	NC
10	4 – 20 ma input 4
11	NC
12	Ground
13	Diode protection of open collector outputs
14	5V DC output
15	4 – 20 ma input 2
16	Ground
17	5V DC output
18	4 – 20 ma input 1
19	Ground
20	Digital I/P 1 +
21	Digital I/P 1 -
22	Digital I/P 2 +
23	Digital I/P 2 -
24	Open Collector O/P 1
25	Open Collector O/P 2

### 2) Power Input

Connector	Signal
JP1 Pin 1	TRx+
JP1 Pin 2	TRX -
JP1 Pin 3	Isolated Ground

### 3) 485

Connector	Signal
CON1 pin 1	12 V DC
CON1 pin 2	Ground

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#### 4) LED Indications

LED Color	Indication
RED	Glowing – Power ON
Yellow	Blinking – When data is transmitted to RS485
Green	Blinking – When data is Received from RS485

#### 5) Dip Switch Setting

Device address can be set from 1 to 255 by using 8 DIP switches provided on back side.

Switch ON = 0

Switch OFF = 1

To set device 1, keep switch 1 in OFF position and all other 7 switches in ON position.

#### Load Default

To load Default values keep all switches in ON position and power cycle the device for 5 seconds.

#### Supported Modbus Functions:

1. Read Coils
2. Write Coil
3. Write Multiple coils
4. Read Holding Registers
5. Write Single Register
6. Write Multiple Registers
7. Read Input Registers

#### Holding Registers:

1. Baudrate R1 (RS-232) Default 9600
2. Data Parameters R2 (RS-232) Default N-8-1
3. Character Wait Timeout R3 (RS-232) Default 10
4. Flow Control R4 (RS-232) Default None
5. Baudrate R5 (RS-485) Default 9600
6. Data Parameters R6 (RS-485) Default N-8-1
7. Character Wait Timeout R7 (RS-485) Default 10
8. Restart R8
9. Analog 1 Highest value of the day R9
10. Analog 1 Lowest value of the day R10
11. Analog 2 Highest value of the day R11
12. Analog 2 Lowest value of the day R12
13. Analog 3 Highest value of the day R13
14. Analog 3 Lowest value of the day R14
15. Analog 4 Highest value of the day R15
16. Analog 4 Lowest value of the day R16

## Input Registers:

1. Analog channel 1 count R1 (Int. ADC)
2. Analog channel 2 count R3 (Int. ADC)
3. Analog channel 3 count R5 (int. ADC)
4. Analog channel 4 count R7 (Int. ADC)
5. Digital Input R9 (2 inputs read as – xxxx xxxx xxxD1D0)
6. Number of bytes received at RS-232 side in R11, R12
7. Slave type- Is always 1 for Sparr Mini I/O module in R13, R14
8. Firmware Version No. 5 R15

## Loading default settings:

Select the slave ID as 0 on power-on for 2 seconds. This will load the default settings of the unit. Restart the unit with the desired slave ID and proceed further.

## Write Single Register/Write Multiple Register:

The slave unit, after receiving the query from the master, responds to it. If the function of the query is to write single register or write multiple registers, the data to be written is sent out to the serial port (RS232). The first 8 holding registers, ie R1 to R8 are reserved for the configuration parameters. R9 to R16 are used for storing the highest and lowest values of the 4 analog signals. These 8 registers can be reset by writing 0 to them. To send out any value to the serial port, master has to send a query with the starting address as R17 or above. Setting R8 as 1 restarts the unit.

<b>R1</b>	<b>Baudrate0</b>	<b>R2</b>	<b>Data Params0</b>	<b>R3 Char Wait Time Out 0 in m Sec</b>  <b>MAX 65535</b>  <b>Default 10</b>	<b>R4</b>	<b>Flow Control0</b>
0	600	0	N81		0	None
1	1200	1	E81		1	XON/XOFF
2	2400	2	O81		2	Hardware
3	4800	3	N82			
4	<b>9600</b>	4	E72			
5	19200	5	O72			
6	38400	6	E71			
7	57600	7	O71			
8	115200					
<b>R5</b>	<b>Baudrate1</b>	<b>R6</b>	<b>Data Params1</b>	<b>R7 Char Wait Time Out 01 in m Sec</b>  <b>MAX 65545</b>  <b>Default 10</b>	<b>R8</b>  <b>1 for Restart</b>	
0	600	0	N81			
1	1200	1	E81			
2	2400	2	O81			
3	4800	3	N82			
4	<b>9600</b>					
5	19200					
6	38400					
7	57600					
8	115200					

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## Read Holding Registers:

Data is also received from the serial port. If the master queries to read holding register, the data received is sent to the master. If the master queries for any of the first 8 registers, ie R1 to R8, then the configuration values are sent back. R9 to R16 returns the highest/lowest values of the analog channels. If any of the registers above R16 is queried, data from the serial side, if any, is returned. Querying for more number of registers than what is available at the serial side will return an error. Maximum of **123** registers can be read or written at the same time using the above 2 functions.

## Read Input Registers:

### Internal Analog Channels

4 Analog Channels, 10-bit ADC connected to four analog devices. Register R1 to R8 represents 4 number 4 – 20ma current input, corresponding value of register will be 1V to 5V.

### Digital Inputs

2 Digital Inputs, Input Validation Time=10ms. The last 2 bits of the register R9 returns status of the 2 inputs R10 will be zero. Digital Input (2 inputs read as – xxxx xxxx xxxx xxD1D0). D0, D1 bits are inverted.

### Serial Data Received

Number of bytes received from the RS-232 side

### Slave Type

This register indicates the type of slave that is present in the network. Slave Type is 1 for a Sparr Mini I/O Module.

### Firmware Version

Version number is 6 for this firmware.

Read Coils:

### Outputs

2 Output pins used to control any external relay, etc. The last 2 bits D1 and D0 of R1 denotes the 2 output pins.

Write Coils/Write Multiple Coils:

Write value to the 2 output pins, as above.

R1 - Output (2 outputs read/written as – xxxx xxxx xxxx xxD1D0)



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## 5. Troubleshooting

Problem	Solution
1) If device is not Powering ON?	Check Input voltage Check Adapter is connected properly Check power ON LED is glowing
2) If device unable to read the Data?	Check the Slave ID of the device Check the Serial parameter settings Check the RxD & TxD LEDs are blinking while communicating
3) How to Load default settings?	Select the slave ID as 0 on power-on for 2 seconds.
4) How to SET the Slave ID?	On the bottom of the unit, there is a 8way DIP Switch which is used for setting the Slave ID for the unit. Bit 1 corresponds to LSB and Bit 8 corresponds to the MSB and using these combinations 256 unique Unit IDs' can be set.

## 6. Contact and Support

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