1. Product Introduction

Thank you for purchasing Modbus Duo Box. This manual contains instructions and warnings that should be followed during the installation, operating and storage of the card. Please keep this manual for further reference.

Applicable models:

● Off-grid inverter 5KW

Before installation, please make sure this Modbus Duo Box is compatible to your existing inverter.

This external box can provide more communication capability for the inverter to lithium battery and monitoring software. Here are the detailed functions:

● Via the communication between the inverter and lithium battery, it's able to re-configure the charging voltage, charging current, battery discharge cut-off voltage and max. discharge current based on the lithium battery parameters.
● Have unit start or stop charging depending on the status of lithium battery.
● Monitoring software

Special Precautions

● If this box must be stored prior to installation; storage must be in a dry place
● The admissible storage temperature range is from -10ºC to +70ºC.

2. Unpacking and Overview

2-1. Package Contents

Before installation, please inspect the unit. Be sure that nothing inside the package is damaged.

You should have received the following items inside of package:
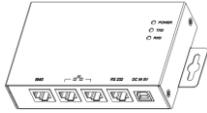
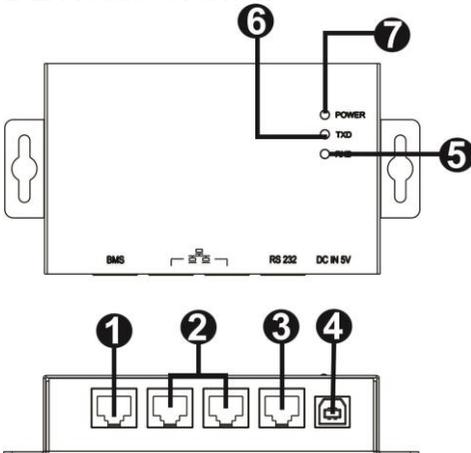| Modbus Duo Box | RJ45 cable (black)
*For BMS function | RJ45 cable (gray)
*To connect inverter and box | Manual |

USB cable

Note: This supplied RJ45 cable is custom-made.

2-2. Product Overview

❶ BMS port (Refer to section 3 for the details).

❷ RS485-Monitor port (Refer to section 4 for the details).

❸ RS232 port

❹ 5V DC input

❺ RS232 RXD LED

❻ RS232 TXD LED

❼ Power indicator

3. Interface Configuration
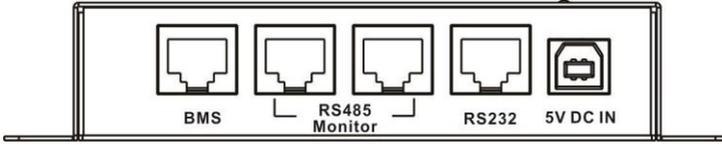
RS485-BMS pin configuration on Modbus Duo Box:

Pin	Function
1/2/3	
4	RS-485 - B
5	RS-485 - A
6/7	
8	GND

RS485–BMS pin configuration on Lithium battery:

Pin	Function
1	RS-485 - B
2	RS-485 - A
3	GND
4/5	
6	GND
7	RS-485 - A
8	RS-485 - B

RS232 Pin Configuration:

Pin	Function
1	Txd
2	Rxd
8	GND

USB spec

Voltage	5V DC
Current	500 mA

4. BMS Configuration

4-1. Communication Format Configuration
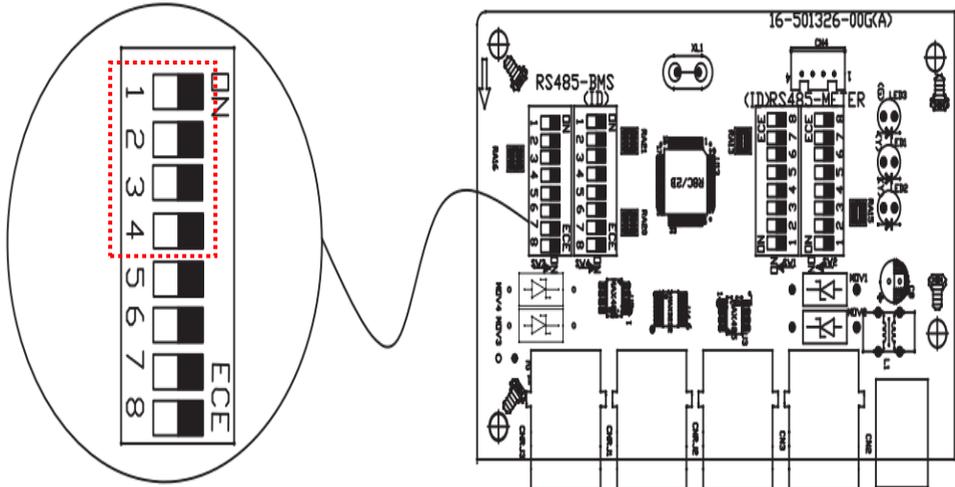
Function	Bit Setting		Meaning
Baud rate	# 2	# 1	
	OFF	OFF	2400bps
	OFF	ON	4800bps
	ON	OFF	9600bps*(Default)
	ON	ON	19200bps
Parity check	# 4	# 3	
	OFF	OFF	Even parity
	ON	OFF	Odd parity
	OFF	ON	No parity check 1 stop bit (Default)
	ON	ON	No parity check 2 stop bits

*It's request to use 9600bps baud rate and no parity check1 stop bit if using BMS port. The bit setting should be # 1 as OFF, # 2 as ON, # 3 as ON and # 4 as OFF.

4-2. BMS Resistance Configuration
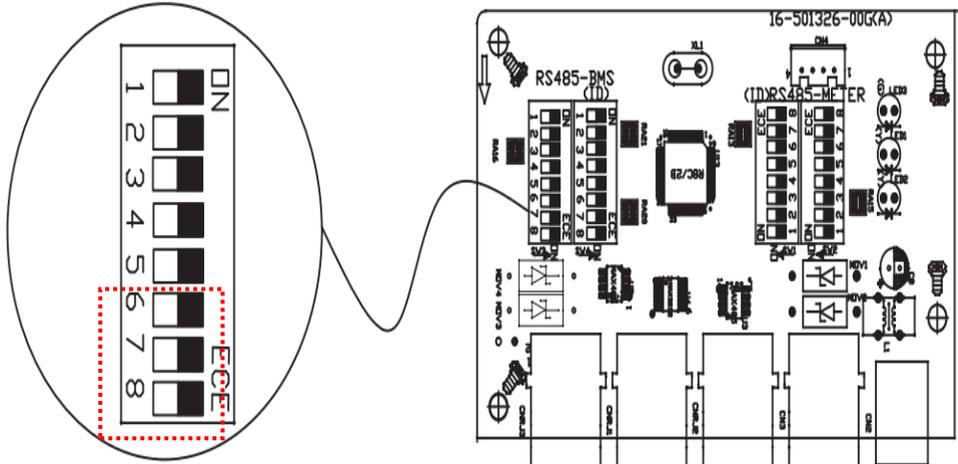
There are three bits (#6, #7 and #8) to configure the BMS resistance. From top to bottom, it's 1 to 8 as shown left. When the switch is pushed left, the bit is set to "OFF". Otherwise, the bit is set as "ON".

Function	Bit #	Setting	Meaning
Push up resistance	# 6	ON	Enable (Default)
		OFF	Disable
Push down resistance	# 7	ON	Enable (Default)
		OFF	Disable
Terminate resistance	# 8	ON	Enable (Default)
		OFF	Disable

4-3. SW4 Reset

All of dip switches in SW4 should be switched to "OFF" or "ON" status.
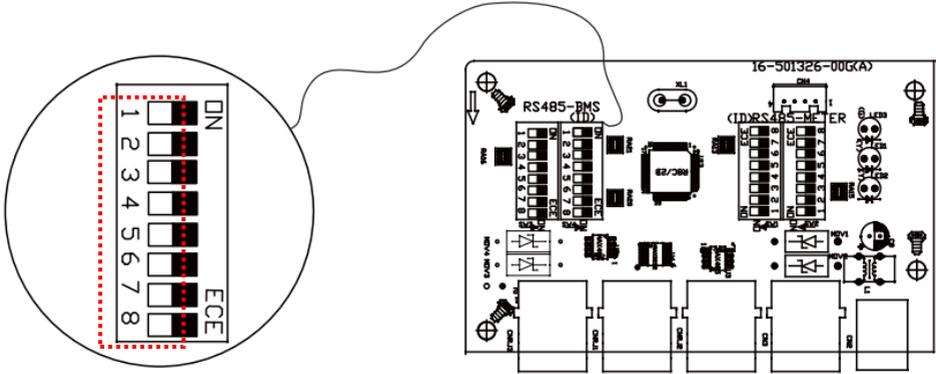
Bit #	Setting	Meaning
# 1	ON	Disable(Default)
# 2	OFF	Disable(Default)
# 3	OFF	Disable(Default)
# 4	OFF	Disable(Default)
# 5	OFF	Disable(Default)
# 6	OFF	Disable(Default)
# 7	OFF	Disable(Default)
# 8	OFF	Disable(Default)

4-4. Lithium battery communication configuration

1. ADD Switch: There are 4 ADD switches on Lithium battery to define different baud rate and battery group address. If switch position is turned to bottom for "OFF" position, it means "0". If switch position is turned to upper for "ON" position, it means "1".
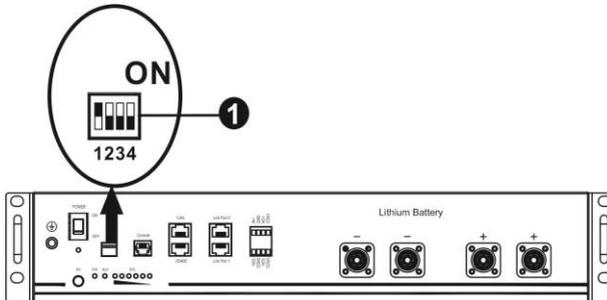
●   Dip 1 is "ON" to represent the baud rate 9600.

- Dip 2, 3 and 4 are to set up battery group address.

Dip switch 2, 3 and 4 on master battery (first battery) are to set up or change the group address.

NOTE: "1" is upper position and "0" is bottom position.

Dip 1	Dip 2	Dip 3	Dip 4	Group address
1: RS485 baud rate=9600 Restart to take effect	0	0	0	Single group only. It's necessary to set up master battery with this setting and slave batteries are unrestricted.
	1	0	0	Two-group condition. It's necessary to set up master battery on the first group with this setting and slave batteries are unrestricted.
	0	1	0	Two-group condition. It's necessary to set up master battery on the second group with this setting and slave batteries are unrestricted.

NOTE: The maximum groups of lithium battery is 2 and for maximum number for each group, please check with battery manufacturer.

4-5. Active Function
This function is to activate lithium battery automatically while commissioning. After battery wiring and commissioning is successfully, if battery is not detected and active function is enabled in bundled software, the inverter will automatically activate battery if the inverter is powered on.

5.　RS485-Monitor Configuration
5.1 Machine ID Configuration
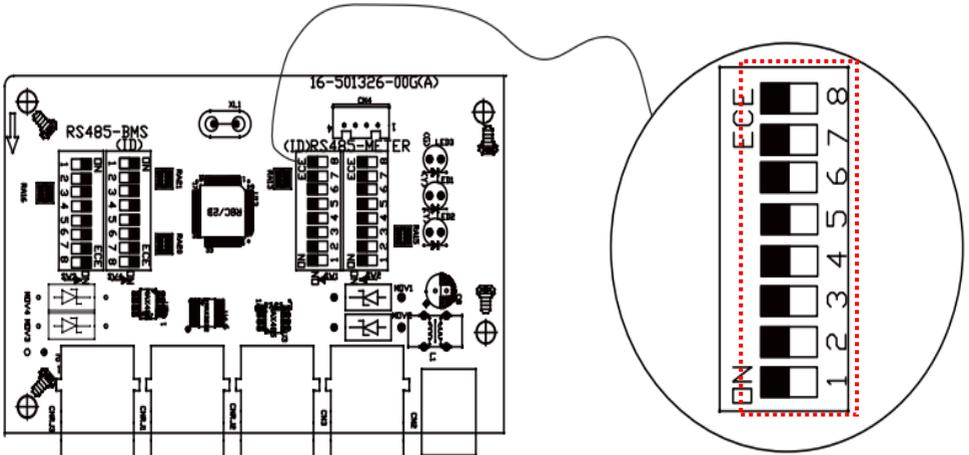
There are eight bits to present ID of each box. Use SW1 to set machine ID. From top to bottom, it's 8 to 1. As shown, when the switch is pushed left as "ON" position, the value of this bit is set to "one". Otherwise, the value of the bit is set as zero when the switch is pushed to right as "OFF" position. The ID of modbus duo box is set to 0x01 as chart. Please check appendix for detailed ID no. and SW1 setting.

Bit #	Setting	Meaning
# 1	ON	Enable (Default)
# 2	OFF	Disable(Default)
# 3	OFF	Disable(Default)
# 4	OFF	Disable(Default)
# 5	OFF	Disable(Default)
# 6	OFF	Disable(Default)
# 7	OFF	Disable(Default)
# 8	OFF	Disable(Default)

5.2 Communication Format Configuration
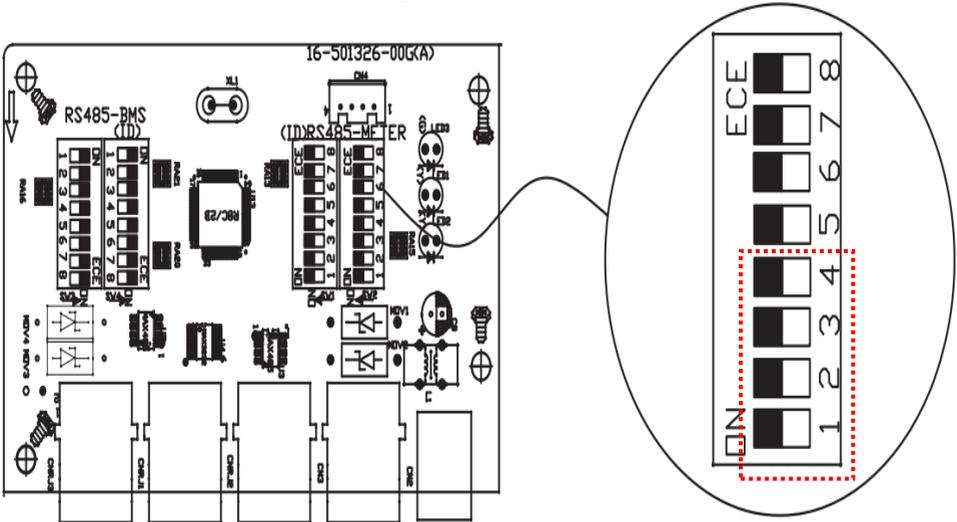
Function	Bit Setting		Meaning
Baud rate	# 2	# 1	
	OFF	OFF	2400bps
	OFF	ON	4800bps
	ON	OFF	9600bps
	ON	ON	19200bps (default)
Parity check	# 4	# 3	
	OFF	OFF	Even parity
	ON	OFF	Odd parity
	OFF	ON	No parity check 1 stop bits (Default)
	ON	ON	No parity check 2 stop bits

5.3 RS485-Monitor Resistance Configuration
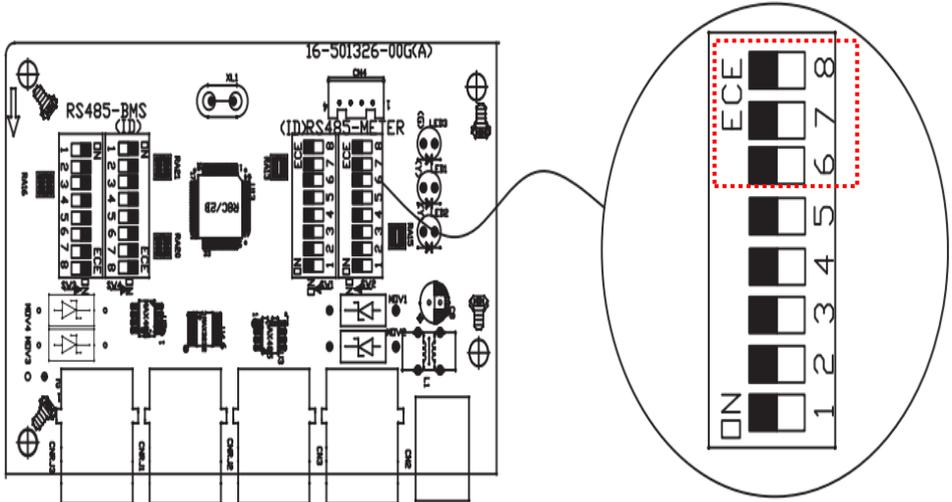
Function	Bit #	Setting	Meaning
Push up resistance	# 6	ON	Enable (Default)
		OFF	Disable
Push down resistance	# 7	ON	Enable (Default)
		OFF	Disable
Terminate resistance	# 8	ON	Enable (Default)
		OFF	Disable

6. Connection and Operation

First, please use one RS-485 to RS-232 converter or RS-485 to Modbus/TCP converter as media converter between Modbus duo box and computer. Please follow below chart for wiring connection between RJ45 and media converter:
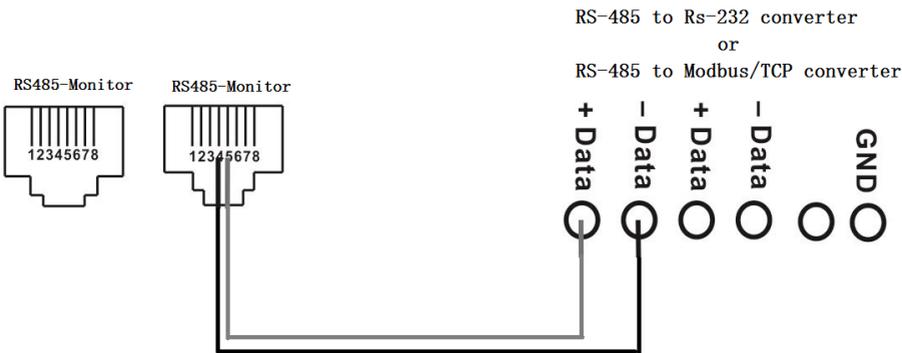
Wiring connection between RJ45 and media converter

Then, follow chapter 4 and 5 to configure RS485-Monitor and BMS ports. After configuration, please install this box with inverter and Lithium battery by following below steps.

RS485-Monitor Port	BMS Port
(1) Use supplied RJ45(gray) cable to connect Modbus duo box and the inverter.	(1) Use supplied RJ45(gray) cable to connect Modbus duo box and the inverter.
(2) Use RS485 to RS 232 converter to connect Modbus Duo Box and PC.	(2) Use supplied RJ45(black) cable to connect Modbus Duo Box and Lithium battery.
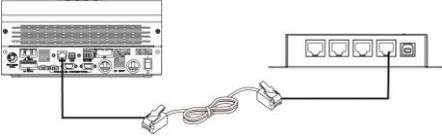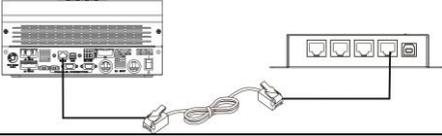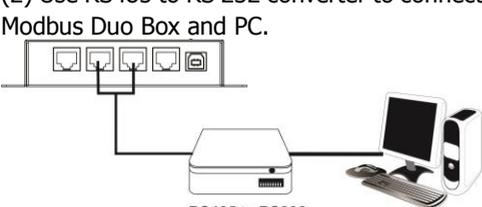
(3) Use supplied USB cable to connect Modbus Duo Box and DC input (5VDC) source.	(3) Use supplied USB cable to connect Modbus Duo Box and DC input (5VDC) source.
(4) Open the monitoring software in the PC.	(4) Switch on Lithium battery.
(5) Turn on the inverter.	(5) Turn on the inverter.
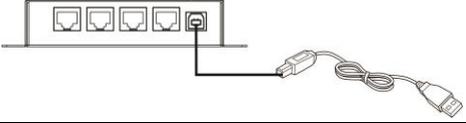
After all wires are connected well and the communication between the inverter and battery is successful, it will show frame of battery icon (⬚ or ⬚) flashing or "Li" battery icon (Li) lighting on the LCD screen.

APPENDIX: Machine ID Configuration Table (SW1) √=ON ×=OFF

SW1 ID	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
1	√	×	×	×	×	×	×	×
2	×	√	×	×	×	×	×	×
3	√	√	×	×	×	×	×	×
4	×	×	√	×	×	×	×	×
5	√	×	√	×	×	×	×	×
6	×	√	√	×	×	×	×	×
7	√	√	√	×	×	×	×	×
8	×	×	×	√	×	×	×	×
9	√	×	×	√	×	×	×	×
10	×	√	×	√	×	×	×	×
11	√	√	×	√	×	×	×	×
12	×	×	√	√	×	×	×	×
13	√	×	√	√	×	×	×	×
14	×	√	√	√	×	×	×	×
15	√	√	√	√	×	×	×	×
16	×	×	×	×	√	×	×	×
17	√	×	×	×	√	×	×	×
18	×	√	×	×	√	×	×	×
19	√	√	×	×	√	×	×	×
20	×	×	√	×	√	×	×	×
21	√	×	√	×	√	×	×	×
22	×	√	√	×	√	×	×	×
23	√	√	√	×	√	×	×	×
24	×	×	×	√	√	×	×	×
25	√	×	×	√	√	×	×	×
26	×	√	×	√	√	×	×	×
27	√	√	×	√	√	×	×	×
28	×	×	√	√	√	×	×	×
29	√	×	√	√	√	×	×	×
30	×	√	√	√	√	×	×	×
31	√	√	√	√	√	×	×	×
32	×	×	×	×	×	√	×	×
33	√	×	×	×	×	√	×	×
34	×	√	×	×	×	√	×	×
35	√	√	×	×	×	√	×	×
36	×	×	√	×	×	√	×	×
37	√	×	√	×	×	√	×	×
38	×	√	√	×	×	√	×	×

39	√	√	√	×	×	√	×	×
40	×	×	×	√	×	√	×	×
41	√	×	×	√	×	√	×	×
42	×	√	×	√	×	√	×	×
43	√	√	×	√	×	√	×	×
44	×	×	√	√	×	√	×	×
45	√	×	√	√	×	√	×	×
46	×	√	√	√	×	√	×	×
47	√	√	√	√	×	√	×	×
48	×	×	×	×	√	√	×	×
49	√	×	×	×	√	√	×	×
50	×	√	×	×	√	√	×	×
51	√	√	×	×	√	√	×	×
52	×	×	√	×	√	√	×	×
53	√	×	√	×	√	√	×	×
54	×	√	√	×	√	√	×	×
55	√	√	√	×	√	√	×	×
56	×	×	×	√	√	√	×	×
57	√	×	×	√	√	√	×	×
58	×	√	×	√	√	√	×	×
59	√	√	×	√	√	√	×	×
60	×	×	√	√	√	√	×	×
61	√	×	√	√	√	√	×	×
62	×	√	√	√	√	√	×	×
63	√	√	√	√	√	√	×	×
64	×	×	×	×	×	×	√	×
65	√	×	×	×	×	×	√	×
66	×	√	×	×	×	×	√	×
67	√	√	×	×	×	×	√	×
68	×	×	√	×	×	×	√	×
69	√	×	√	×	×	×	√	×
70	×	√	√	×	×	×	√	×
71	√	√	√	×	×	×	√	×
72	×	×	×	√	×	×	√	×
73	√	×	×	√	×	×	√	×
74	×	√	×	√	×	×	√	×
75	√	√	×	√	×	×	√	×
76	×	×	√	√	×	×	√	×
77	√	×	√	√	×	×	√	×
78	×	√	√	√	×	×	√	×
79	√	√	√	√	×	×	√	×

80	×	×	×	×	√	×	√	×
81	√	×	×	×	√	×	√	×
82	×	√	×	×	√	×	√	×
83	√	√	×	×	√	×	√	×
84	×	×	√	×	√	×	√	×
85	√	×	√	×	√	×	√	×
86	×	√	√	×	√	×	√	×
87	√	√	√	×	√	×	√	×
88	×	×	×	√	√	×	√	×
89	√	×	×	√	√	×	√	×
90	×	√	×	√	√	×	√	×
91	√	√	×	√	√	×	√	×
92	×	×	√	√	√	×	√	×
93	√	×	√	√	√	×	√	×
94	×	√	√	√	√	×	√	×
95	√	√	√	√	√	×	√	×
96	×	×	×	×	×	√	√	×
97	√	×	×	×	×	√	√	×
98	×	√	×	×	×	√	√	×
99	√	√	×	×	×	√	√	×
100	×	×	√	×	×	√	√	×
101	√	×	√	×	×	√	√	×
102	×	√	√	×	×	√	√	×
103	√	√	√	×	×	√	√	×
104	×	×	×	√	×	√	√	×
105	√	×	×	√	×	√	√	×
106	×	√	×	√	×	√	√	×
107	√	√	×	√	×	√	√	×
108	×	×	√	√	×	√	√	×
109	√	×	√	√	×	√	√	×
110	×	√	√	√	×	√	√	×
111	√	√	√	√	×	√	√	×
112	×	×	×	×	√	√	√	×
113	√	×	×	×	√	√	√	×
114	×	√	×	×	√	√	√	×
115	√	√	×	×	√	√	√	×
116	×	×	√	×	√	√	√	×
117	√	×	√	×	√	√	√	×
118	×	√	√	×	√	√	√	×
119	√	√	√	×	√	√	√	×
120	×	×	×	√	√	√	√	×

121	√	×	×	√	√	√	√	×
122	×	√	×	√	√	√	√	×
123	√	√	×	√	√	√	√	×
124	×	×	√	√	√	√	√	×
125	√	×	√	√	√	√	√	×
126	×	√	√	√	√	√	√	×
127	√	√	√	√	√	√	√	×
128	×	×	×	×	×	×	×	√
129	√	×	×	×	×	×	×	√
130	×	√	×	×	×	×	×	√
131	√	√	×	×	×	×	×	√
132	×	×	√	×	×	×	×	√
133	√	×	√	×	×	×	×	√
134	×	√	√	×	×	×	×	√
135	√	√	√	×	×	×	×	√
136	×	×	×	√	×	×	×	√
137	√	×	×	√	×	×	×	√
138	×	√	×	√	×	×	×	√
139	√	√	×	√	×	×	×	√
140	×	×	√	√	×	×	×	√
141	√	×	√	√	×	×	×	√
142	×	√	√	√	×	×	×	√
143	√	√	√	√	×	×	×	√
144	×	×	×	×	√	×	×	√
145	√	×	×	×	√	×	×	√
146	×	√	×	×	√	×	×	√
147	√	√	×	×	√	×	×	√
148	×	×	√	×	√	×	×	√
149	√	×	√	×	√	×	×	√
150	×	√	√	×	√	×	×	√
151	√	√	√	×	√	×	×	√
152	×	×	×	√	√	×	×	√
153	√	×	×	√	√	×	×	√
154	×	√	×	√	√	×	×	√
155	√	√	×	√	√	×	×	√
156	×	×	√	√	√	×	×	√
157	√	×	√	√	√	×	×	√
158	×	√	√	√	√	×	×	√
159	√	√	√	√	√	×	×	√
160	×	×	×	×	×	√	×	√
161	√	×	×	×	×	√	×	√

162	×	√	×	×	×	√	×	√
163	√	√	×	×	×	√	×	√
164	×	×	√	×	×	√	×	√
165	√	×	√	×	×	√	×	√
166	×	√	√	×	×	√	×	√
167	√	√	√	×	×	√	×	√
168	×	×	×	√	×	√	×	√
169	√	×	×	√	×	√	×	√
170	×	√	×	√	×	√	×	√
171	√	√	×	√	×	√	×	√
172	×	×	√	√	×	√	×	√
173	√	×	√	√	×	√	×	√
174	×	√	√	√	×	√	×	√
175	√	√	√	√	×	√	×	√
176	×	×	×	×	√	√	×	√
177	√	×	×	×	√	√	×	√
178	×	√	×	×	√	√	×	√
179	√	√	×	×	√	√	×	√
180	×	×	√	×	√	√	×	√
181	√	×	√	×	√	√	×	√
182	×	√	√	×	√	√	×	√
183	√	√	√	×	√	√	×	√
184	×	×	×	√	√	√	×	√
185	√	×	×	√	√	√	×	√
186	×	√	×	√	√	√	×	√
187	√	√	×	√	√	√	×	√
188	×	×	√	√	√	√	×	√
189	√	×	√	√	√	√	×	√
190	×	√	√	√	√	√	×	√
191	√	√	√	√	√	√	×	√
192	×	×	×	×	×	×	√	√
193	√	×	×	×	×	×	√	√
194	×	√	×	×	×	×	√	√
195	√	√	×	×	×	×	√	√
196	×	×	√	×	×	×	√	√
197	√	×	√	×	×	×	√	√
198	×	√	√	×	×	×	√	√
199	√	√	√	×	×	×	√	√
200	×	×	×	√	×	×	√	√
201	√	×	×	√	×	×	√	√
202	×	√	×	√	×	×	√	√

203	√	√	×	√	×	×	√	√
204	×	×	√	√	×	×	√	√
205	√	×	√	√	×	×	√	√
206	×	√	√	√	×	×	√	√
207	√	√	√	√	×	×	√	√
208	×	×	×	×	√	×	√	√
209	√	×	×	×	√	×	√	√
210	×	√	×	×	√	×	√	√
211	√	√	×	×	√	×	√	√
212	×	×	√	×	√	×	√	√
213	√	×	√	×	√	×	√	√
214	×	√	√	×	√	×	√	√
215	√	√	√	×	√	×	√	√
216	×	×	×	√	√	×	√	√
217	√	×	×	√	√	×	√	√
218	×	√	×	√	√	×	√	√
219	√	√	×	√	√	×	√	√
220	×	×	√	√	√	×	√	√
221	√	×	√	√	√	×	√	√
222	×	√	√	√	√	×	√	√
223	√	√	√	√	√	×	√	√
224	×	×	×	×	×	√	√	√
225	√	×	×	×	×	√	√	√
226	×	√	×	×	×	√	√	√
227	√	√	×	×	×	√	√	√
228	×	×	√	×	×	√	√	√
229	√	×	√	×	×	√	√	√
230	×	√	√	×	×	√	√	√
231	√	√	√	×	×	√	√	√
232	×	×	×	√	×	√	√	√
233	√	×	×	√	×	√	√	√
234	×	√	×	√	×	√	√	√
235	√	√	×	√	×	√	√	√
236	×	×	√	√	×	√	√	√
237	√	×	√	√	×	√	√	√
238	×	√	√	√	×	√	√	√
239	√	√	√	√	×	√	√	√
240	×	×	×	×	√	√	√	√
241	√	×	×	×	√	√	√	√
242	×	√	×	×	√	√	√	√
243	√	√	×	×	√	√	√	√

244	×	×	√	×	√	√	√	√
245	√	×	√	×	√	√	√	√
246	×	√	√	×	√	√	√	√
247	√	√	√	×	√	√	√	√