# SAI140 Modbus RTU Over RS485 to Digital IO Quick Start Guide









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# 1.Introduction

SDIO43 provides 4 Digital Inputs and 3 Digital Outputs. One RS485 Serial

Port (Terminal Block interface) support Modbus RTU protocol for control DIO.

### Digital I/O

Digital Input : 4 (active High / Low selectable)

Digital Output : 3 (active High / Low selectable)

DO x 3 : Relay output, 125V AC@0.5A, 30V DC@1A

DI x 4 : 3000 VDC Isolation Protect

## **1.1 Product Views**



Figure 1 Product View



# **1.2 Wiring Architecture**





# 2. Configuration

### 2.1 Digital Input Settings





# 2.2 Configuration Via Windows Utility

Step1→ Open and configure SDIO43 via the "*Modbus RTU\_AI4\_DIO22*"



Step2 $\rightarrow$  Configure the test tool (as shown below)





#### Figure 3 SCAI4 test tool configuration

Step3→ After configure COM port parameters then Click "Connect"
 Step4→One should get 'Connected" from SDIO43 And now you have successfully connected to SDIO43.

COM         Baudrat         Length         Parity         Stop         De           COM 5         •         38400         8         -         n         •         1         •         10	vice ID(01~F7)
Device Configure Baudrate Device ID(01~F7) 38400 • 01 Baudrate	Length Parity Stop 8 <b>x</b> n <b>x</b> 1 <b>x</b> Configure
Voltage         Output         Output         Output           v_0         v_1         v_2         v_3	Current 00.000 000 00.000 00.000 00.000 00.000 00.000 00.000 00.000 00.000 00.000 00.000 00.000 000 00.000 000 000 00.000 00.000 00.000 00.000 00.000 00.000
DIDL_0 DL_1	-D0 D0_0 ON D0_1 ON Read D0
Clear Auto test Command interval (mS)	200

# **2.3 Function Test**

1. Voltage test

SCA4Test2.00	
COM     Port     Baudrak     Length     Parity     Stop     Device ID(01~F7)       COM 4     V     38400     3     n     1     101     Disconnect	
Device Configure       Baudrate     Device ID(01-F7)       58400     101       Baudrate     8       n     1       Configure	
Voltage	
V1         V2         V3         V4         11         12         13         14	
VO Configure         VO2(0~10000)         Ex. Setup Value 1500 means 1.5V           0         Setup VO1         Setup VO2	
Clear	
2019/07/15 14:05:43 receive 0.10 30 20 000 B6 44 2019/07/15 14:05:43 send 0.10 30 01 00 00 185 CF 2019/07/15 14:05:43 receive 0.10 30 20 00 00 B6 44 2019/07/15 14:05:43 receive 0.10 30 00 C0 00 14 40 90 2019/07/15 14:05:41 receive 0.10 30 00 C0 00 14 40 90 2019/07/15 14:05:43 receive 0.10 30 00 80 00 16 5 C8 2019/07/15 14:05:33 receive 0.10 30 20 DD BF C 8F 2019/07/15 14:05:31 receive 0.10 30 20 DD BF C 8F	н



#### 2.Current test

COM COM Port Baudrats Length Parity Stop Device ID(01-F7) COM 4 ▼ 38400 ▼ 8 ▼ n ▼ 11 ▼ 01 Disconnect	
Device Configure       Baudrate     Device ID(01-F7)       38400     01       Baudrate     3       n     1       Configure	
Voltage         Current           v1         v2         v3         v4         11         12         13         14	
VO Configure         V02(0-10000)         Ex. Setup Value 1500 means 1.5V           0         Setup         0         Setup           VO10-10000         VO2(0-10000)         Ex. Setup Value 1500 means 1.5V	
Clear D19077/5 1407747 receive 01 03 02 28 53 56 79 D019077/5 1407747 rend 01 03 00 11 00 01 D4 0[P 2019077/5 1407741 receive 01 03 02 28 46 27 B6 2019077/5 1407740 receive 01 03 02 28 46 27 B6 2019077/5 1407740 receive 01 03 02 00 00 08 44	* III
201907715140740 send 01 03 00 99 00 01 54 08 201907715140739 receive 01 03 02 00 00 08 44 201907715140739 send 01 03 02 00 00 08 44 201907715140543 receive 01 03 02 00 00 844	Ψ.

### 3. VO Settings

> SCA14 Test2.0.0	x
COM       Port       Baudrate       Length       Parity       Stop       Device ID(01~F7)         COM 4       38400       8       n       1       01       Disconnect	
Device Configure       Baudrate     Device ID(01~F7)       38400     01       Baudrate     8       Image: Setup Baudrate     1	
Voltage         Current           1.547         1.547         1.547         1.0323           V1         V2         V3         V4         I1         I2         I3         I4	
VO Configure         VO2(0~10000)         Ex. Setup Value 1500 means 1.5V           2000         Setup VO1         Setup VO2	
Clear           2019/07/15 14:10:45 send 01 06 00 14 07 D0 CA 62           2019/07/15 14:10:36 send 01 06 00 18 27 10 13 F1           2019/07/15 14:10:36 send 01 06 00 14 03 B8 C9 70           2019/07/15 14:07:47 receive 01 03 02 28 53 E6 79           2019/07/15 14:07:47 send 01 03 00 11 00 01 D4 0F           2019/07/15 14:07:47 send 01 03 00 22 84 62 7 B6           2019/07/15 14:07:40 send 01 03 00 0D 00 01 15 C9           2019/07/15 14:07:40 send 01 03 00 0D 00 88 44           2019/07/15 14:07:40 send 01 03 00 00 00 15 4 08	4 III
۲	Þ



# 2.4 Modbus Command Set

A basic MODBUS command always takes two main parameters :

- 1. ID Address : Designated to receive this Command ID address •
- 2. Function Code : This Command function •

The reception to the Command element will return a Response inform the completion of action in response to the remote or the value returned by the read, Response Command format in the format is basically the same, but also have ID Address and Function code in order to master identification, the following table for common Function code order.

#### 1. MODBUS RTU Protocol

#### The following MODBUS functions are supported.

Function code	Description
0x03	Read Holding Registers
0x06	Write Single Register

#### MODBUS Protocol Address Map

MODBUS Register	HEX	Function	Description	Action
0000	0106	Read/Write Modbus device Address And Baud Rate Setting	High byte: Modbus device Address The rage is 1~247 Low byte: Baud Rate Setting 1: 2400 2: 4800 3: 9600 4: 14400 5: 19200 6: 38400 7: 115200	R/W
0001	0600	Data length,	High byte: Data length , Parity, and stop bits. Valid values	R/W



		Parity, and stop bits Setting	are :	
		6	SERIAL_7N1 0x04	
			SERIAL_8N1 0x06(default)	
			SERIAL_7N2 0x0C	
			SERIAL_8N2 0x0E	
			SERIAL_7E1 0x24	
			SERIAL_8E1 0x26	
			SERIAL_7E2 0x2C	
			SERIAL_8E2 0x2E	
			SERIAL_701 0x34	
			SERIAL_8O1 0x36	
			SERIAL_7O2 0x3C	
			SERIAL_8O2 0x3E	
			Low byte: Reserved	
0004	0018	Read AI1 voltage	Ex: 0x2710 = 10000 in decimal. It means 10.000V	R
0005	0030	Read AI1 current	Ex: 0x4E20 = 20000 in decimal. It means 20.000mA	R
0008	0018	Read AI2 voltage	Ex: 0x2710 = 10000 in decimal. It means 10.000V	R
0009	0030	Read AI2 current	Ex: 0x4E20 = 20000 in decimal. It means 20.000mA	R
0014	2710	Read AO1 voltage	Ex: 0x2710 = 10000 in decimal. It means 10.000V	R/W
0018	1388	Read AO2 voltage	Ex: 0x1388 = 5000 in decimal. It means 5.000V	R/W

#### Example for read Modbus Address and Baud Rate :

Request		Response	
Field Name	(Hex)	Field Name	(Hex)



MODBUS Address	01	MODBUS Address	01
Function	03	Function	03
Starting Address Hi	00	Byte Count	02
Starting Address Lo	00	High Byte Data	01
Quantity of Outputs Hi	00	Low Byte Data	06
Quantity of Outputs Lo	01	High Byte CRC	39
High Byte CRC	84	Low Byte CRC	D6
Low Byte CRC	0A		

Ex: High Byte Data 0x01 means Modbus Address = 01. The available rage is  $1^{2}247$ .

Low Byte Data 0x06 means Baud Rate = 38400

For 1 means baud rate is 2400

2 means baud rate is 4800

3 means baud rate is 9600

4 means baud rate is 14400

5 means baud rate is 19200

6 means baud rate is 38400

7 means baud rate is 115200

#### Example for read Al1 voltage input

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MODBUS Address	01	MODBUS Address	01
Function	03	Function	03
Starting Address Hi	00	Byte Count	02
Starting Address Lo	04	High Byte Data	00
Quantity of Outputs Hi	00	Low Byte Data	18
Quantity of Outputs Lo	01	High Byte CRC	B8
High Byte CRC	C5	Low Byte CRC	4E
Low Byte CRC	СВ		



ModScan32 - [ModSca1]	
Address: 0005 Device Id: 1 MODBUS Point Ty Length: 1 03: HOLDING REGIST	Number of Polls: 176         /pe         Valid Slave Responses: 176         ER ▼         Reset Ctrs
40005: <39329>	
ModScan32 - (COMM4)	Polls: 176 Resps: 176

Ex: Data 0x0018 = 24 in decimal. It means 0.024V

Example for read Al1 current input

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MODBUS Address	01	MODBUS Address	01
Function	03	Function	03
Starting Address Hi	00	Byte Count	02
Starting Address Lo	05	High Byte Data	00
Quantity of Outputs Hi	00	Low Byte Data	30
Quantity of Outputs Lo	01	High Byte CRC	B8
High Byte CRC	94	Low Byte CRC	50
Low Byte CRC	OB		

Ex: Data 0x0030 = 48 in decimal. It means 0.048mA

Example for read AI2 voltage input

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MODBUS Address	01	MODBUS Address	01
Function	03	Function	03
Starting Address Hi	00	Byte Count	02
Starting Address Lo	08	High Byte Data	00
Quantity of Outputs Hi	00	Low Byte Data	18
Quantity of Outputs Lo	01	High Byte CRC	B8
High Byte CRC	05	Low Byte CRC	4E
Low Byte CRC	C8		

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ModScan32 - [ModSca1]	
E File Connection Setup View Window Help □ ☞ ■ ● €    ● ♥ №	_ 8 ×
Address:     0009     Device Id:     1       Address:     0009     MODBUS Point Type       Length:     1     03: HOLDING REGISTER     •	Number of Polls: 12 Valid Slave Responses: 13 Reset Ctrs
40009: <39306>	
ModScan32 - (COMM4)	Polls: 13 Resps: 13

Ex: Data 0x0018 = 24 in decimal. It means 0.024V

Example for read Al2 current input

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MODBUS Address	01	MODBUS Address	01
Function	03	Function	03
Starting Address Hi	00	Byte Count	02
Starting Address Lo	09	High Byte Data	00
Quantity of Outputs Hi	00	Low Byte Data	30
Quantity of Outputs Lo	01	High Byte CRC	B8
High Byte CRC	54	Low Byte CRC	50
Low Byte CRC	08		

Ex: Data 0x0030 = 48 in decimal. It means 0.048mA

Example for set Modbus Address and Baud Rate :

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MODBUS Address	01	MODBUS Address	01
Function	06	Function	06
Data Address Hi	00	Data Address Hi	00
Address Lo	00	Data Address Lo	00
High Byte Data	02	High Byte Data	02
Low Byte Data	06	Low Byte Data	06



High Byte CRC	08	High Byte CRC	08
Low Byte CRC	A8	Low Byte CRC	A8

Ex: High Byte Data 0x02 set Modbus Address as 02. The available rage is 1~247.

Low Byte Data 0x06 set Baud Rate as 38400

For 1 set baud rate as 2400

2 set baud rate as 4800

3 set baud rate as 9600

4 set baud rate as 14400

5 set baud rate as 19200

6 set baud rate as 38400

7 set baud rate as 115200



Example for set AO1 :

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MODBUS Address	01	MODBUS Address	01
Function	06	Function	06
Data Address Hi	00	Data Address Hi	00
Address Lo	14	Data Address Lo	14
High Byte Data	27	High Byte Data	27
Low Byte Data	10	Low Byte Data	10
High Byte CRC	D3	High Byte CRC	D3
Low Byte CRC	F2	Low Byte CRC	F2

Ex: High Byte Data & Low Byte Data 0x2710 set AO1 10.000V output

#### Example for set AO2 :

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MODBUS Address	01	MODBUS Address	01
Function	06	Function	06
Data Address Hi	00	Data Address Hi	00
Address Lo	18	Data Address Lo	18
High Byte Data	13	High Byte Data	13
Low Byte Data	88	Low Byte Data	88
High Byte CRC	04	High Byte CRC	04
Low Byte CRC	9B	Low Byte CRC	9B

Ex: High Byte Data & Low Byte Data 0x1388 set AO2 5.000V output

### 2.5 Reset Button

If any chance you forgot the login password or have incorrect settings making this Device inoperable, upon the power is on and the "SYS" LED light on, use a point tip to press this button and hold it for more than 20 seconds the release the point tip. The Device will reboot and all the parameters will be reset to the factory default.