

### *Bi-directional Controller DMX data protocol*

Data protocol utilizes for communicating Controllers between themselves and/or between computer and controller. Controller DMX test tool uses this data protocol also.

The protocol is bi-directional. It means that each side sends states of its Input ports and switches states of its Output ports according to incoming data string.

#### Data string format

ASCII style, unique header, HEX data blocks delimited by 'comma', Check Sum, Carrier Return and Line Feed symbols

#### Data update

Data refresh (update) rate: 20 Hz

#### Serial Port settings

RS-232, asynchronous, bitrate: 38400 bit/s, bits: 8 bit, parity: no parity, stop: 1 stop bit.

#### Data format of Analog Input ports values

AI#0 – AI#15	4 bytes for every AI port. Elder symbol with a lower address. Data sends in ASCII symbols, Values are in range 0x0000 — 0xFFFF (4 digits HEX number).
--------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------

#### Data format of Digital Input ports values

DI#3 – DI#0	2 bytes per DI port. Elder symbol with a lower address. Data sends in ASCII symbols, Values are in range 0x00 — 0xFF (2 digits HEX number). Significant bits in a byte are presented right to left: least significant bit is 1, most significant bit is 128.
-------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

#### Control Sum

CH Sum	2 bytes for Check sum Data sends in ASCII HEX symbols. Elder symbol with a lower address. Formula: the sum modulo 2 ("exclusive or" operation) of bytes from address #1 to #97 included
--------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

#### Delimiter

Data blocks delimiter: ASCII code of 'comma' symbol

#### End of string symbols

End of string: 2 symbols used – CR and LF (0x0d and 0x0a)

**AP subsea Inc.**

**Email:** [sales@apsubsea.com](mailto:sales@apsubsea.com)

[support@apsubsea.com](mailto:support@apsubsea.com)

**Web:** <http://www.apsubsea.com>

**Phone:** +1 604 363 38 62

**Office address:**

302-11295, Pazarena Place, Maple Ridge, BC,

Canada V2X 4K9

*Data protocol message format*

Address (position) in string	Q-ty bytes	Symbol	Value Range, Hex	Description
0	1	\$		Begin of string symbol
1	1	R		5 followed symbols of source name 'RMDAC'
2	1	M		
3	1	D		
4	1	A		
5	1	C		
6	1	,		Blocks delimiter 'comma'
7-10	4	Ain0	0x0000 — 0xFFFF	Controller Analog inputs, values in HEX ASCII
11	1	,		
12-15	4	Ain1	0x0000 — 0xFFFF	
16	1	,		
17-20	4	Ain2	0x0000 — 0xFFFF	
21	1	,		
22-25	4	Ain3	0x0000 — 0xFFFF	
26	1	,		
27-30	4	Ain4	0x0000 — 0xFFFF	
31	1	,		
32-35	4	Ain5	0x0000 — 0xFFFF	
36	1	,		
37-40	4	Ain6	0x0000 — 0xFFFF	
41	1	,		
42-45	4	Ain7	0x0000 — 0xFFFF	
46	1	,		
47-50	4	Ain8	0x0000 — 0xFFFF	
51	1	,		
52-55	4	Ain9	0x0000 — 0xFFFF	
56	1	,		
57-60	4	Ain10	0x0000 — 0xFFFF	
61	1	,		
62-65	4	Ain11	0x0000 — 0xFFFF	
66	1	,		
67-70	4	Ain12	0x0000 — 0xFFFF	
71	1	,		
72-75	4	Ain13	0x0000 — 0xFFFF	
76	1	,		
77-80	4	Ain14	0x0000 — 0xFFFF	
81	1	,		

**AP subsea Inc.**  
**Email:** [sales@apsubsea.com](mailto:sales@apsubsea.com)  
[support@apsubsea.com](mailto:support@apsubsea.com)  
**Web:** <http://www.apsubsea.com>

**Phone:** +1 604 363 38 62  
**Office address:**  
 302-11295, Pazarena Place, Maple Ridge, BC,  
 Canada V2X 4K9

82-85	4	Ain15	0x0000 — 0xFFFF	
86	1	,		
87-88	2	Din3	0x00 — 0xFF	Digital Inputs states DI29-DI24 (from left to right)
89	1	,		
90-91	2	Din2	0x00 — 0xFF	Digital Inputs states DI23-DI16 (from left to right)
92	1	,		
93-94	2	Din1	0x00 — 0xFF	Digital Inputs states DI15-DI8 (from left to right)
95	1	,		
96-97	2	Din0	0x00 — 0xFF	Digital Inputs states DI7-DI0 (from left to right)
98	1	*		ASCII symbol 'star'
99-100	2	CH Sum	0x00 — 0xFF	Check Sum (ASCII)
101	1	0x0d		ASCII symbol 'CR' (Carriage Return)
102	1	0x0a		ASCII symbol 'LF' (Line Feed)
<b>TOTAL bytes</b>	<b>103</b>			

### Examples

#### Analog Input port

Analog Input port 0	AI#0			
HEX value 0x0200 = 512	0	2	0	0
Address position taken in data string	7	8	9	10

#### Digital Input port

Digital Input port 0 - 7	DI#0	
HEX number 0x81 = 129	8	1
Address position taken in data string	87	88

#### Check Sum

Check Sum	Check Sum	
HEX number 0x7B	7	B
Address position taken in data string	99	100