Contents

1 Introduction and Scope

This document is designed to supply supplementary information for those OPC N2 user wishing to write their own programs to drive the OPC unit rather than relying on the supplied software.
This document should be used in conjunction with the OPC-N2 Optical Particle Counter Manual (072-0300).
A coding example, in the form of a flow chart, is provided, as well as additional information on timing, full details of all the SPI Commands and configuration information and also a list of OPC-N2 Factory settings.
The command list supplied are for firmware 18, command lists for earlier versions are available on request.

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

2 Coding Example/flow chart

1. Set up SPI interface as follows:
   SPI Mode1 (clock idle low, data transmitted on clock leading edge).
   Set SPI frequency to between 300 kHz and 750 kHz.
2. SPI Master system must drive MOSI and SCK and SS communication lines.
3. SPI Master system should be active before or within one minute of switching on power to OPC-N2 (slave).
4. Delay between a command byte and any subsequent bytes of an SPI communication should be > 10ms (< 100 ms).
5. Delay between final byte of one SPI communication and first byte (command byte) of the next SPI communication should be > 10 ms (< 100 ms).
6. Interval between bytes following the command byte of an SPI communication should be > 10 µs (< 100 µs).
7. Under certain circumstances the intervals may need to be longer i.e. the interval between one 'Get Histogram' communication sequence and the next should be between 0.5 s and 20 s and no greater than 60s. The interval after a 'Switch Fan on' sequence should be > 600 ms (< 2 s) to allow the firmware time to perform multiple attempts to switch the fan on. Normally users should allow a much longer time than this anyway e.g. 5-10 s to allow the fan to get up to speed. Following power-up, the OPC should be allowed at least 1 s to initialise before beginning SPI communication.
8. The first histogram data set in a session, or the first histogram obtained after any kind of error condition has passed, will have been recorded over an unknown sampling period and should be discarded.
9. The timings and SPI frequencies specified are guidelines only. Users may experiment with different timings at their own risk.
10. The SS connection to the OPC should be driven LOW during any SPI communication with the OPC.

Notes on Flow Chart:

* 0x03 is SPI command byte to control fan and laser power state.
0x00 is SPI byte following 0x03 to turn fan and laser ON (normal power).
0x01 is SPI byte following 0x03 to turn fan and laser OFF (low power).
0xF3 indicates OPC ready for SPI communication.
0x30 is SPI command byte to request a histogram data set.

** OPC may not have been ready for SPI communication at the time the SPI command byte was sent e.g. due to going through a reset cycle. If this was the case, after a period of 1s, the OPC should be ready for a second attempt.

*** OPC will reset itself after ~1 minute of no SPI communication. After this has happened, a new attempt at SPI communication can be made.

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

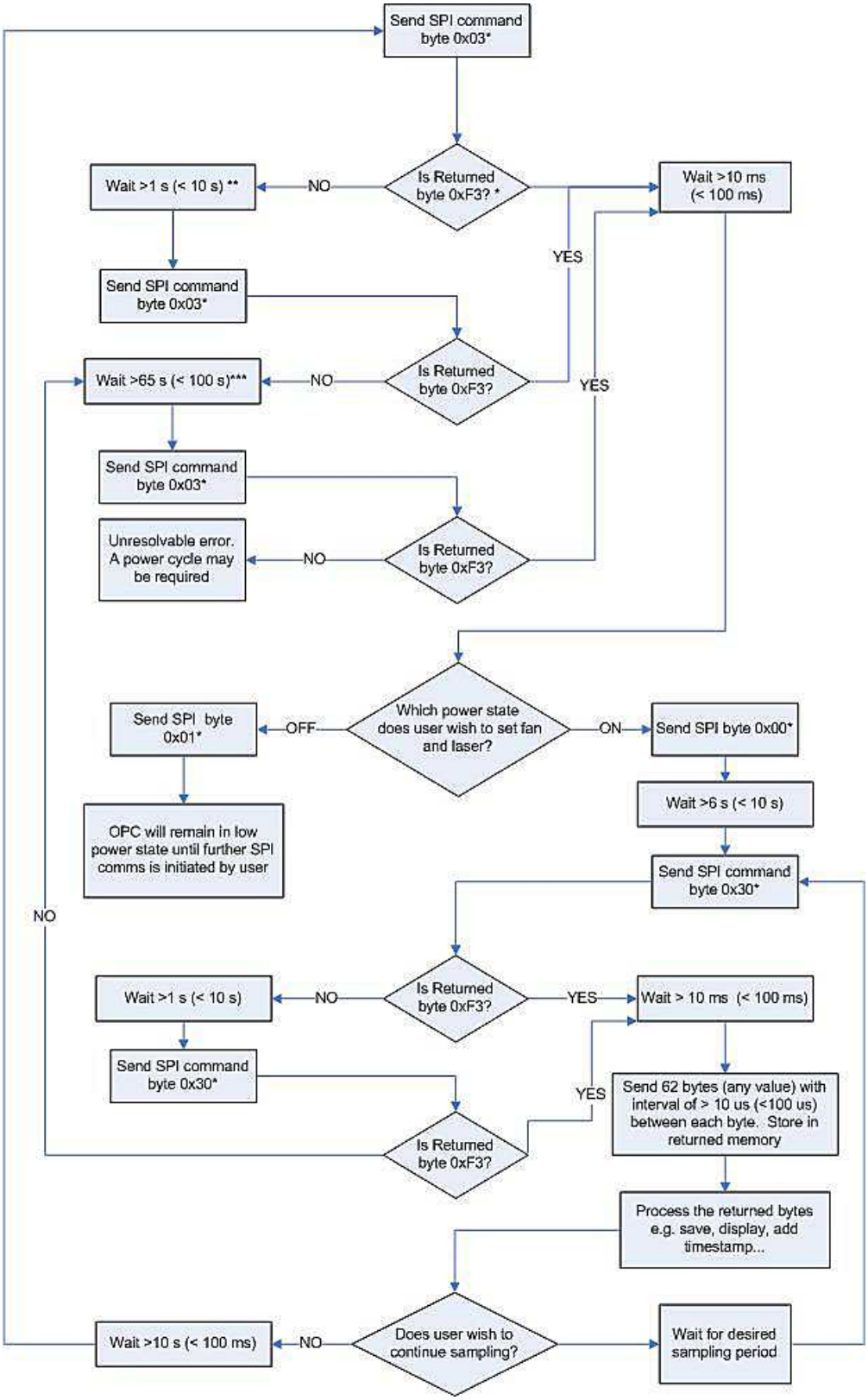

Figure 1: Flow chart depicting a typical sequence of commands and delays to run an OPC-N2 histogram sampling session.

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

3 SPI Sequence Timing

The SPI communication sequences for OPC command- and data transfer are shown below.

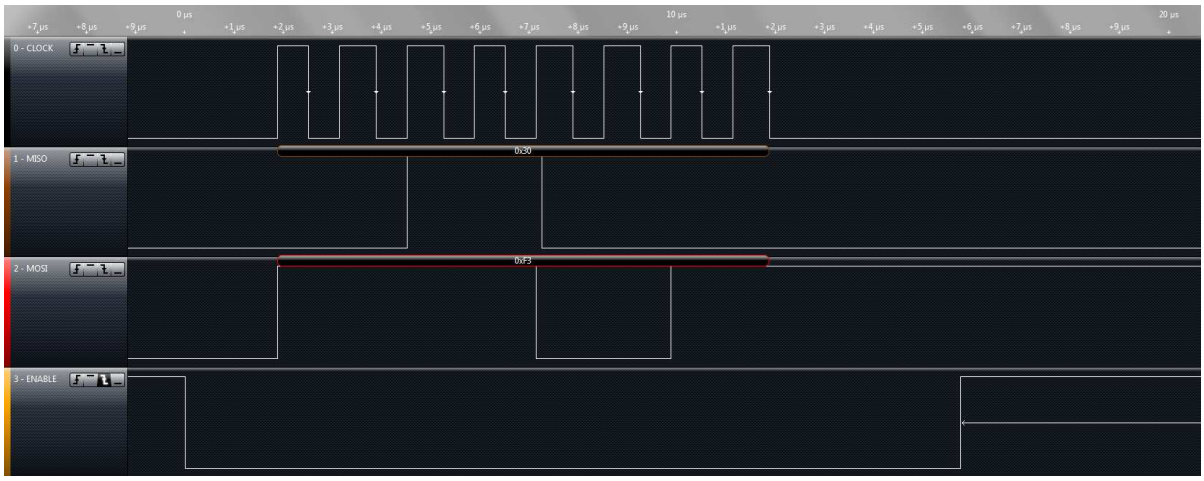

Figure 2: 'Read histogram data' command byte

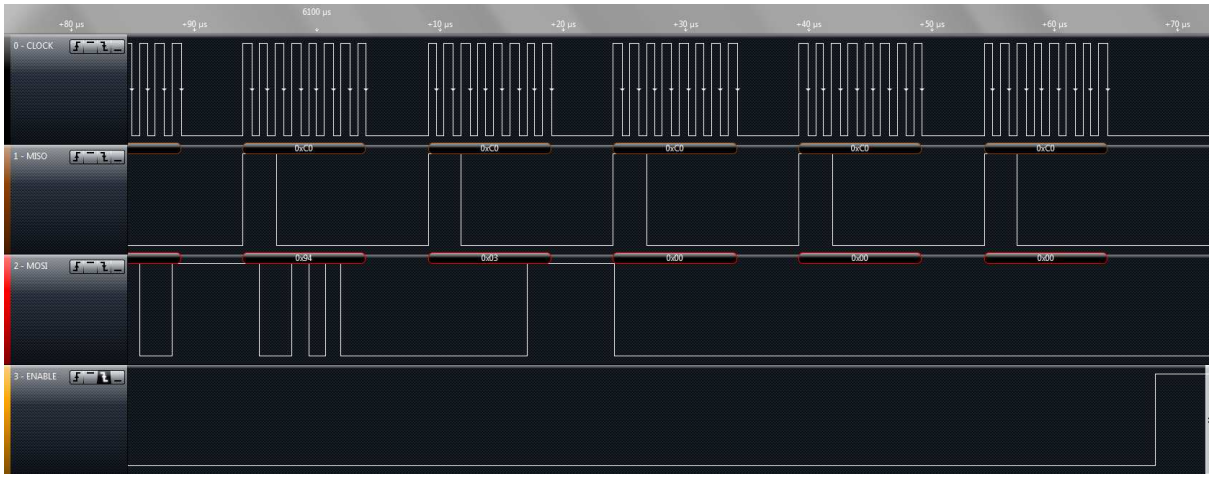

Figure 3: Final few bytes of histogram data transfer

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

4 Firmware commands

OPC-N2 SPI functions (from point of view of SPI Master system) for firmware version 18.

Function	Command byte	Byte(s) out	Byte(s) in (0xF3 is set as standard initial return byte value from OPC-N2)	Measured time between end of current and start of next byte	Notes
Digital pot (fan and laser power) ON	**0x03**	0x03	0xF3	3ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x00	0x03	NA	
Digital pot (fan and laser power) OFF	**0x03**	0x03	0xF3	1.5ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x01	0x03	NA	
Digital pot (fan power only) ON	**0x03**	0x03	0xF3	5ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x04	0x03	NA	
Digital pot (fan power only) OFF	**0x03**	0x03	0xF3	3ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x05	0x03	NA	
Digital pot (laser power only) ON	**0x03**	0x03	0xF3	6ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x02	0x03	NA	
Digital pot (laser power only) OFF	**0x03**	0x03	0xF3	3ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x03	0x03	NA	
Digital pot Set Laser Power	**0x42**	0x42	0xF3	3.5ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x01	0x42	6us	LaserDAC is a unsigned 8bit integer variable.
		LaserDAC	0x01	NA	
Digital pot Set Fan Power	**0x42**	0x42	0xF3	7ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x00	0x42	6us	FanDAC is a unsigned 8bit integer

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		FanDAC	0x00	NA	variable.
Digital pot Read Status	**0x13**	0x13	0xF3		Suggest that 10ms be used as delay between command byte and following byte.
		0x13	FanON		FanON is unsigned 8bit integer variable (1 or 0).
		0x13	LaserON		LaserON is unsigned 8bit integer variable (1 or 0).
		0x13	FanDACVal		FanDACVal is unsigned 8bit integer variable.
		0x13	LaserDACVal		LaserDACVal is unsigned 8bit integer variable.
Read information string	**0x3F**	0x3F	0xF3	1.5ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x3F	InfoStr ascii char00: “O” (=0x4F)	6us	SerialStr is a string of 60 characters.
		0x3F	InfoStr ascii char01: “P” (=0x50)	“	Value of shaded bytes doesn’t matter.
		0x3F	InfoStr ascii char02: “C” (=0x43)	“	
		0x3F	InfoStr ascii char03: “-“ (=0x2D)	“	
		0x3F	InfoStr ascii char04: “N” (=0x4E)	“	
		0x3F	InfoStr ascii char05: “2” (=0x32)	“	
		0x3F	InfoStr ascii char06: “ “ (=0x20)	“	
		0x3F	InfoStr ascii char07: “F” (=0x46)	“	
		0x3F	InfoStr ascii char08: “i” (=0x69)	“	
		0x3F	InfoStr ascii char09: “r” (=0x72)	“	
		0x3F	InfoStr ascii char10: “m” (=0x6D)	“	
		0x3F	InfoStr ascii char11: “w” (=0x77)	“	
		0x3F	InfoStr ascii char12: “a” (=0x61)	“	
		0x3F	InfoStr ascii char13: “r” (=0x72)	“	
		0x3F	InfoStr ascii char14: “e” (=0x65)	“	
		0x3F	InfoStr ascii char15: “V” (=0x56)	“	
		0x3F	InfoStr ascii char16: “e” (=0x65)	“	
		0x3F	InfoStr ascii char17: “r” (=0x72)	“	
		0x3F	InfoStr ascii char18: “=” (=0x3D)	“	
		0x3F	InfoStr ascii char19: “O” (=0x4F)	“	
		0x3F	InfoStr ascii char20: “P” (=0x50)	“	
		0x3F	InfoStr ascii char21: “C” (=0x43)	“	
		0x3F	InfoStr ascii char22: “-“ (=0x2D)	“	
		0x3F	InfoStr ascii char23: “0” (=0x30)	“	
		0x3F	InfoStr ascii char24: “1” (=0x31)	“	
		0x3F	InfoStr ascii char25: “8” (=0x36)	“	
		0x3F	InfoStr ascii char26: “.” (=0x2E)	“	
		0x3F	InfoStr ascii char27: “.” (=0x2E)	“	
		0x3F	InfoStr ascii char28: “.” (=0x2E)	“	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		0x3F	InfoStr ascii char29: "." (=0x2E)	"	
		0x3F	InfoStr ascii char30: "." (=0x2E)	"	
		0x3F	InfoStr ascii char31: "." (=0x2E)	"	
		0x3F	InfoStr ascii char32: "." (=0x2E)	"	
		0x3F	InfoStr ascii char33: "." (=0x2E)	"	
		0x3F	InfoStr ascii char34: "." (=0x2E)	"	
		0x3F	InfoStr ascii char35: "." (=0x2E)	"	
		0x3F	InfoStr ascii char36: "." (=0x2E)	"	
		0x3F	InfoStr ascii char37: "." (=0x2E)	"	
		0x3F	InfoStr ascii char38: "." (=0x2E)	"	
		0x3F	InfoStr ascii char39: "." (=0x2E)	"	
		0x3F	InfoStr ascii char40: "." (=0x2E)	"	
		0x3F	InfoStr ascii char41: "." (=0x2E)	"	
		0x3F	InfoStr ascii char42: "." (=0x2E)	"	
		0x3F	InfoStr ascii char43: "." (=0x2E)	"	
		0x3F	InfoStr ascii char44: "." (=0x2E)	"	
		0x3F	InfoStr ascii char45: "." (=0x2E)	"	
		0x3F	InfoStr ascii char46: "." (=0x2E)	"	
		0x3F	InfoStr ascii char47: "." (=0x2E)	"	
		0x3F	InfoStr ascii char48: "." (=0x2E)	"	
		0x3F	InfoStr ascii char49: "." (=0x2E)	"	
		0x3F	InfoStr ascii char50: "." (=0x2E)	"	
		0x3F	InfoStr ascii char51: "." (=0x2E)	"	
		0x3F	InfoStr ascii char52: "." (=0x2E)	"	
		0x3F	InfoStr ascii char53: "." (=0x2E)	"	
		0x3F	InfoStr ascii char54: "." (=0x2E)	"	
		0x3F	InfoStr ascii char55: "." (=0x2E)	"	
		0x3F	InfoStr ascii char56: "." (=0x2E)	"	
		0x3F	InfoStr ascii char57: "." (=0x2E)	"	
		0x3F	InfoStr ascii char58: "." (=0x2E)	"	
		0x3F	InfoStr ascii char59: "." (=0x2E)	NA	
Read serial number string	**0x10**	0x10	0xF3		Suggest that 10ms be used as delay between command byte and following byte.
		0x10	SerialStr ascii char00		SerialStr is a string of 60 characters. Value of shaded bytes doesn't matter.
		0x10	SerialStr ascii char01		
		0x10	SerialStr ascii char02		
		0x10	SerialStr ascii char03		
		0x10	SerialStr ascii char04		
		0x10	SerialStr ascii char05		
		0x10	SerialStr ascii char06		
		0x10	SerialStr ascii char07		
		0x10	SerialStr ascii char08		
		0x10	SerialStr ascii char09		
		0x10	SerialStr ascii char10		
		0x10	SerialStr ascii char11		

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		0x10	SerialStr ascii char12		
		0x10	SerialStr ascii char13		
		0x10	SerialStr ascii char14		
		0x10	SerialStr ascii char15		
		0x10	SerialStr ascii char16		
		0x10	SerialStr ascii char17		
		0x10	SerialStr ascii char18		
		0x10	SerialStr ascii char19		
		0x10	SerialStr ascii char20		
		0x10	SerialStr ascii char21		
		0x10	SerialStr ascii char22		
		0x10	SerialStr ascii char23		
		0x10	SerialStr ascii char24		
		0x10	SerialStr ascii char25		
		0x10	SerialStr ascii char26		
		0x10	SerialStr ascii char27		
		0x10	SerialStr ascii char28		
		0x10	SerialStr ascii char29		
		0x10	SerialStr ascii char30		
		0x10	SerialStr ascii char31		
		0x10	SerialStr ascii char32		
		0x10	SerialStr ascii char33		
		0x10	SerialStr ascii char34		
		0x10	SerialStr ascii char35		
		0x10	SerialStr ascii char36		
		0x10	SerialStr ascii char37		
		0x10	SerialStr ascii char38		
		0x10	SerialStr ascii char39		
		0x10	SerialStr ascii char40		
		0x10	SerialStr ascii char41		
		0x10	SerialStr ascii char42		
		0x10	SerialStr ascii char43		
		0x10	SerialStr ascii char44		
		0x10	SerialStr ascii char45		
		0x10	SerialStr ascii char46		
		0x10	SerialStr ascii char47		
		0x10	SerialStr ascii char48		
		0x10	SerialStr ascii char49		
		0x10	SerialStr ascii char50		
		0x10	SerialStr ascii char51		
		0x10	SerialStr ascii char52		
		0x10	SerialStr ascii char53		
		0x10	SerialStr ascii char54		
		0x10	SerialStr ascii char55		
		0x10	SerialStr ascii char56		
		0x10	SerialStr ascii char57		
		0x10	SerialStr ascii char58		
		0x10	SerialStr ascii char59		

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

Write serial number string	**0x11**	0x11	0xF3		Suggest that 10ms be used as delay between command byte and following byte.
		SerialStr ascii char00	0x11		SerialStr is a string of 60 characters. This string can only be written once.
		SerialStr ascii char01	SerialStr ascii char00		
		SerialStr ascii char02	SerialStr ascii char01		
		SerialStr ascii char03	SerialStr ascii char02		
		SerialStr ascii char04	SerialStr ascii char03		
		SerialStr ascii char05	SerialStr ascii char04		
		SerialStr ascii char06	SerialStr ascii char05		
		SerialStr ascii char07	SerialStr ascii char06		
		SerialStr ascii char08	SerialStr ascii char07		
		SerialStr ascii char09	SerialStr ascii char08		
		SerialStr ascii char10	SerialStr ascii char09		
		SerialStr ascii char11	SerialStr ascii char10		
		SerialStr ascii char12	SerialStr ascii char11		
		SerialStr ascii char13	SerialStr ascii char12		
		SerialStr ascii char14	SerialStr ascii char13		
		SerialStr ascii char15	SerialStr ascii char14		
		SerialStr ascii char16	SerialStr ascii char15		
		SerialStr ascii char17	SerialStr ascii char16		
		SerialStr ascii char18	SerialStr ascii char17		
		SerialStr ascii char19	SerialStr ascii char18		
		SerialStr ascii char20	SerialStr ascii char19		
		SerialStr ascii char21	SerialStr ascii char20		
		SerialStr ascii char22	SerialStr ascii char21		
		SerialStr ascii char23	SerialStr ascii char22		
		SerialStr ascii char24	SerialStr ascii char23		
		SerialStr ascii char25	SerialStr ascii char24		
		SerialStr ascii char26	SerialStr ascii char25		
		SerialStr ascii char27	SerialStr ascii char26		
		SerialStr ascii char28	SerialStr ascii char27		
		SerialStr ascii char29	SerialStr ascii char28		

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		SerialStr ascii char30	SerialStr ascii char29		
		SerialStr ascii char31	SerialStr ascii char30		
		SerialStr ascii char32	SerialStr ascii char31		
		SerialStr ascii char33	SerialStr ascii char32		
		SerialStr ascii char34	SerialStr ascii char33		
		SerialStr ascii char35	SerialStr ascii char34		
		SerialStr ascii char36	SerialStr ascii char35		
		SerialStr ascii char37	SerialStr ascii char36		
		SerialStr ascii char38	SerialStr ascii char37		
		SerialStr ascii char39	SerialStr ascii char38		
		SerialStr ascii char40	SerialStr ascii char39		
		SerialStr ascii char41	SerialStr ascii char40		
		SerialStr ascii char42	SerialStr ascii char41		
		SerialStr ascii char43	SerialStr ascii char42		
		SerialStr ascii char44	SerialStr ascii char43		
		SerialStr ascii char45	SerialStr ascii char44		
		SerialStr ascii char46	SerialStr ascii char45		
		SerialStr ascii char47	SerialStr ascii char46		
		SerialStr ascii char48	SerialStr ascii char47		
		SerialStr ascii char49	SerialStr ascii char48		
		SerialStr ascii char50	SerialStr ascii char49		
		SerialStr ascii char51	SerialStr ascii char50		
		SerialStr ascii char52	SerialStr ascii char51		
		SerialStr ascii char53	SerialStr ascii char52		
		SerialStr ascii char54	SerialStr ascii char53		
		SerialStr ascii char55	SerialStr ascii char54		
		SerialStr ascii char56	SerialStr ascii char55		
		SerialStr ascii char57	SerialStr ascii char56		
		SerialStr ascii char58	SerialStr ascii char57		
		SerialStr ascii char59	SerialStr ascii char58		
Read Firmware Version	0x12	0x12	0xF3		Suggest that 10ms be used as delay between command byte and following byte.
		0x12	FirmwareVerMajor		FirmwareVerMajor is unsigned 8bit integer

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

					variable.
		0x12	FirmwareVerMinor		FirmwareVerMinor is unsigned 8bit integer variable.
Read Configuration Variables	**0x3C**	0x3C	0xF3	1.5ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x3C	BB0 LSB	6us	Bin Boundaries (BB0 – BB14) are unsigned 16bit integer variables.
		0x3C	BB0 MSB	"	Value of shaded bytes doesn't matter.
		0x3C	BB1 LSB	"	
		0x3C	BB1 MSB	"	
		0x3C	BB2 LSB	"	
		0x3C	BB2 MSB	"	
		0x3C	BB3 LSB	"	
		0x3C	BB3 MSB	"	
		0x3C	BB4 LSB	"	
		0x3C	BB4 MSB	"	
		0x3C	BB5 LSB	"	
		0x3C	BB5 MSB	"	
		0x3C	BB6 LSB	"	
		0x3C	BB6 MSB	"	
		0x3C	BB7 LSB	"	
		0x3C	BB7 MSB	"	
		0x3C	BB8 LSB	"	
		0x3C	BB8 MSB	"	
		0x3C	BB9 LSB	"	
		0x3C	BB9 MSB	"	
		0x3C	BB10 LSB	"	
		0x3C	BB10 MSB	"	
		0x3C	BB11 LSB	"	
		0x3C	BB11 MSB	"	
		0x3C	BB12 LSB	"	
		0x3C	BB12 MSB	"	
		0x3C	BB13 LSB	"	
		0x3C	BB13 MSB	"	
		0x3C	BB14 LSB	"	
		0x3C	BB14 MSB	"	
		0x3C	Spare byte	"	
		0x3C	Spare byte	"	
		0x3C	BPV0 Byte0	"	Bin Particle Volumes (BPV0 – BPV15) are float variables occupying 4 bytes each.
		0x3C	BPV0 Byte1	"	
		0x3C	BPV0 Byte2	"	
		0x3C	BPV0 Byte3	"	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		0x3C	BPV1 Byte0	“	
		0x3C	BPV1 Byte1	“	
		0x3C	BPV1 Byte2	“	
		0x3C	BPV1 Byte3	“	
		0x3C	BPV2 Byte0	“	
		0x3C	BPV2 Byte1	“	
		0x3C	BPV2 Byte2	“	
		0x3C	BPV2 Byte3	“	
		0x3C	BPV3 Byte0	“	
		0x3C	BPV3 Byte1	“	
		0x3C	BPV3 Byte2	“	
		0x3C	BPV3 Byte3	“	
		0x3C	BPV4 Byte0	“	
		0x3C	BPV4 Byte1	“	
		0x3C	BPV4 Byte2	“	
		0x3C	BPV4 Byte3	“	
		0x3C	BPV5 Byte0	“	
		0x3C	BPV5 Byte1	“	
		0x3C	BPV5 Byte2	“	
		0x3C	BPV5 Byte3	“	
		0x3C	BPV6 Byte0	“	
		0x3C	BPV6 Byte1	“	
		0x3C	BPV6 Byte2	“	
		0x3C	BPV6 Byte3	“	
		0x3C	BPV7 Byte0	“	
		0x3C	BPV7 Byte1	“	
		0x3C	BPV7 Byte2	“	
		0x3C	BPV7 Byte3	“	
		0x3C	BPV8 Byte0	“	
		0x3C	BPV8 Byte1	“	
		0x3C	BPV8 Byte2	“	
		0x3C	BPV8 Byte3	“	
		0x3C	BPV9 Byte0	“	
		0x3C	BPV9 Byte1	“	
		0x3C	BPV9 Byte2	“	
		0x3C	BPV9 Byte3	“	
		0x3C	BPV10 Byte0	“	
		0x3C	BPV10 Byte1	“	
		0x3C	BPV10 Byte2	“	
		0x3C	BPV10 Byte3	“	
		0x3C	BPV11 Byte0	“	
		0x3C	BPV11 Byte1	“	
		0x3C	BPV11 Byte2	“	
		0x3C	BPV11 Byte3	“	
		0x3C	BPV12 Byte0	“	
		0x3C	BPV12 Byte1	“	
		0x3C	BPV12 Byte2	“	
		0x3C	BPV12 Byte3	“	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		0x3C	BPV13 Byte0	“	
		0x3C	BPV13 Byte1	“	
		0x3C	BPV13 Byte2	“	
		0x3C	BPV13 Byte3	“	
		0x3C	BPV14 Byte0	“	
		0x3C	BPV14 Byte1	“	
		0x3C	BPV14 Byte2	“	
		0x3C	BPV14 Byte3	“	
		0x3C	BPV15 Byte0	“	
		0x3C	BPV15 Byte1	“	
		0x3C	BPV15 Byte2	“	
		0x3C	BPV15 Byte3	“	
		0x3C	BPD0 Byte0	“	Bin Particle Densities (BPD0 – BPD15) are float variables occupying 4 bytes each.
		0x3C	BPD0 Byte1	“	
		0x3C	BPD0 Byte2	“	
		0x3C	BPD0 Byte3	“	
		0x3C	BPD1 Byte0	“	
		0x3C	BPD1 Byte1	“	
		0x3C	BPD1 Byte2	“	
		0x3C	BPD1 Byte3	“	
		0x3C	BPD2 Byte0	“	
		0x3C	BPD2 Byte1	“	
		0x3C	BPD2 Byte2	“	
		0x3C	BPD2 Byte3	“	
		0x3C	BPD3 Byte0	“	
		0x3C	BPD3 Byte1	“	
		0x3C	BPD3 Byte2	“	
		0x3C	BPD3 Byte3	“	
		0x3C	BPD4 Byte0	“	
		0x3C	BPD4 Byte1	“	
		0x3C	BPD4 Byte2	“	
		0x3C	BPD4 Byte3	“	
		0x3C	BPD5 Byte0	“	
		0x3C	BPD5 Byte1	“	
		0x3C	BPD5 Byte2	“	
		0x3C	BPD5 Byte3	“	
		0x3C	BPD6 Byte0	“	
		0x3C	BPD6 Byte1	“	
		0x3C	BPD6 Byte2	“	
		0x3C	BPD6 Byte3	“	
		0x3C	BPD7 Byte0	“	
		0x3C	BPD7 Byte1	“	
		0x3C	BPD7 Byte2	“	
		0x3C	BPD7 Byte3	“	
		0x3C	BPD8 Byte0	“	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		0x3C	BPD8 Byte1	"	
		0x3C	BPD8 Byte2	"	
		0x3C	BPD8 Byte3	"	
		0x3C	BPD9 Byte0	"	
		0x3C	BPD9 Byte1	"	
		0x3C	BPD9 Byte2	"	
		0x3C	BPD9 Byte3	"	
		0x3C	BPD10 Byte0	"	
		0x3C	BPD10 Byte1	"	
		0x3C	BPD10 Byte2	"	
		0x3C	BPD10 Byte3	"	
		0x3C	BPD11 Byte0	"	
		0x3C	BPD11 Byte1	"	
		0x3C	BPD11 Byte2	"	
		0x3C	BPD11 Byte3	"	
		0x3C	BPD12 Byte0	"	
		0x3C	BPD12 Byte1	"	
		0x3C	BPD12 Byte2	"	
		0x3C	BPD12 Byte3	"	
		0x3C	BPD13 Byte0	"	
		0x3C	BPD13 Byte1	"	
		0x3C	BPD13 Byte2	"	
		0x3C	BPD13 Byte3	"	
		0x3C	BPD14 Byte0	"	
		0x3C	BPD14 Byte1	"	
		0x3C	BPD14 Byte2	"	
		0x3C	BPD14 Byte3	"	
		0x3C	BPD15 Byte0	"	
		0x3C	BPD15 Byte1	"	
		0x3C	BPD15 Byte2	"	
		0x3C	BPD15 Byte3	"	
		0x3C	BSVW0 Byte0	"	Bin Sample Volume Weightings (BSVW0 – BSVW15) are float variables occupying 4 bytes each.
		0x3C	BSVW0 Byte1	"	
		0x3C	BSVW0 Byte2	"	
		0x3C	BSVW0 Byte3	"	
		0x3C	BSVW1 Byte0	"	
		0x3C	BSVW1 Byte1	"	
		0x3C	BSVW1 Byte2	"	
		0x3C	BSVW1 Byte3	"	
		0x3C	BSVW2 Byte0	"	
		0x3C	BSVW2 Byte1	"	
		0x3C	BSVW2 Byte2	"	
		0x3C	BSVW2 Byte3	"	
		0x3C	BSVW3 Byte0	"	
		0x3C	BSVW3 Byte1	"	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		0x3C	BSVW3 Byte2	“	
		0x3C	BSVW3 Byte3	“	
		0x3C	BSVW4 Byte0	“	
		0x3C	BSVW4 Byte1	“	
		0x3C	BSVW4 Byte2	“	
		0x3C	BSVW4 Byte3	“	
		0x3C	BSVW5 Byte0	“	
		0x3C	BSVW5 Byte1	“	
		0x3C	BSVW5 Byte2	“	
		0x3C	BSVW5 Byte3	“	
		0x3C	BSVW6 Byte0	“	
		0x3C	BSVW6 Byte1	“	
		0x3C	BSVW6 Byte2	“	
		0x3C	BSVW6 Byte3	“	
		0x3C	BSVW7 Byte0	“	
		0x3C	BSVW7 Byte1	“	
		0x3C	BSVW7 Byte2	“	
		0x3C	BSVW7 Byte3	“	
		0x3C	BSVW8 Byte0	“	
		0x3C	BSVW8 Byte1	“	
		0x3C	BSVW8 Byte2	“	
		0x3C	BSVW8 Byte3	“	
		0x3C	BSVW9 Byte0	“	
		0x3C	BSVW9 Byte1	“	
		0x3C	BSVW9 Byte2	“	
		0x3C	BSVW9 Byte3	“	
		0x3C	BSVW10 Byte0	“	
		0x3C	BSVW10 Byte1	“	
		0x3C	BSVW10 Byte2	“	
		0x3C	BSVW10 Byte3	“	
		0x3C	BSVW11 Byte0	“	
		0x3C	BSVW11 Byte1	“	
		0x3C	BSVW11 Byte2	“	
		0x3C	BSVW11 Byte3	“	
		0x3C	BSVW12 Byte0	“	
		0x3C	BSVW12 Byte1	“	
		0x3C	BSVW12 Byte2	“	
		0x3C	BSVW12 Byte3	“	
		0x3C	BSVW13 Byte0	“	
		0x3C	BSVW13 Byte1	“	
		0x3C	BSVW13 Byte2	“	
		0x3C	BSVW13 Byte3	“	
		0x3C	BSVW14 Byte0	“	
		0x3C	BSVW14 Byte1	“	
		0x3C	BSVW14 Byte2	“	
		0x3C	BSVW14 Byte3	“	
		0x3C	BSVW15 Byte0	“	
		0x3C	BSVW15 Byte1	“	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		0x3C	BSVW15 Byte2	“	
		0x3C	BSVW15 Byte3	“	
		0x3C	GSC Byte0	“	Gain Scaling Coefficient (GSC) is float variable occupying 4 bytes.
		0x3C	GSC Byte1	“	
		0x3C	GSC Byte2	“	
		0x3C	GSC Byte3	“	
		0x3C	SFR Byte0	“	Sample Flow Rate’ is a float variable occupying 4 bytes that represents the sample flow rate in ml/s.
		0x3C	SFR Byte1	“	
		0x3C	SFR Byte2	“	
		0x3C	SFR Byte3	“	
		0x3C	LaserDACVal	“	LaserDACVal is unsigned 8bit integer variable.
		0x3C	FanDACVal	“	FanDACVal is unsigned 8bit integer variable.
		0x3C	TOF to SFR factor	“	Time of Flight to Sample Flow Rate conversion factor’ is unsigned 8bit integer variable.
		0x3C	Spare byte	“	21 spare bytes follow configuration variables.
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	“	
		0x3C	Spare byte	NA	
Write Configuration Variables	**0x3A**	0x3A	0xF3	3ms	Suggest that 10ms be used as delay between command

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

					byte and following byte.
		BB0 LSB	0x3A	6us	Bin Boundaries (BB0 – BB14) are unsigned 16bit integer variables.
		BB0 MSB	BB0 LSB	"	Value of shaded bytes doesn't matter.
		BB1 LSB	BB0 MSB	"	
		BB1 MSB	BB1 LSB	"	
		BB2 LSB	BB1 MSB	"	
		BB2 MSB	BB2 LSB	"	
		BB3 LSB	BB2 MSB	"	
		BB3 MSB	BB3 LSB	"	
		BB4 LSB	BB3 MSB	"	
		BB4 MSB	BB4 LSB	"	
		BB5 LSB	BB4 MSB	"	
		BB5 MSB	BB5 LSB	"	
		BB6 LSB	BB5 MSB	"	
		BB6 MSB	BB6 LSB	"	
		BB7 LSB	BB6 MSB	"	
		BB7 MSB	BB7 LSB	"	
		BB8 LSB	BB7 MSB	"	
		BB8 MSB	BB8 LSB	"	
		BB9 LSB	BB8 MSB	"	
		BB9 MSB	BB9 LSB	"	
		BB10 LSB	BB9 MSB	"	
		BB10 MSB	BB10 LSB	"	
		BB11 LSB	BB10 MSB	"	
		BB11 MSB	BB11 LSB	"	
		BB12 LSB	BB11 MSB	"	
		BB12 MSB	BB12 LSB	"	
		BB13 LSB	BB12 MSB	"	
		BB13 MSB	BB13 LSB	"	
		BB14 LSB	BB13 MSB	"	
		BB14 MSB	BB14 LSB	"	
		0x3A	BB14 MSB	"	
		0x3A	Spare byte	"	
		BPV0 Byte0	Spare byte	"	Bin Particle Volumes (BPV0 – BPV15) are float variables occupying 4 bytes each.
		BPV0 Byte1	BPV0 Byte0	"	
		BPV0 Byte2	BPV0 Byte1	"	
		BPV0 Byte3	BPV0 Byte2	"	
		BPV1 Byte0	BPV0 Byte3	"	
		BPV1 Byte1	BPV1 Byte0	"	
		BPV1 Byte2	BPV1 Byte1	"	
		BPV1 Byte3	BPV1 Byte2	"	
		BPV2 Byte0	BPV1 Byte3	"	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		BPV2 Byte1	BPV2 Byte0	"	
		BPV2 Byte2	BPV2 Byte1	"	
		BPV2 Byte3	BPV2 Byte2	"	
		BPV3 Byte0	BPV2 Byte3	"	
		BPV3 Byte1	BPV3 Byte0	"	
		BPV3 Byte2	BPV3 Byte1	"	
		BPV3 Byte3	BPV3 Byte2	"	
		BPV4 Byte0	BPV3 Byte3	"	
		BPV4 Byte1	BPV4 Byte0	"	
		BPV4 Byte2	BPV4 Byte1	"	
		BPV4 Byte3	BPV4 Byte2	"	
		BPV5 Byte0	BPV4 Byte3	"	
		BPV5 Byte1	BPV5 Byte0	"	
		BPV5 Byte2	BPV5 Byte1	"	
		BPV5 Byte3	BPV5 Byte2	"	
		BPV6 Byte0	BPV5 Byte3	"	
		BPV6 Byte1	BPV6 Byte0	"	
		BPV6 Byte2	BPV6 Byte1	"	
		BPV6 Byte3	BPV6 Byte2	"	
		BPV7 Byte0	BPV6 Byte3	"	
		BPV7 Byte1	BPV7 Byte0	"	
		BPV7 Byte2	BPV7 Byte1	"	
		BPV7 Byte3	BPV7 Byte2	"	
		BPV8 Byte0	BPV7 Byte3	"	
		BPV8 Byte1	BPV8 Byte0	"	
		BPV8 Byte2	BPV8 Byte1	"	
		BPV8 Byte3	BPV8 Byte2	"	
		BPV9 Byte0	BPV8 Byte3	"	
		BPV9 Byte1	BPV9 Byte0	"	
		BPV9 Byte2	BPV9 Byte1	"	
		BPV9 Byte3	BPV9 Byte2	"	
		BPV10 Byte0	BPV9 Byte3	"	
		BPV10 Byte1	BPV10 Byte0	"	
		BPV10 Byte2	BPV10 Byte1	"	
		BPV10 Byte3	BPV10 Byte2	"	
		BPV11 Byte0	BPV10 Byte3	"	
		BPV11 Byte1	BPV11 Byte0	"	
		BPV11 Byte2	BPV11 Byte1	"	
		BPV11 Byte3	BPV11 Byte2	"	
		BPV12 Byte0	BPV11 Byte3	"	
		BPV12 Byte1	BPV12 Byte0	"	
		BPV12 Byte2	BPV12 Byte1	"	
		BPV12 Byte3	BPV12 Byte2	"	
		BPV13 Byte0	BPV12 Byte3	"	
		BPV13 Byte1	BPV13 Byte0	"	
		BPV13 Byte2	BPV13 Byte1	"	
		BPV13 Byte3	BPV13 Byte2	"	
		BPV14 Byte0	BPV13 Byte3	"	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		BPV14 Byte1	BPV14 Byte0	"	
		BPV14 Byte2	BPV14 Byte1	"	
		BPV14 Byte3	BPV14 Byte2	"	
		BPV15 Byte0	BPV14 Byte3	"	
		BPV15 Byte1	BPV15 Byte0	"	
		BPV15 Byte2	BPV15 Byte1	"	
		BPV15 Byte3	BPV15 Byte2	"	
		BPD0 Byte0	BPV15 Byte3	"	Bin Particle Densities (BPD0 – BPD15) are float variables occupying 4 bytes each.
		BPD0 Byte1	BPD0 Byte0	"	
		BPD0 Byte2	BPD0 Byte1	"	
		BPD0 Byte3	BPD0 Byte2	"	
		BPD1 Byte0	BPD0 Byte3	"	
		BPD1 Byte1	BPD1 Byte0	"	
		BPD1 Byte2	BPD1 Byte1	"	
		BPD1 Byte3	BPD1 Byte2	"	
		BPD2 Byte0	BPD1 Byte3	"	
		BPD2 Byte1	BPD2 Byte0	"	
		BPD2 Byte2	BPD2 Byte1	"	
		BPD2 Byte3	BPD2 Byte2	"	
		BPD3 Byte0	BPD2 Byte3	"	
		BPD3 Byte1	BPD3 Byte0	"	
		BPD3 Byte2	BPD3 Byte1	"	
		BPD3 Byte3	BPD3 Byte2	"	
		BPD4 Byte0	BPD3 Byte3	"	
		BPD4 Byte1	BPD4 Byte0	"	
		BPD4 Byte2	BPD4 Byte1	"	
		BPD4 Byte3	BPD4 Byte2	"	
		BPD5 Byte0	BPD4 Byte3	"	
		BPD5 Byte1	BPD5 Byte0	"	
		BPD5 Byte2	BPD5 Byte1	"	
		BPD5 Byte3	BPD5 Byte2	"	
		BPD6 Byte0	BPD5 Byte3	"	
		BPD6 Byte1	BPD6 Byte0	"	
		BPD6 Byte2	BPD6 Byte1	"	
		BPD6 Byte3	BPD6 Byte2	"	
		BPD7 Byte0	BPD6 Byte3	"	
		BPD7 Byte1	BPD7 Byte0	"	
		BPD7 Byte2	BPD7 Byte1	"	
		BPD7 Byte3	BPD7 Byte2	"	
		BPD8 Byte0	BPD7 Byte3	"	
		BPD8 Byte1	BPD8 Byte0	"	
		BPD8 Byte2	BPD8 Byte1	"	
		BPD8 Byte3	BPD8 Byte2	"	
		BPD9 Byte0	BPD8 Byte3	"	
		BPD9 Byte1	BPD9 Byte0	"	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		BPD9 Byte2	BPD9 Byte1	"	
		BPD9 Byte3	BPD9 Byte2	"	
		BPD10 Byte0	BPD9 Byte3	"	
		BPD10 Byte1	BPD10 Byte0	"	
		BPD10 Byte2	BPD10 Byte1	"	
		BPD10 Byte3	BPD10 Byte2	"	
		BPD11 Byte0	BPD10 Byte3	"	
		BPD11 Byte1	BPD11 Byte0	"	
		BPD11 Byte2	BPD11 Byte1	"	
		BPD11 Byte3	BPD11 Byte2	"	
		BPD12 Byte0	BPD11 Byte3	"	
		BPD12 Byte1	BPD12 Byte0	"	
		BPD12 Byte2	BPD12 Byte1	"	
		BPD12 Byte3	BPD12 Byte2	"	
		BPD13 Byte0	BPD12 Byte3	"	
		BPD13 Byte1	BPD13 Byte0	"	
		BPD13 Byte2	BPD13 Byte1	"	
		BPD13 Byte3	BPD13 Byte2	"	
		BPD14 Byte0	BPD13 Byte3	"	
		BPD14 Byte1	BPD14 Byte0	"	
		BPD14 Byte2	BPD14 Byte1	"	
		BPD14 Byte3	BPD14 Byte2	"	
		BPD15 Byte0	BPD14 Byte3	"	
		BPD15 Byte1	BPD15 Byte0	"	
		BPD15 Byte2	BPD15 Byte1	"	
		BPD15 Byte3	BPD15 Byte2	"	
		BSVW0 Byte0	BPD15 Byte3	"	Bin Sample Volume Weightings (BSVW0 – BSVW15) are float variables occupying 4 bytes each.
		BSVW0 Byte1	BSVW0 Byte0	"	
		BSVW0 Byte2	BSVW0 Byte1	"	
		BSVW0 Byte3	BSVW0 Byte2	"	
		BSVW1 Byte0	BSVW0 Byte3	"	
		BSVW1 Byte1	BSVW1 Byte0	"	
		BSVW1 Byte2	BSVW1 Byte1	"	
		BSVW1 Byte3	BSVW1 Byte2	"	
		BSVW2 Byte0	BSVW1 Byte3	"	
		BSVW2 Byte1	BSVW2 Byte0	"	
		BSVW2 Byte2	BSVW2 Byte1	"	
		BSVW2 Byte3	BSVW2 Byte2	"	
		BSVW3 Byte0	BSVW2 Byte3	"	
		BSVW3 Byte1	BSVW3 Byte0	"	
		BSVW3 Byte2	BSVW3 Byte1	"	
		BSVW3 Byte3	BSVW3 Byte2	"	
		BSVW4 Byte0	BSVW3 Byte3	"	
		BSVW4 Byte1	BSVW4 Byte0	"	
		BSVW4 Byte2	BSVW4 Byte1	"	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		BSVW4 Byte3	BSVW4 Byte2	"	
		BSVW5 Byte0	BSVW4 Byte3	"	
		BSVW5 Byte1	BSVW5 Byte0	"	
		BSVW5 Byte2	BSVW5 Byte1	"	
		BSVW5 Byte3	BSVW5 Byte2	"	
		BSVW6 Byte0	BSVW5 Byte3	"	
		BSVW6 Byte1	BSVW6 Byte0	"	
		BSVW6 Byte2	BSVW6 Byte1	"	
		BSVW6 Byte3	BSVW6 Byte2	"	
		BSVW7 Byte0	BSVW6 Byte3	"	
		BSVW7 Byte1	BSVW7 Byte0	"	
		BSVW7 Byte2	BSVW7 Byte1	"	
		BSVW7 Byte3	BSVW7 Byte2	"	
		BSVW8 Byte0	BSVW7 Byte3	"	
		BSVW8 Byte1	BSVW8 Byte0	"	
		BSVW8 Byte2	BSVW8 Byte1	"	
		BSVW8 Byte3	BSVW8 Byte2	"	
		BSVW9 Byte0	BSVW8 Byte3	"	
		BSVW9 Byte1	BSVW9 Byte0	"	
		BSVW9 Byte2	BSVW9 Byte1	"	
		BSVW9 Byte3	BSVW9 Byte2	"	
		BSVW10 Byte0	BSVW9 Byte3	"	
		BSVW10 Byte1	BSVW10 Byte0	"	
		BSVW10 Byte2	BSVW10 Byte1	"	
		BSVW10 Byte3	BSVW10 Byte2	"	
		BSVW11 Byte0	BSVW10 Byte3	"	
		BSVW11 Byte1	BSVW11 Byte0	"	
		BSVW11 Byte2	BSVW11 Byte1	"	
		BSVW11 Byte3	BSVW11 Byte2	"	
		BSVW12 Byte0	BSVW11 Byte3	"	
		BSVW12 Byte1	BSVW12 Byte0	"	
		BSVW12 Byte2	BSVW12 Byte1	"	
		BSVW12 Byte3	BSVW12 Byte2	"	
		BSVW13 Byte0	BSVW12 Byte3	"	
		BSVW13 Byte1	BSVW13 Byte0	"	
		BSVW13 Byte2	BSVW13 Byte1	"	
		BSVW13 Byte3	BSVW13 Byte2	"	
		BSVW14 Byte0	BSVW13 Byte3	"	
		BSVW14 Byte1	BSVW14 Byte0	"	
		BSVW14 Byte2	BSVW14 Byte1	"	
		BSVW14 Byte3	BSVW14 Byte2	"	
		BSVW15 Byte0	BSVW14 Byte3	"	
		BSVW15 Byte1	BSVW15 Byte0	"	
		BSVW15 Byte2	BSVW15 Byte1	"	
		BSVW15 Byte3	BSVW15 Byte2	"	
		GSC Byte0	BSVW15 Byte3	"	Gain Scaling Coefficient (GSC) is float variable occupying 4 bytes.

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		GSC Byte1	GSC Byte0	“	
		GSC Byte2	GSC Byte1	“	
		GSC Byte3	GSC Byte2	“	
		NA Byte0	GSC Byte3	“	‘NA’ is unused float variable occupying 4 bytes.
		NA Byte1	NA Byte0	“	
		NA Byte2	NA Byte1	“	
		NA Byte3	NA Byte2	“	
		LaserDAC	NA Byte3	“	LaserDAC is unsigned 8bit integer variable.
		FanDAC	LaserDAC	“	FanDAC is unsigned 8bit integer variable.
		TOF to SFR factor	FanDAC	“	Time of Flight to Sample Flow Rate conversion factor’ is unsigned 8bit integer variable.
Read Configuration Variables 2	**0x3D**	0x3D	0xF3		Suggest that 10ms be used as delay between command byte and following byte.
		0x3D	AMSamplingIntervalCount LSB		AMSamplingIntervalCount is unsigned 16bit integer variable.
		0x3D	AMSamplingIntervalCount MSB		
		0x3D	AMIdleIntervalCount LSB		AMIdleIntervalCount is unsigned 16bit integer variable.
		0x3D	AMIdleIntervalCount MSB		
		0x3D	AMFanOnInIdle		AMFanOnInIdle is unsigned 8bit integer variable (1 or 0).
		0x3D	AMLaserOnInIdle		AMLaserOnInIdle is unsigned 8bit integer variable (1 or 0).
		0x3D	AMMaxDataArraysInFile LSB		AMMaxDataArraysInFile is unsigned 16bit integer variable.
		0x3D	AMMaxDataArraysInFile MSB		
		0x3D	AMOnlySavePMData		AMOnlySavePMData is unsigned 8bit integer variable (1 or 0).
Write Configuration Variables 2	**0x3B**	0x3B	0xF3		Suggest that 10ms be used as delay between command byte and following byte.
		AMSamplingIntervalCount LSB	0x3B		AMSamplingIntervalCount is unsigned 16bit integer variable.
		AMSamplingIntervalCount MSB	AMSamplingIntervalCount LSB		
		AMIdleIntervalCount LSB	AMSamplingIntervalCount MSB		AMIdleIntervalCount is unsigned 16bit integer variable.
		AMIdleIntervalCount MSB	AMIdleIntervalCount LSB		
		AMFanOnInIdle	AMIdleIntervalCount MSB		AMFanOnInIdle is

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

					unsigned 8bit integer variable (1 or 0).
		AMLaserOnInIdle	AMFanOnInIdle		AMLaserOnInIdle is unsigned 8bit integer variable (1 or 0).
		AMMaxDataArraysInFile LSB AMMaxDataArraysInFile MSB	AMLaserOnInIdle AMMaxDataArraysInFile LSB		AMMaxDataArraysInFile is unsigned 16bit integer variable.
		AMOnlySavePMData	AMMaxDataArraysInFile MSB		AMOnlySavePMData is unsigned 8bit integer variable (1 or 0).
Read histogram data (and reset histogram)	**0x30**	0x30	0xF3	9ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x30	Bin0 LSB	6us	Bin Counts (Bin0 – Bin15) are unsigned 16bit integer variables.
		0x30	Bin0 MSB	"	Value of shaded bytes doesn't matter.
		0x30	Bin1 LSB	"	
		0x30	Bin1 MSB	"	
		0x30	Bin2 LSB	"	
		0x30	Bin2 MSB	"	
		0x30	Bin3 LSB	"	
		0x30	Bin3 MSB	"	
		0x30	Bin4 LSB	"	
		0x30	Bin4 MSB	"	
		0x30	Bin5 LSB	"	
		0x30	Bin5 MSB	"	
		0x30	Bin6 LSB	"	
		0x30	Bin6 MSB	"	
		0x30	Bin7 LSB	"	
		0x30	Bin7 MSB	"	
		0x30	Bin8 LSB	"	
		0x30	Bin8 MSB	"	
		0x30	Bin9 LSB	"	
		0x30	Bin9 MSB	"	
		0x30	Bin10 LSB	"	
		0x30	Bin10 MSB	"	
		0x30	Bin11 LSB	"	
		0x30	Bin11 MSB	"	
		0x30	Bin12 LSB	"	
		0x30	Bin12 MSB	"	
		0x30	Bin13 LSB	"	
		0x30	Bin13 MSB	"	
		0x30	Bin14 LSB	"	
		0x30	Bin14 MSB	"	
		0x30	Bin15 LSB	"	

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		0x30	Bin15 MSB	“	
		0x30	Bin1 MtoF	“	‘MtoF’ is an unsigned 8bit integer that represents the average
		0x30	Bin3 MtoF	“	amount of time that particles sized in the stated bin took to
		0x30	Bin5 MtoF	“	cross the OPS’s laser beam. Each value is in 1/3 us. I.e. a value
		0x30	Bin7 MtoF	“	of 10 would represent 3.33us.
		0x30	Sample Flow Rate Byte0	“	‘Sample Flow Rate’ is a float variable occupying 4 bytes that represents the sample flow rate in ml/s.
		0x30	Sample Flow Rate Byte1	“	
		0x30	Sample Flow Rate Byte2	“	
		0x30	Sample Flow Rate Byte3	“	
		0x30	Temperature/Pressure LSB	“	Temperatrue and Pressure alternating. ‘Temperature’ is an unsigned
		0x30	Temperature/Pressure Byte1	“	32bit integer that represents temperature in C multiplied by 10.
		0x30	Temperature/Pressure Byte2	“	‘Pressure’ is an unsigned 32bit integer that represents pressure
		0x30	Temperature/Pressure MSB	“	in pascals.
		0x30	Sampling Period Byte0	“	Sampling Period’ is a float variable occupying 4 bytes and is a
		0x30	Sampling Period Byte1	“	measure of the histogram’s actual sampling period in seconds.
		0x30	Sampling Period Byte2	“	
		0x30	Sampling Period Byte3	“	
		0x30	Checksum LSB	“	‘Checksum’ is an unsigned 16bit integer and is the least significant
		0x30	Checksum MSB	“	16bits of the sum of the counts in all the histogram bins.
		0x30	PM1 Byte0	“	PM1 is a float variable occupying 4 bytes. Units are ug/m^3.
		0x30	PM1 Byte1	“	
		0x30	PM1 Byte2	“	
		0x30	PM1 Byte3	“	
		0x30	PM2.5 Byte0	“	PM2.5 is a float variable occupying 4 bytes. Units are ug/m^3.

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

		0x30	PM2.5 Byte1	"	
		0x30	PM2.5 Byte2	"	
		0x30	PM2.5 Byte3	"	
		0x30	PM10 Byte0	"	PM10 is a float variable occupying 4 bytes. Units are ug/m^3.
		0x30	PM10 Byte1	"	
		0x30	PM10 Byte2	"	
		0x30	PM10 Byte3	NA	
Read PM data (and reset histogram)	**0x32**	0x32	0xF3		Suggest that 10ms be used as delay between command byte and following byte.
		0x32	PM1 Byte0		PM1 is a float variable occupying 4 bytes. Units are ug/m^3.
		0x32	PM1 Byte1		
		0x32	PM1 Byte2		
		0x32	PM1 Byte3		
		0x32	PM2.5 Byte0		PM2.5 is a float variable occupying 4 bytes. Units are ug/m^3.
		0x32	PM2.5 Byte1		
		0x32	PM2.5 Byte2		
		0x32	PM2.5 Byte3		
		0x32	PM10 Byte0		PM10 is a float variable occupying 4 bytes. Units are ug/m^3.
		0x32	PM10 Byte1		
		0x32	PM10 Byte2		
		0x32	PM10 Byte3		
Save Configuration Variables in non-volatile memory	**0x43**	0x43	0xF3	5ms	Suggest that 10ms be used as delay between command byte and following byte.
		0x3F	0x43	6us	Initial command byte must be followed by sequence of bytes (shown in red).
		0x3C	0x3F	"	
		0x3F	0x3C	"	
		0x3C	0x3F	"	
		0x43	0x3C	NA	
Check Status	**0xCF**	0xCF	0xF3	NA	
Enter bootloader mode	**0x41**	0x41	0xF3	NA	

In general, suggest that the delay following first byte of any command sequence is 10ms and the delay between subsequent byte transfers is 10us.

Command lists for other versions of firmware are available on request.

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com

5 OPC-N2 Factory settings

The OPC firmware retains the factory settings and calibrations.
These settings should not be modified as this will affect the OPC calibration and its accuracy.
If you wish to modify any of these settings, then contact Alphasense at (+44) 1376 556700.

The following parameters are factory set and stored in the firmware:

Bin boundaries The upper and lower particle size limits defining each of the 16 size bins. Note the lower boundary of bin 0 and the higher of bin 15 are fixed.

Bin particle volumes (um3) The volume ascribed to each particle in that bin in firmware.

Bin particle volumes by software (um3) The volume ascribed to each particle in that bin in software (parameter present to confirm firmware values, which should be the same).

Bin particle densities (g/ml) The density ascribed to each particle in that bin. The default setting is 1.65 g/ml for all bins.

Bin sample volume weightings Correction for size dependent sampling efficiency. Current settings are:

Bin	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Weighting	4.5	3.0	2.0	0.5	0.3	0.25	0.25	0.25	0.35	0.45	0.5	0.8	1.0	1.0	1.0	1.0

Gain scaling coefficient A global factor to normalise between units. Normally 1.0.

Laser digital pot setting A parameter to determine laser beam power.

Fan digital pot setting A parameter to determine fan speed.

NOTE: Changing either the fan speed or laser power will change calibration and the OPC-N2 will require recalibration. When the OPC-N2 is not sampling, both the laser and fan are switched automatically to low-power settings.

6 Revision Control

Version	Comment	Release Date	Released by
D	**First release for Firmware 18**	**February 2016**	**Mark Giles**
E	**Amended flow chart**	**March 2016**	**Mark Giles**

Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley. Essex.CM77 7AA. UK
Tel: +44 (0) 1376 556700 - Fax: +44 (0) 1376 335899
Email: sensors@alphasense.com - Web: www.alphasense.com