

# SmartStixä

User Manual for the Modbus Versions of:

**DIM610**    **DIM710**  
**DQM601**   **DQM701**  
**DQM602**   **DIQ811**

## Remote I/O

For Electronic Information, see [www.SmartStix.com](http://www.SmartStix.com)

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### 1 Technical Support

For user manual updates and technical assistance, contact Technical Support:  
**North America:** (317) 916-4274    **Europe:** (+) 353-21-4321-266  
or visit our website at [www.heapp.com](http://www.heapp.com),    or visit our website at [www.horner-apg.com](http://www.horner-apg.com).

### 2 Installation / Safety

- All applicable codes and standards need to be followed in the installation of this product.
- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG or larger.
- This product has a Programmer's Reference (SUP0552).



**Warning:** Consult user documentation.



**Warning:** Electrical Shock Hazard.

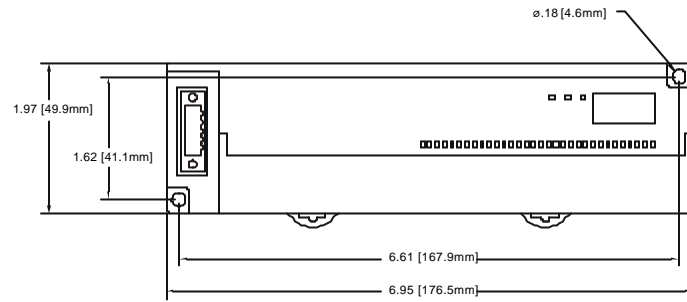
### 3 Model Numbers

Model Number (Long or Short Dimension)	Description
DIM610 (Short)	16 DC Inputs (24VDC, positive/negative logic)
DIM710 (Long)	32 DC Inputs (24VDC, positive/negative logic)
DQM601 (Short)	16 DC Outputs (24VDC, negative logic, 0.1A)
DQM701 (Long)	32 DC Outputs (24VDC, negative logic, 0.1A)
DQM602 (Long)	16 Relay Outputs (250VAC, 30VDC, 2.0A)
DIQ811 (Long)	16 DC Inputs (24VDC, positive/negative logic) 16 DC Outputs (24VDC, negative logic, 0.1A)

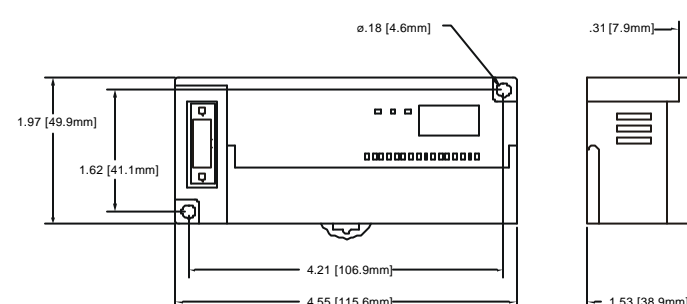
### 4 Dimensions

SmartStix modules come in two sizes depending upon the model number. See Section 3 to determine if a module has long or short dimensions.

#### a. Long Dimensions



#### b. Short Dimensions

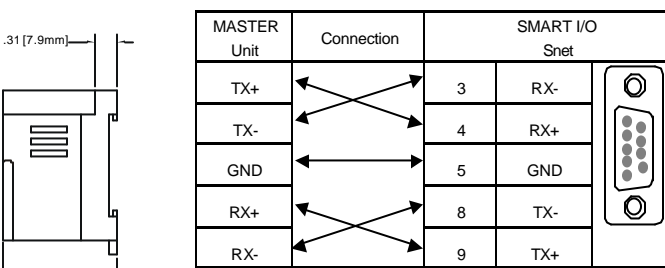


### 5 General Specifications

General Specifications				
Storage Temperature	-25° to 70° C	Operating and Storage Humidity	5 to 95% Non-condensing	
Operating Temperature	0° to 55° C	Pollution degree	2 or lower	
Atmosphere	Free from corrosive gases and excessive dust	Cooling method	Self-cooling	
Vibration				
Occasional Vibration				
Frequency	Acceleration	Amplitude	Sweep Count	
10 ≤ f < 57 Hz	-	0.075 mm	10 times in each direction for X,Y,Z	
57 ≤ f ≤ 150 Hz	9.8 m/s <sup>2</sup> (1G)	-		
Continuous Vibration				
Frequency	Acceleration	Amplitude	Sweep Count	
10 ≤ f < 57 Hz	-	0.035 mm	10 times in each direction for X,Y,Z	
57 ≤ f ≤ 150 Hz	4.9 m/s <sup>2</sup> (0.5G)	-		
Shocks				
Maximum shock acceleration	147 m/s <sup>2</sup> (15G)			
Duration Time	11 ms.			
Pulse Wave	Half sine wave pulse (3 times in each of X, Y, Z directions)			
Noise Immunity				
Square wave impulse noise	AC: ± 1,500VDC DC: ± 900VDC			
Electrostatic Discharge	Voltage: 4kV (contact discharge)			
Radiated electromagnetic field	27 – 500MHz, 10V/m			
Fast Transient Burst Noise				
	Severity level	All power modules	Digital I/Os (Ue < 24V)	Digital I/Os (Ue < 24V) Analog I/Os Communication I/Os
	Voltage	2 kV	1 kV	0.25 kV

### 6 Network

#### a. Network Cable (RS-485)



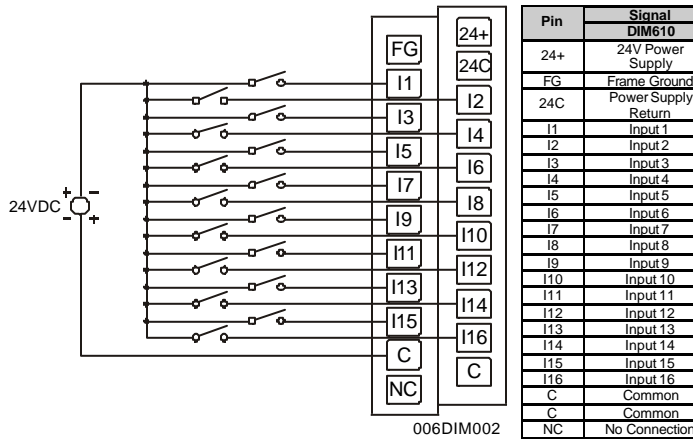
#### b. Modbus Support

Modbus ASCII Support	No
RTU Binary Support	Yes
Baud Rates	2400, 4800, 9600, 19.2K, 38.4K
Parity, Data Bits, Stop Bits	N, 8, 1
Handshaking	None
Modbus Commands Supported	3,4, 6,16
Modbus Offset	0

### 7 SmartStix Modules

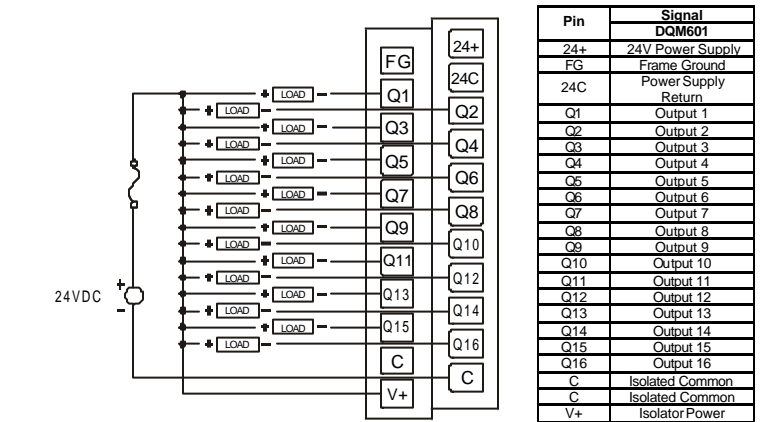
#### a. DIM610: 16VDC IN, Positive / Negative Logic

DIM610 Specifications			
Number of input points	16	OFF to ON Response	0 - 3ms. or less
Rated Input Current	7mA	ON to OFF Response	0 - 3ms. or less
ON Voltage Level	19VDC or more	Common Terminal	16 points / COM
OFF Voltage Level	6VDC or less	Operating Indicator	LED turns on during ON state of input
Input Characteristics	Bidirectional	External Connections	Terminal block connector (M3 x 6 screws)
Isolation Method	Photo Coupler	Altitude for use	Up to 2,000m
Internal power Consumption (mA)	200mA	Weight	5.5 oz. (157 g)



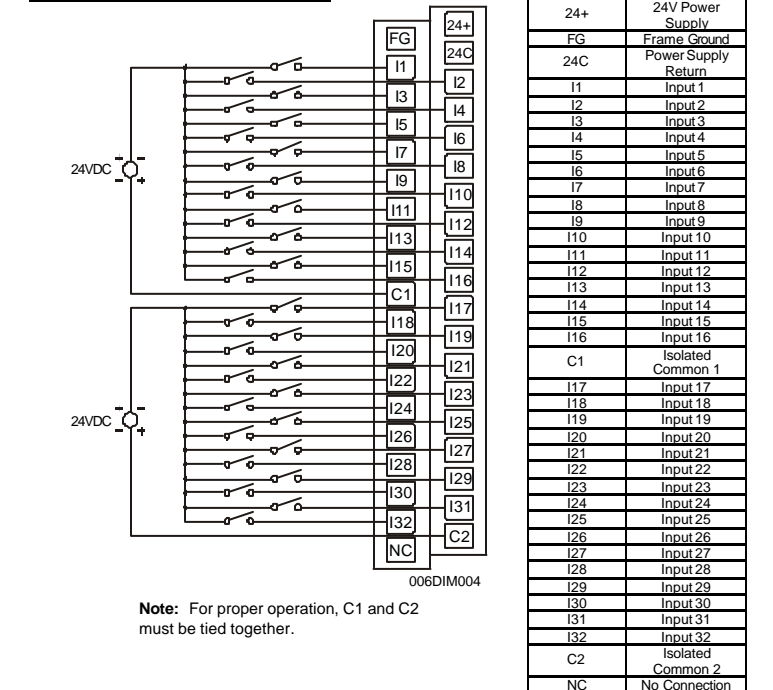
#### b. DQM601: 16 DC OUT, Negative Logic

DQM601 Outputs			
Number of output points	16	External Power Supply	Voltage: 24VDC ± 10%(ripple voltage: 4Vp-p or less) Current: 30mA (TYP. All points ON)
Commons per Module	1	OFF to ON Response	2ms.
Operating Voltage	24VDC	ON to OFF Response	2ms.
Rated Load Voltage	24VDC	Output Type	Sinking
Maximum Load Current per channel	0.1A Max. per output 2A per common	Common Method	16 points / COM
OFF Leakage Current	0.1mA or less	Operating Indicator	LED turns on during ON state of output
Maximum Inrush Current per channel	0.4A, 10ms.	External connections	Terminal block connector (M3 x 6 screws)
Maximum Voltage Drop during ON circuit	1.5VDC(0.5A)	Isolation methods	Photo Coupler
Internal power Consumption (mA)	280	Weight	5.6 oz. (160g)



#### c. DIM710: 32VDC IN, Positive / Negative Logic

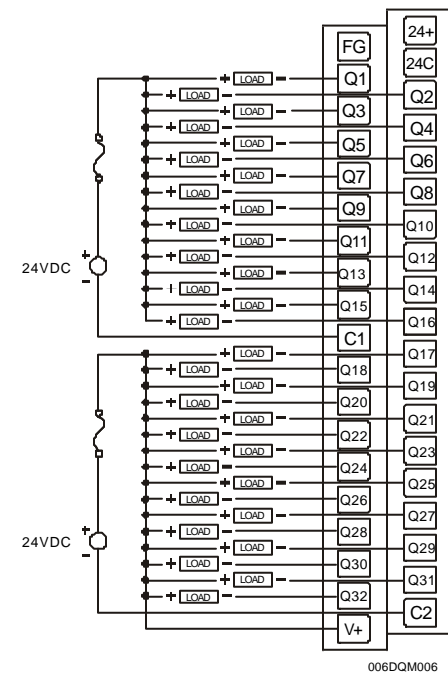
DIM710 INPUTS			
Number of input points	32	OFF to ON Response	0 - 3ms. or less
Rated Input Current	7mA	ON to OFF Response	0 - 3ms. or less
ON Voltage Level	19VDC or more	Common Terminal	16 points / COM
OFF Voltage Level	6VDC or less	Operating Indicator	LED turns on during ON state of input
Input Characteristics	Bidirectional	External Connections	Terminal block connector (M3 x 6 screws)
Isolation Method	Photo Coupler	Weight	8.2oz. (235 g)
Internal power Consumption (mA)	300		



Note: For proper operation, C1 and C2 must be tied together.

d. DQM701: 32 DC OUT, Negative Logic

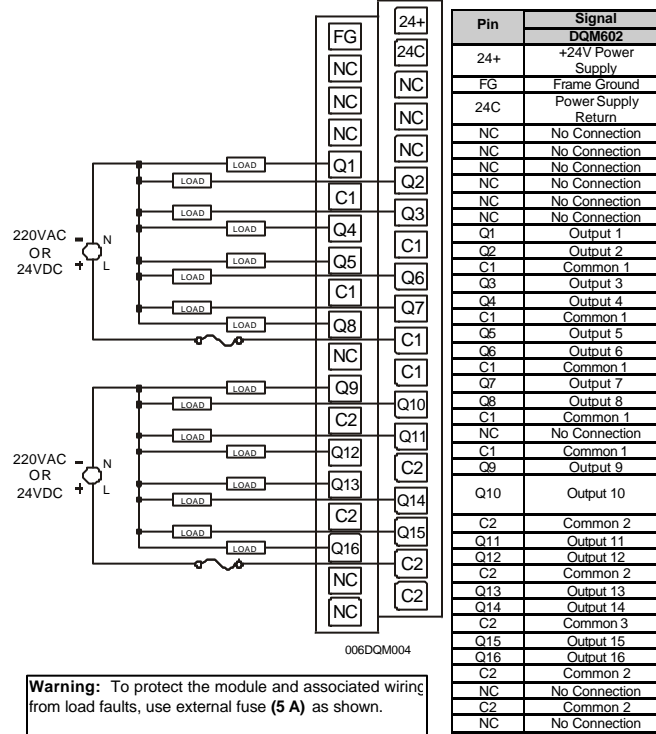
DQM701 Outputs				
Number of output points	32	External Power Supply	Voltage	24VDC ± 10% (ripple voltage: 4Vp-p or less)
Commons per Module	2		Current	30mA (TYP, All points ON)
Operating Voltage	24VDC	OFF to ON Response		2ms.
Rated Load Voltage	24VDC	ON to OFF Response		2ms.
Maximum Load Current per channel	0.1A Max. per output 2A per common	Output Type		Sinking
OFF Leakage Current	0.1mA or less	Common Method		16 points / COM
Maximum Inrush Current per channel	0.4A, 10ms.	Operating Indicator		LED turns on during ON state of output
		External connections		Terminal block connector (M3 x 6 screws)
Maximum Voltage Drop during ON circuit	1.5VDC(0.5A)	Isolation methods		Photo Coupler
Internal power Consumption (mA)	380mA	Weight		8.4 (238G)



Pin	Signal
24+	24V Power Supply
FG	Frame Ground
24C	Power Supply Return
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
Q11	Output 11
Q12	Output 12
Q13	Output 13
Q14	Output 14
Q15	Output 15
Q16	Output 16
C1	Isolated Common 1
Q17	Output 17
Q18	Output 18
Q19	Output 19
Q20	Output 20
Q21	Output 21
Q22	Output 22
Q23	Output 23
Q24	Output 24
Q25	Output 25
Q26	Output 26
Q27	Output 27
Q28	Output 28
Q29	Output 29
Q30	Output 30
Q31	Output 31
Q32	Output 32
C2	Isolated Common 2
V+	Isolator Power

e. DQM602: 16 RELAY OUTPUTS

DQM602 Relay Outputs			
Number of output points	16	Maximum Load Current (resistive)	2.0A per channel 5.0A per common
Commons per Module	2	OFF to ON Response	10ms. Max.
Rated Load Voltage	24VDC, 220VAC	ON to OFF Response	12ms. Max.
Minimum load voltage / current	5VDC / 1mA	Output Type	N.O.
Internal power Consumption (mA)	550mA	Weight	9.8oz. (280 g)



**Warning:** To protect the module and associated wiring from load faults, use external fuse (5 A) as shown.

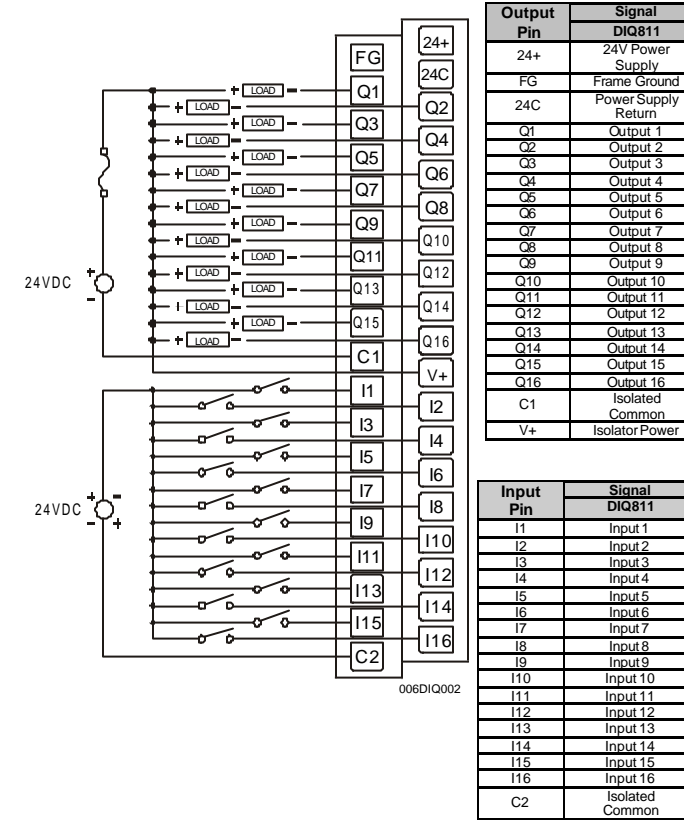
**Warning:** Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

**Warning:** Wiring the line side of the AC source to loads connected to outputs 0 through 15 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

f. DIQ811 16 DC IN, Positive/Negative / 16 DC OUT, Negative Logic

DIQ811 IN			
Number of input points	16	OFF to ON Response	0 - 3ms. or less
Rated Input Current	7mA	ON to OFF Response	0 - 3ms. or less
ON Voltage Level	19VDC or more	Common Terminal	16 points / COM
OFF Voltage Level	6VDC or less	Operating Indicator	LED turns on during ON state of input
Input Characteristics	Bidirectional	External Connections	Terminal block connector (M3 x 6 screws)
Isolation Method	Photo Coupler		
DIQ811OUT			
Number of output points	16	External Power Supply	Voltage: 24VDC ± 10% (ripple voltage: 4Vp-p or less) Current: 30mA (TYP, All points ON)
Commons per Module	1	OFF to ON Response	2ms.
Operating Voltage	24VDC	ON to OFF Response	2ms.
Rated Load Voltage	24VDC	Output Type	Sinking
Maximum Load Current per channel	0.1A Max. per output 2A per common		
OFF Leakage Current	0.1mA or less	Common Method	16 points / COM
Internal power Consumption (mA)	350	Weight	8.3 oz. (236 g)

DIQ811 continued



Output Pin	Signal
24+	24V Power Supply
FG	Frame Ground
24C	Power Supply Return
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
Q11	Output 11
Q12	Output 12
Q13	Output 13
Q14	Output 14
Q15	Output 15
Q16	Output 16
C1	Isolated Common
V+	Isolator Power

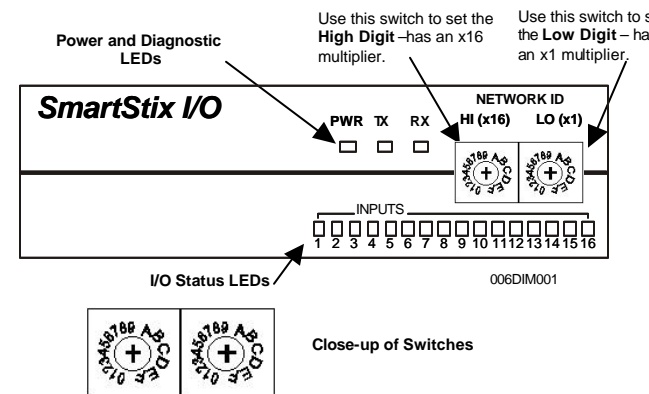
  

Input Pin	Signal
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
I9	Input 9
I10	Input 10
I11	Input 11
I12	Input 12
I13	Input 13
I14	Input 14
I15	Input 15
I16	Input 16
C2	Isolated Common

8 Modbus Slave Address Switches

Setting Slave Addresses:

Modbus Slave Addresses are set using the hexadecimal number system from 01 to F7. The decimal equivalent is 1 to 247. Refer to Section 10, which shows the decimal equivalent of hexadecimal numbers. Set a unique address by inserting a small Phillips screwdriver into the two identical switches.



9 LEDs

Communication LED	Status
PWR	Displays the status of power
TX	Displays the status of sending of Comm. module
RX	Displays the status of receiving of Comm. module

Dec	Hex		Dec	Hex		Dec	Hex	
	HI	LO		HI	LO		HI	LO
			86	5	6	172	A	C
1	0	1	87	5	7	173	A	D
2	0	2	88	5	8	174	A	E
3	0	3	89	5	9	175	A	F
4	0	4	90	5	A	176	B	0
5	0	5	91	5	B	177	B	1
6	0	6	92	5	C	178	B	2
7	0	7	93	5	D	179	B	3
8	0	8	94	5	E	180	B	4
9	0	9	95	5	F	181	B	5
10	0	A	96	6	0	182	B	6
11	0	B	97	6	1	183	B	7
12	0	C	98	6	2	184	B	8
13	0	D	99	6	3	185	B	9
14	0	E	100	6	4	186	B	A
15	0	F	101	6	5	187	B	B
16	1	0	102	6	6	188	B	C
17	1	1	103	6	7	189	B	D
18	1	2	104	6	8	190	B	E
19	1	3	105	6	9	191	B	F
20	1	4	106	6	A	192	C	0
21	1	5	107	6	B	193	C	1
22	1	6	108	6	C	194	C	2
23	1	7	109	6	D	195	C	3
24	1	8	110	6	E	196	C	4
25	1	9	111	6	F	197	C	5
26	1	A	112	7	0	198	C	6
27	1	B	113	7	1	199	C	7
28	1	C	114	7	2	200	C	8
29	1	D	115	7	3	201	C	9
30	1	E	116	7	4	202	C	A
31	1	F	117	7	5	203	C	B
32	2	0	118	7	6	204	C	C
33	2	1	119	7	7	205	C	D
34	2	2	120	7	8	206	C	E
35	2	3	121	7	9	207	C	F
36	2	4	122	7	A	208	D	0
37	2	5	123	7	B	209	D	1
38	2	6	124	7	C	210	D	2
39	2	7	125	7	D	211	D	3
40	2	8	126	7	E	212	D	4
41	2	9	127	7	F	213	D	5
42	2	A	128	8	0	214	D	6
43	2	B	129	8	1	215	D	7
44	2	C	130	8	2	216	D	8
45	2	D	131	8	3	217	D	9
46	2	E	132	8	4	218	D	A
47	2	F	133	8	5	219	D	B
48	3	0	134	8	6	220	D	C
49	3	1	135	8	7	221	D	D
50	3	2	136	8	8	222	D	E
51	3	3	137	8	9	223	D	F
52	3	4	138	8	A	224	E	0
53	3	5	139	8	B	225	E	1
54	3	6	140	8	C	226	E	2
55	3	7	141	8	D	227	E	3
56	3	8	142	8	E	228	E	4
57	3	9	143	8	F	229	E	5
58	3	A	144	9	0	230	E	6
59	3	B	145	9	1	231	E	7
60	3	C	146	9	2	232	E	8
61	3	D	147	9	3	233	E	9
62	3	E	148	9	4	234	E	A
63	3	F	149	9	5	235	E	B
64	4	0	150	9	6	236	E	C
65	4	1	151	9	7	237	E	D
66	4	2	152	9	8	238	E	E
67	4	3	153	9	9	239	E	F
68	4	4	154	9	A	240	F	0
69	4	5	155	9	B	241	F	1
70	4	6	156	9	C	242	F	2
71	4	7	157	9	D	243	F	3
72	4	8	158	9	E	244	F	4
73	4	9	159	9	F	245	F	5
74	4	A	160	A	0	246	F	6
75	4	B	161	A	1	247	F	7
76	4	C	162	A	2			
77	4	D	163	A	3			
78	4	E	164	A	4			
79	4	F	165	A	5			
80	5	0	166	A	6			
81	5	1	167	A	7			
82	5	2	168	A	8			
83	5	3	169	A	9			
84	5	4	170	A	A			
85	5	5	171	A	B			