LogDator Communication Protocol

v. 3.1

Document Scope

The document describes the communication protocol used by Lindorm's SM3 instruments. The communication protocol can be used by system integrators to connect a SediMeter to a logger. This version differs from version 2.0 in that it introduces a new command for polling individual measurement values.

Document Version

Document version 3.1, dated 2019-08-33.

Supersedes "LogDator Communication Manual version 3.0", dated 2014-11-03.

Use and limitations

This device is intended only for scientific and professional use, whether in a laboratory or in nature under the water. It uses and may emit radio frequency energy, and it is not designed or tested with regard to radio interference. The user is responsible for mitigating any problems that may arise. The device is furthermore exempt from complying with the RoHS directive, and it is not lead free, traditional solder being used.

Copyright

Contents

Changes

Changes from Rev. 3.0 to 3.1

Command N has had its reply changed. Some instruments will still reply with zero data, but others may reply with data directly if addressed by their RS485 net address byte. If so, the data returned is the same as the instrument would otherwise return after a Command P. The purpose of this change is to enable faster turn-around time for measuring many times per second.

Changes from Rev. 2.0 to 3.0

One new command has been introduced: Q, Get Previous Single Measurement Value. The master sends this command with an argument that tells the slave which sensor result it is interested in (for instance, bottom level in the case of the SediMeter). The slave responds with the value it already has in memory from its last measurement (it doesn't perform a new measurement; if the master wants the value to be fresh it must first send Cmd N, Measure Now). This allows the slave to both do self-timed logging, and provide real-time data to a master, for increased redundancy.

Changes from Rev. 1.0 to 2.0

Several new commands and some changes have been introduced in order to make the LogDator able to act as a network Master logger, and so that sensors from other manufacturers can act as slaves on the network. Novelties include:

- a sleeping pill, which tells the slave(s) that they can power down and stop listening to traffic until a certain set time in the future. This saves a substantial amount of power. The sleeping pill is a change to the flags in cmd H, SetSettings.
- a GetDelay command (A), so the Master can find out how long time a slave needs from the MeasureNow (N) command to the data are ready.
- the GetNetList (G) and SetNetList (I) commands. They make it possible to transfer a list of instruments on the network between a computer and the LogDator. The list can be generated automatically in the LogDator (a roll call), and automatically or manually in the computer software.

Commands are also introduced for transferring instrument calibration information:

- the GetCalibration (C) command reads all the calibration data from the instrument, and the SetCalibration (E) command writes new data back to the instrument.

The calibration data is open-ended, meaning that other instrument manufacturers can use it for whatever data they require. Similarly, the GetPrevious (P) command is no longer specified to be formatted for LogDator data, but can contain any data from 1 to 255 words

long. What the master does with the data is beyond the scope of the communication protocol.

The final change is in the intellectual rights. Starting now a permission is granted for using this protocol in any device or software designed to interface with the LogDator, as long as no unapproved changes to the specification are made. A partial implementation of the protocol could thus be considered a copyright infringement.

Communication Protocol

Introduction

Although the protocol may work on many physical layers, it was designed for an RS-485 network. This communication protocol was originally developed for use by the LogDator, the controller of the SediMeter. It specifies the command language, but from the present revision it also allows for custom (undefined) data packets. It can thus be used to transfer data from any sensor to a LogDator working in Master mode, and the LogDator will store the data as-is in a separate file on a memory card. The user can then insert the card in a computer, and open the file using the intended software. If the data is ASCII formatted it can for instance be opened directly in a spreadsheet.

Physical Layer: RS-485

This standard is now defined in TIA-485-A. The maximal cable length according to specifications in the standard is 1200 m, and the maximum number of devices is 32. The limit for cable length is in the reflections, and the limit for number of devices is in the load.

However, the LogDator has an RS-485 chip that is slew rate limited so that the maximal baud rate is 250,000 instead of 1 million. This should increase the usable cable length. Furthermore, it has a chip with only 1/8th the nominal load, why in theory 256 devices can be on the same net (in reality 255 since there are only 255 addresses available and also the Master LogDator needs an address for identifying its data.)

The default baud rate in this specification is **9600,N,8,1** (9600 baud, No parity, 8 data bits, 1 stop bit), but it can be changed by command (the SM3 also supports 115,200 baud). The low speed eliminates the need for termination resistors except on very long cables, which decreases power demand (since RS-485 is biased, the termination resistors short-circuits the + and – via the biasing resistors, and this leak current can be very significant compared to the ultra-low power demand of the LogDator itself). Furthermore, there is a protocol feature that allows the cables to be powered down when not in use (putting the RS485 chip in sleep until the next measurement).

NetAddr, the RS485 ID

In RS-485 there must be an application level mechanism for addressing a specific slave. Each slave has an address (NetAddr; RS485 ID), which is one byte with a value from 01h to FFh (h means hexadecimal notation). Each communication from the master starts with the NetAddr byte to indicate the addressee. Each communication from a slave starts with its NetAddr to indicate the sender identity. The slave only listens to communication that starts with its own NetAddr, or with NetAddr = 00h. Only the master uses code 00h, and that is called a broadcast. The slave will respond only to messages addressed to its NetAddr, not to broadcasts.

Idle-Line Multiprocessor Format

In order to separate transmissions from multiple devices on the same net, each transmission starts with an address byte, the NetAddr. The idle-line format is used to separate transmissions from each other. If the line has been idle for 10 bits or more, any transmission must start by sending an address byte. Any device transmitting on the net must make sure to wait a minimum of 10 bits after the last transmission ended before starting to send. If they do not, their transmission will be considered part of the previous one, and ignored by all devices (since the actively listening device has received a byte count and only reads that many bytes).

Communication Sentence Structure

Each message consists of the following five parts:

Content	NetAddr	CheckSum	Command	NumWords	Data
Length in bytes	1	1	1	1	0, 2, 4, … 508, 510
Start byte position	0	1	2	3	4
Explanation	Either 00h for broadcast, or 01h…FFh (the RS-485 address of the slave; ignored in USB)	Two's complement of a sum without carry of all bytes in positions 2…n	Indicates the type of communication	The number of 2-byte words in the Data segment of the sentence	Either parameters to the slave, or data requested by the master

This basic sentence structure is used in both directions, as exemplified here.

From master to slave

NetAddr: Either 00h for broadcast, or a number from 01h to FFh to address a specific slave.
CheckSum: Two's complement of the sum of all the bytes to follow in the transmission.
Command: The instruction for the slave(s) to act upon.
Words: The number of 2-byte words of parameters being transmitted.
Data: The parameters for the command. Always an even number of bytes.
Example: "006E 0100"

From slave to master

NetAddr: A number from 01h to FFh identifying the transmitting slave.
CheckSum: Two's complement of the sum of all the bytes to follow in the transmission.
Command: The instruction from the master that the slave is responding to.
Words: The number of 2-byte words of data being transmitted.
Data: The data requested by the master. Always an even number of bytes.

About the CheckSum

To check for transmission errors a checksum is calculated. The receiver can start with the checksum value, and add all the following bytes to that (in 8-bit mode). If the result if zero (00h), the transmission is assumed to have been received correctly. The checksum is thus two's complement of the sum of the bytes without carry.

Commands

Conventions

The structure of each command sentence is described in a table, as in this example (the Set Clock imaginary command):

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	3Eh	62	>	Byte	Command: SetClk
3	01h	1		Byte	Words in data field
4	4F4Bh	20299	OK	Word	OK*

- Position: The position of the first transmitted byte in the serial transmission, starting at 0, which is always the NetAddr (00h for an RS-485 broadcast, 01h…FFh for addressing a specific LogDator). In USB this has no meaning so 00h can be used regardless of what the tables say.
- Hex Value: The hexadecimal value or value range for the field.
- Decimal value: The decimal value or value range for the field.
- Char(s): The ASCII character equivalent for human-readable parameters.
- Type: The data type, which can be Byte (8 bits), Word (16 bits), or Long (32 bits), and represent either characters or positive integers.
- Meaning: An explanation of what the parameter signifies.

The length of the transmission in bytes is always four (for the 4 values in the header) plus the length of the data field, which starts on position 4. The number of bytes in the data field is twice the numerical value of position 3. In the above example, the total transmission length is thus 4 + 2 * 1 = 6 bytes.

List of All Commands

The commands have been given codes that correspond to ASCII characters so that they can be referred to by a single letter. They are described on the following pages. The columns .VI and .s43 refer to subroutines that handle the code in the computer software and LogDator assembler, respectively. The USB and RS485 columns mark the minimum functionality in each mode. In reality most commands work in RS485.

Shorthand	Command Char	Hex	Full Command Name
GetDelay	A	41	Get Delay
GetMemInfo	B	42	Get Memory Information
GetCalibration	C	43	Get Instrument Data
Download	D	44	Download One Page of Memory
SetCalibration	E	45	Set Instrument Data
GetSettings	F	46	Get Clock, Start, Interval, Rate, Samples
GetNetList	G	47	Get RS485 Net List
SetSettings	H	48	Set Clock, Start, Interval, Rate, Samples
SetNetList	I	49	Set RS485 Net List
GetMode	J	4A	Get Mode & RS-485 baud rate
PacketData	K	4B	Packet of Data
SetMode	L	4C	Set Mode & RS-485 baud rate
MotorRun	M	4D	Motor Run
MeasureNow	N	4E	Measure Now
	O	4F	
GetPrevious	P	50	Get Previous Data Record
QueryData	Q	51	Query Previous Single Measurement Value
Err	R	52	Error, Repeat!
	S	53	
MarkRead	T	54	Mark As Read
	U	55	
Erase	V	56	Erase Internal Memory
SetWiper	W	57	SetWiper
GetNetAddr	X	58	Get RS-485 NetAddr
GetWiper	Y	59	GetWiper
SetNetAddr	Z	5A	Set RS-485 NetAddr

Memory Handling

The LogDator stores data to the internal memory unless a valid MMC card is present, in which case it uses that.

The LogDator keeps a counter of how many records there are in memory, and this NumRec counter can be retrieved using the GetMemInfo command. If the counter equals 0, the next record will also be written to page 0. There are 4096 pages in the internal flash, so the last record has number 4095. The counter is reset when an Erase command is set, after erasing all the pages that were in use. It is possible to download any page in random order, but the standard procedure is to start with 0 and end with NumRec-1.

The NumRec counter is stored in RAM why it is lost if VCC drops below 1.8 V. After a Reset the value is restored based on memory contents (bit 7 in byte 1 equals 0 if the page contains a record).

Get Delay, A

Purpose: Find out instrument information.

Type: To a single instrument.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	BFh	191		Byte	Checksum
2	41h	65	A	Byte	Command: GetDelay
3	00h	0		Byte	Words in data field

The slave will respond as follows.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	41h	65	A	Byte	Command: GetDelay
3	02h	2		Byte	Words in data field
4	00…FFh	0-255		Byte	secWait*
5	ASCII	ASCII letters	3	Char	File extension**

*How many seconds after receiving an N command until data will be ready.

**The file created on a memory card by a master logger for data from this slave will have the extension given by these three characters. They must thus be in the range permitted by DOS 8.3 filename conventions, i.e., A through Z, or a through z. The extension should be chosen by the instrument or sensor manufacturer to match the data format, as the LogDator in master logger mode simply writes whatever the slave transmits directly to memory (minus the 4 transmission header bytes, of course).

Get Memory Information, B

Purpose: To retrieve essential parameters for downloading data and managing the device memory.

Type: To a single slave.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning	Assem. Label
0	01…FFh	1-255		Byte	NetAddr	NetAddrIN
1	BEh	190		Byte	Checksum	ChkSumIN
2	42h	66	B	Byte	Command: GetMemInfo	UARTcmdIN
3	00h	0		Byte	Words in data field	wordsIN

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning	Assem. Label
0	01…FFh	1-255		Byte	NetAddr	NetAddrOUT
1	00…FFh	0-255		Byte	Checksum	ChkSumOUT

2	42h	66	B	Byte	Command: GetRecs	UARTcmdOUT
3	02h	2		Byte	Words in data field	wordsOUT
4	Ex: 1000h, 2000h	Ex: 4096, 8192		Word	Recrods of internal memory, M	MemSize
6	0000…1000h	0-4096		Word	Next Free Record, NumRec, N	WRP
7	0000…1000h	0-4096		Word	Next Un-Read Record, NewRec, U	RRP

A 2 MB internal memory can hold 4,096 data records, each occupying one page of 512 bytes. The number of records in memory equals N, and the free memory is the difference between M and N. The number of new records equals N minus U. Only data from the beginning to U may be erased (using command V). The new 4 MB memory can hold 8,192 pages, and with planned denser packing, it will be able to hold 16,384 records.

Get Calibration Values, C

Purpose: Find out instrument information.

Type: To a single instrument.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	BDh	189		Byte	Checksum
2	43h	67	C	Byte	Command: GetCalib
3	00h	0		Byte	Words in data field

The slave will respond as follows.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	43h	67	C	Byte	Command: GetCalib
3	14h...E0h	16...216		Byte	Words in data field
4	ASCII	ASCII	8	Char	Manufacturer name
12	ASCII	ASCII	8	Char	Model info*
20	ASCII	ASCII	8	Char	Serial nr*
28	00…FFh	0-255	0-480	Any	Calibration data**

*The meaning of the information in these fields is defined by the manufacturer. The only restriction is that it must be printable ASCII characters (padded with space, ASCII 20h). For SediMeters and LogDators the coding is given in *LogDator Tech Manual 2.0*.

**This is a variable size parameter. The byte count can be calculated from the Words byte. The only restriction is that it must be an even number of bytes. Refer to the specific instrument for the structure of this field.

An instrument manufacturer can use this command for getting necessary information before re-calibrating an instrument. As master logger the LogDator will not issue this command.

Download One Record of Memory, D

Purpose: To retrieve one record from the internal memory of the SediMeter or LogDator. Redefined "page" to "record" in version 3.0.

Type: To a single slave, or to a network master acting as a slave in relation to the PC.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning	Assem. Label
0	01…FFh	1-255		Byte	NetAddr	NetAddrIN
1	00…FFh	0-255		Byte	Checksum	ChkSumIN
2	44h	68	D	Byte	Command: Download	UARTcmdIN
3	01h	1		Byte	Words in data field	wordsIN
4	0000h… FFFFh	0-65535		Word	Record number to download. FFFFh means "download next unread record".	paramsIN

Use this command to request one record at a time.

From Slave (data content from byte 4 can vary)

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	44h	68	D	Byte	Command: Download
3	FFh	255		Byte	Words in data field
4	00-FFh	0-255		Byte	DataFlags*
5	00…3Bh	0-59		Byte	Second
6	00…3Bh	0-59		Byte	Minute
7	00…17h	0-23		Byte	Hour
8	01…1Fh	1-31		Byte	Day
9	01…0Ch	1-12		Byte	Month
10 (0Ah)	07D7h…	2007-		Word	Year
12 (0Ch)	0000…FFFFh	0…65535		Word	Temperature
14 (0Eh)	0000…FFFFh	0…65535		Word	Battery
16 (10h)	0000…FFFFh	0…65535		Word	Interval in 1/32768th seconds
18 (12h)	00…FFh	0..255		Byte	AI6 format ("exponent")
	41…5Ah	65..90	A..Z	Chars	AI6 unit
22 (16h)	00…FFh	0..255		Byte	AI7 format ("exponent")
	41…5Ah	65..90	A..Z	Chars	AI7 unit
26 (1Ah)	0000…FFFFh	0…65535		Word	SMData
170(AAh)	0000 0054h	84		Long	AIRows
174 (AEh)	0000 0002h	2		Long	AICols
178 (B2h)	0000…0FFFh	0…4095		Word	AIData

*See Flags

The data block (from byte 4 to the end) can have any content in this protocol. The example in the above table refers to the SediMeter and LogDator.

The record from the LogDator is of varying length depending on the number of burst samples (AIData).

Always read the values returned, even if they are indicated as constant here, since they may become variables in future releases.

Set Calibration Values, E

Purpose: Store new calibration parameters to an instrument.

Type: To a single instrument.

Note: Not supported by the LogDator since calibration is handled in software.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	45h	69	E	Byte	Command: SetCalib
3	00h	0		Byte	Words in data field
3	14h...E0h	16...216		Byte	Words in data field
4	ASCII	ASCII	8	Char	Manufacturer name
12	ASCII	ASCII	8	Char	Model name or Nr
20	ASCII	ASCII	8	Char	Serial Nr
28	00…FFh	0-255	0-480	Any	Calibration data*

*This is a variable size parameter. Refer to the specific instrument for the structure of this field.

An instrument manufacturer can use this command for re-calibrating an instrument. The OEM can determine whether to make manufacturer name, model name, and serial number re-programmable, to use them for verification, or to have the slave ignore those parameters. As master logger the LogDator will not issue this command.

The slave will respond as follows.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	BBh	187		Byte	Checksum
2	45h	69	E	Byte	Command: SetCalib
3	00h	0		Byte	Words in data field

Get Settings, F

Purpose: Get the date, time, and logging settings currently in a LogDator, SediMeter, or other slave.

Type: To a single slave.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning	Assem. Label
0	01…FFh	1-255		Byte	NetAddr	NetAddrIN
1	BAh	186		Byte	Checksum	ChkSumIN
2	46h	60	F	Byte	Command: GetSettings	UARTcmdIN
3	00h	0		Byte	Words in data field	wordsIN

The recommended usage is to send this command, edit the setting or settings that need editing, and then use the SetSettings command to send them back. This command can also be used after a SetSettings to make sure that everything was set correctly.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning	Assem. Label
0	01…FFh	1-255		Byte	NetAddr	NetAddrOUT
1	00…FFh	0-255		Byte	Checksum	ChkSumOUT
2	46h	60	F	Byte	Command: GetSettings	UARTcmdOUT
3	09h	9		Byte	Words in data field	wordsOUT
4	00…01h	0-1		Byte	F_Flags*	optFlags
5	00…3Bh	0-59		Byte	Clock: Second	DEC_second
6	00…3Bh	0-59		Byte	Clock: Minute	DEC_minute
7	00…17h	0-23		Byte	Clock: Hour	DEC_hour
8	01…1Fh	1-31		Byte	Clock: Day	DEC_day
9	01…0Ch	1-12		Byte	Clock: Month	DEC_month
10 (0Ah)	07D7h…	2007-		Word	Clock: Year	DEC_year
12 (0Ch)	00…3Bh	0-59		Byte	Start: nextSecond	nextSecond
13 (0Dh)	00…3Bh	0-59		Byte	Start: nextMinute	nextMinute
14 (0Eh)	00…17h	0-23		Byte	Start: nextHour	nextHour
15 (0Fh)	00…3Bh	0-59		Byte	Interval: intSecond	intSecond
16 (10h)	00…3Bh	0-59		Byte	Interval: intMinute	intMinute
17 (11h)	00…17h	0-23		Byte	Interval: intHour	intHour
18 (12h)	0000…FFFFh	0-65536		Word	Sampling rate**	analogInt
20 (14h)	00…7Ch	0-84		Byte	Number of samples	samples
21 (15h)	00…63h	0-99		Byte	Clock: Fractional seconds***	N/A, created from TBR

*Flags: Bit 0, when set, indicates that all times are in UTC, otherwise they are in local time (the user must keep track of changes in time zone or daylight savings time/seasonal time changes, if not using UTC). For the remaining bits, see H_flags for meaning.

**The optional analog channel sampling rate within a measurement is sent as a 16-bit word where each bit corresponds to clock-cycles of 1/32768th second. E.g., for 0.5 s intervals send 16384, equal to 4000h. In SM2 the default is 23406, which gives a sampling frequency of

1.4000 Hz (this makes it possible to sample with a continuous rate if the measurement interval is 1 minute, which is the default, by taking 84 samples per 60 seconds [NB: This actually depends on the sensor being used since an extra delay is necessary in some cases]). The maximal interval is 2 s.

***In 1/256th seconds (8-bit value).

Get RS-485 NetList, G

Purpose: Get the NetList from a LogDator that works as a master on the network

Type: To a single slave (i.e., the master when the PC is disconnected)

From Master (i.e., PC)

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	B9h	185		Byte	Checksum
2	47h	71	G	Byte	Command: SetNetAddr
3	00h	0		Byte	Words in data field

The slave will respond as follows.

From Slave (i.e., LogDator configured as network master)

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	170		Byte	Checksum
2	47h	71	G	Byte	Command: GetNetList
3	10h	16		Byte	Words in data field
4	0000-FFFFh	0-65535		Word	Flags for NetAddr 0-15
6	0000-FFFFh	0-65535		Word	Flags for NetAddr 16-31
8	0000-FFFFh	0-65535		Word	Flags for NetAddr 32-47
10	0000-FFFFh	0-65535		Word	Flags for NetAddr 48-63
12	0000-FFFFh	0-65535		Word	Flags for NetAddr 64-79
14	0000-FFFFh	0-65535		Word	Flags for NetAddr 80-95
16	0000-FFFFh	0-65535		Word	Flags for NetAddr 96-111
18	0000-FFFFh	0-65535		Word	Flags for NetAddr 112-127
20	0000-FFFFh	0-65535		Word	Flags for NetAddr 128-143
22	0000-FFFFh	0-65535		Word	Flags for NetAddr 144-159
24	0000-FFFFh	0-65535		Word	Flags for NetAddr 160-175
26	0000-FFFFh	0-65535		Word	Flags for NetAddr 176-191
28	0000-FFFFh	0-65535		Word	Flags for NetAddr 192-207
30	0000-FFFFh	0-65535		Word	Flags for NetAddr 208-223
32	0000-FFFFh	0-65535		Word	Flags for NetAddr 224-239
34	0000-FFFFh	0-65535		Word	Flags for NetAddr 240-255

The command can be used to verify receipt of a SetNetList command, or to get a NetList that the LogDator has built using a built-in Roll Call function.

Set Settings, H

Purpose: Set the date, time, and logging settings in the LogDator.

Type: Broadcast or to single slave.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	00…FFh	0-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	48h	72	H	Byte	Command: SetSettings
3	09h	9		Byte	Words in data field
4	00…01h	0-1		Byte	H_Flags* (optFlags in assem.)
5	00…3Bh	0-59		Byte	Clock: Second
6	00…3Bh	0-59		Byte	Clock: Minute
7	00…17h	0-23		Byte	Clock: Hour
8	01…1Fh	1-31		Byte	Clock: Day
9	01…0Ch	1-12		Byte	Clock: Month
10 (0Ah)	07D7h…	2007-		Word	Clock: Year
12 (0Ch)	00…3Bh	0-59		Byte	Start: nextSecond
13 (0Dh)	00…3Bh	0-59		Byte	Start: nextMinute
14 (0Eh)	00…17h	0-23		Byte	Start: nextHour
15 (0Fh)	00…3Bh	0-59		Byte	Interval: intSecond
16 (10h)	00…3Bh	0-59		Byte	Interval: intMinute
17 (11h)	00…17h	0-23		Byte	Interval: intHour
18 (12h)	0000…FFFFh	0-65536		Word	Sampling rate**
20 (14h)	00…7Ch	0-84		Byte	Number of samples
21 (15h)	00h	0		Byte	Reserved

*The H_Flags have the following meaning: NB. Only bit 0 is used in ver. 1.4 of the assembler code.

Bit	When Set = 1	When Cleared = 0	From ver.
0	UTC time	Local Time	1.0
1	Set clock, next, and interval	~~Leave Clock, Start, Interval as is~~	— (def=1)
2	Set sampling Rate (analog)	Leave Rate as is	2.0
3	Set sampling Count (analog)	Leave Count as is	2.0
4		Reserved, use 0	
5		Reserved, use 0	
6	Turn RS485 off	Do not turn RS485 off	2.0
7	Measure at wakeup in Slave mode	Do not measure	2.0

Bit 0 indicates that the clock is being set in UTC as opposed to the local time zone. Setting it in UTC is recommended since it eliminates potential errors caused by varying time zones and seasonal time. (A corresponding flag is set in the data records.)

When the SediMeter receives this command it resets its real-time counter. For sub-second synchronization the command should be sent at or slightly before the top of the second. [Note: The transmission latency in seconds can be estimated by dividing 220—the number of bits in the transmission—with the baud rate, since baud rate in this case equals bits per second. It is ca 23 ms at 9600

baud.] When a master LogDator sends this to a slave LogDator the slave's clock will thus be 0 to 1 s late compared to the master. This means that no extra wait in byte 21 is necessary (but 1 s is still prudent).

This command can be broadcast to the entire network to synchronize the clocks. Send it at an integer second, or so many milliseconds earlier as it takes for the transmission to arrive.

The slaves will not respond to a broadcast, so to check that the command was successful the master can send the GetSettings command to each of the slaves.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	B8h	184		Byte	Checksum
2	48h	72	H	Byte	Command: SetSettings
3	00h	0		Byte	Words in data field

If the slave was unable to understand the command or parameters it will instead send the Error (R) command. To make sure the parameters are set a GetSettings (F) command can be sent after this.

Set RS-485 NetList, I

Purpose: Set the NetList in a LogDator that will work as a master on the network

Type: To a single slave (i.e., the master when the PC is disconnected)

From Master (i.e., PC)

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	49h	73	I	Byte	Command: SetNetList
3	10h	16		Byte	Words in data field
4	0000-FFFFh	0-65535		Word	Flags for NetAddr 0-15
6	0000-FFFFh	0-65535		Word	Flags for NetAddr 16-31
8	0000-FFFFh	0-65535		Word	Flags for NetAddr 32-47
10	0000-FFFFh	0-65535		Word	Flags for NetAddr 48-63
12	0000-FFFFh	0-65535		Word	Flags for NetAddr 64-79
14	0000-FFFFh	0-65535		Word	Flags for NetAddr 80-95
16	0000-FFFFh	0-65535		Word	Flags for NetAddr 96-111
18	0000-FFFFh	0-65535		Word	Flags for NetAddr 112-127
20	0000-FFFFh	0-65535		Word	Flags for NetAddr 128-143
22	0000-FFFFh	0-65535		Word	Flags for NetAddr 144-159
24	0000-FFFFh	0-65535		Word	Flags for NetAddr 160-175
26	0000-FFFFh	0-65535		Word	Flags for NetAddr 176-191
28	0000-FFFFh	0-65535		Word	Flags for NetAddr 192-207
30	0000-FFFFh	0-65535		Word	Flags for NetAddr 208-223
32	0000-FFFFh	0-65535		Word	Flags for NetAddr 224-239
34	0000-FFFFh	0-65535		Word	Flags for NetAddr 240-255

The data field contains 256 bits = 32 bytes = 16 words, where each bit when set signifies that the corresponding NetAddr is present on the network and should be polled for data. Bit 0 of the word in position 4 corresponds to NetAddr 0, and so on.

The slave will respond as follows.

From Slave (i.e., LogDator configured as network master)

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	B7h	183		Byte	Checksum
2	49h	71	I	Byte	Command: SetNetAddr
3	00h	0		Byte	Words in data field

To verify receipt use the preceding command.

Get Mode, J

Purpose: Find out instrument mode and RS-485 baud rate.

Type: To a single instrument.

Note: As regards the LogDator, this command can be used over USB as a way to find out the necessary parameters to establish an RS-485 communication. Modes number 3, 4 and 5 are listening to RS485 initially (until receiving a sleeping pill). Modes 0 and 1 do not listen to RS485 traffic.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	B6h	182		Byte	Checksum
2	4Ah	74	J	Byte	Command: GetMode
3	00h	0		Byte	Words in data field

The slave will respond as follows.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning	SM2v1	SM2v2	SM3
0	01…FFh	1-255		Byte	NetAddr			
1	00…FFh	0-255		Byte	Checksum			
2	4Ah	74	J	Byte	Command: GetMode			
3	01h	1		Byte	Words in data field			
4	00…02h	0-2		Byte	ModeNr*	0,1,2	0,1,2,3,4	0,1
5	00…05h	0-5		Byte	RS485baud rate**	1	1	1,4

*The possible values are: 0 = Sleep, 1 = Logger, 2 = Slave, 3 = Master, 4 = Adapter.

**The baud rates are: 0 for 4800, 1 for 9600, 2 for 28800, 3 for 56000, 4 bfor 115200, 5 for 230400, and 6 for 921600 baud.

Cmd K (not implemented)

Purpose: TBD, can be used to request a part of a photo,

Type: TBD

Note: This was proposed as Packet of Data but it was redundant to implement that command since the new radios handled the packetization automatically, thus it could instead be used for transmitting photos in pieces, for instance. The text below is from the old proposal, unedited.

From Slave (in reply to Cmd D or Cmd P)

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	4Bh	75	K	Byte	Command: PacketData
3	32h	50		Byte	Words in data field
4	50h	80	P	Byte	Received Command
5	21h	33		Byte	Remaining words
6	00…FFh	0-255		Any	94 bytes of data

The Slave copies the data to the transmit buffer area, sends the first packet, and then prepares for sending the next packet when a Cmd K arrives. If a Master would send a Cmd K without first receiving a Cmd K, the result would be unpredictable.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	B5h	181		Byte	Checksum
2	4Bh	75	K	Byte	Command: PacketData
3	00h	0		Byte	Words in data field

The command from the Master instructs the Slave to send the next packet in the sequence.

From Slave (in reply to Cmd K)

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	4Bh	75	K	Byte	Command: PacketData
3	22h	34		Byte	Words in data field
4	50h	80	P	Byte	Received Command
5	0h	0		Byte	Remaining words
6	00…FFh	0-255		Any	66 bytes of data

Note that the header is 4 bytes, so the “data field” starts with position 4. However, the first two bytes are arguments to the K command, so the “data” do not start until position 6. This explains why the Slave first said that there were 33 words of data left to send, while the

data field in the second packet contains 34 words. The "data field" refers to the communication protocol, the "data" to the measurement data.

The Master can determine that the transfer is complete when Remaining words = 0.

Set Mode, L

Purpose: Change operation mode and or RS-485 baud rate.

Type: Broadcast or to a single slave.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	00…FFh	0-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	4Ch	76	L	Byte	Command: SetMode
3	01h	1		Byte	Words in data field
4	00…02h	0-2		Byte	ModeNr*
5	00…05h	0-5		Byte	RS485baud rate**

*The possible values are: 0 = Sleep, 1 = Logger, 2 = Slave, 3 = Master, 4 = Adapter

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	4Ch	76	L	Byte	Command: SetMode
3	00h	0		Byte	Words in data field
4	00…02h	0-2		Byte	ModeNr*
5	00…05h	0-5		Byte	RS485baud rate**

If the slave was unable to implement the change it should respond with an R command instead.

A proposed change is that it instead responds with the ModeNr and RS485baudrate that it is going to switch to after sending the reply. The master can then directly take those values and switch to them, whether the original or the new ones.

Motor Run, M

Purpose: Run the cleaner motor a predetermined length of time so that the pulley can be lined up with the access hole.

Type: To a single slave (broadcast might work but will not be useful).

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	00…FFh	0-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	4Dh	77	M	Byte	Command: MotorRun
3	01h	1		Byte	Words in data field
4	00…01h	0-1		Byte	DirectionUp*

5	00…04h	0-4		Byte	Duration**

* Only bit 0 is used, as a boolean. The possible values are: 0h = down, 1h = up.

** The possible values are: 0 = 8 ms, 1 = 16 ms, 2 = 64 ms, 3 = 250 ms, 4 = 1 s.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	B3h	179		Byte	Checksum
2	4Dh	77	M	Byte	Command: MotorRun
3	00h	0		Byte	Words in data field

Measure Now, N

Purpose: Trigger an immediate measurement. When ready the data will be available for download using the command GetPrevious (P).

Type: Broadcast or to single slave.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	00…FFh	0-255		Byte	NetAddr
1	B2h	178		Byte	Checksum
2	4Eh	78	N	Byte	Command: MeasureNow
3	00h	0		Byte	Words in data field

This command can be broadcast to trigger a synchronous measurement over an entire RS-485 network. In that case the slaves will carry out a measurement, but they will not confirm having received this command.

Use the GetPrevious (P) command to request the data from one instrument at a time, after waiting for an appropriate amount of time (see the GetDelay command).

From Slave

Alternative 1

This is the reply from most instruments, and certainly all before 2019:

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	B2h	178		Byte	Checksum
2	4Eh	78	N	Byte	Command: MeasureNow
3	00h	0		Byte	Words in data field

Alternative 2

This reply is identical to the reply from the Cmd-P (see below), except that the command byte is 4Eh rather than 50h. This reply is sent from SediMeter SM3 serial number 0107 and

onwards, SM4, and may be implemented in other instruments as well. Callers should be able to handle both alternatives (if a reply comes in, accept it; if not, issue Cmd-P).

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	4Eh	78	N	Byte	Command: MeasureNow
3	1h…FFh	1-255		Byte	Words in data field
4	any	any	any	any	Data, any content

In the general definition of this command, the data portion can have any content as long as it is an even number of bytes, and as long as it is not more than 510 bytes long.

Get Previous Measurement Complete Data Record, P

Purpose: Request the buffered last complete measurement data record.

Type: To a single slave.

Note: Wait until the measurement is finished after sending N before sending P (see the GetDelay command).

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	B0h	176		Byte	Checksum
2	50h	80	P	Byte	Command: GetPrev
3	00h	0		Byte	Words in data field

Use this command to request the data from one instrument at a time after sending the Measure Now command (N), and waiting an appropriate amount of time. If a measurement is not requested in time using this command, it will get overwritten in the case that another Measure Now (N) command was sent later. Use the time of the measurement to check which data record it is that was retrieved.

From Slave

General

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	50h	80	P	Byte	Command: GetAll
3	1h…FFh	1-255		Byte	Words in data field
4	any	any	any	any	Data, any content

In the general definition of this command, the data portion can have any content as long as it is an even number of bytes, and as long as it is not more than 510 bytes long. A LogDator in master mode that receives this data will write it as received to a file.

In LogDator

This is the data structure of the LogDator and SediMeter rev. 2. As noted, other sensors may use a different data structure. However, if they use the structure below they can transmit temperature plus 2 analog sensors and have the data available in the SediMeter ver 2 software.

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	50h	80	P	Byte	Command: GetAll
3	59h…FFh	89-255		Byte	Words in data field
4	00-FFh	0-255		Byte	DataFlags*
5	00…3Bh	0-59		Byte	Second
6	00…3Bh	0-59		Byte	Minute
7	00…17h	0-23		Byte	Hour
8	01…1Fh	1-31		Byte	Day
9	01…0Ch	1-12		Byte	Month
10 (0Ah)	07D7h…	2007-		Word	Year
12 (0Ch)	0000…FFFFh	0…65535		Word	Temperature
14 (0Eh)	0000…FFFFh	0…65535		Word	Battery
16 (10h)	5B6Eh (def.)	23406 (def.)		Word	Interval in 1/32768th seconds
18 (12h)	00…FFh	0..255		Byte	AI6 format (“exponent”)
19 (13h)	41…5Ah	65..90	3	Chars	AI6 unit (space padded, e.g. “hPa”)
22 (16h)	00…FFh	0..255		Byte	AI7 format (“exponent”)
23 (17h)	41…5Ah	65..90	3	Chars	AI7 unit (space padded, e.g. “lx “)
26 (1Ah)	0000…FFFFh	0…65535		Word	SMData
170(AAh)	0000 0000… 0000 0054h	0-84		Long	AIRows
174 (AEh)	0000 0002h	2		Long	AICols
178 (B2h)	0000…0FFFh	0…4095		Word	AIData

*These Flags are the same as used for data stored on Flash memory. Bit 7 has no significance and is always 0 (for logged data bit 7 means memory checksum error when set).

Query Previous Measurement Part of Record, Q

Purpose: Request the buffered last data from an individual sensor, or part of the result so that the packet size is within limits for the medium used.

Type: To a single slave.

Note: Wait until the measurement is finished after sending N before sending P (see the GetDelay command), or wait until a self-timed logging measurement has finished.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr

1	B0h	176		Byte	Checksum
2	51h	81	Q	Byte	Command: QueryData
3	01h	1		Byte	Words in data field
4	See table			Byte	Code for queried data
5	00h	0		Byte	Index if more than one sensors

Use this command to request a specific data from a specific instrument. The index is in default 0, but if there are more than one sensor of the same type, then an index from 1 to 255 can be used to identify which one of them to use. This is an unsigned byte.

The following codes are defined and can be requested from SM3. The value is a 16-bit word.

Hex Value	Decimal Value	Meaning	Details	Note
00h	0	Level	Bottom level (cm/128)	Divide reply by 128 to get cm
01h	1	Turbidity	Turbidity (FBU)	Integer
02h	2	tUon	Value for calibration	16-bit raw value
03h	3	tUoff	Value for calibration	16-bit raw value

*If Index=0 then the dedicated turbidity OBS sensor, #37, is used. If 1≤Index≤36 then the OBS detector with that number is used (#1 is at 0 cm, #2 at 1 cm, etc). In firmware rev. 1.0 only index=0 is supported.

From Slave

General

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	51h	81	Q	Byte	Command: QueryData
3	05h	5		Byte	Words in data field
4	See table			Byte	Code for queried data
5	00…3Bh	0-59		Byte	Second of the measurement
6	00…3Bh	0-59		Byte	Minute of the measurement
7	00…17h	0-23		Byte	Hour
8	01…1Fh	1-31		Byte	Day
9	01…0Ch	1-12		Byte	Month
10	07D7h…	2007-		Word	Year
12	0000…FFFFh	0…65535		Word	Requested Data

This will return one word of data in the same format as in the complete data record, and in the same units. The time stamp reflects the time the measurement was taken by the instrument (the instrument will always return the latest data available).

Error, R

Purpose: Response to any command to which the instrument is unable to comply. If bit 2 is set the appropriate response on behalf of the master is to resend the command.

Type: From slave to master. Note that this is a unique command.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning

0	01…FFh	0-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	52h	82	R	Byte	Command: Error
3	01h	1		Byte	Words in data field
4	00…FFh	0-255		Byte	The command byte, as received
5	00…FFh	0-255		Byte	ErrorFlags*

*ErrorFlags: Bit 0 = unknown command, bit 1 = bad parameters, bit 2 = checksum error, bits 3…7 = reserved.

NB: The R is checked for in GetReply.vi, but as of yet the data bytes are not decoded (although they are returned as Data, so the caller can use them, but it is better to add an error handler within GetReply).

Mark As Read, T

Purpose: Marks all records as read without downloading or erasing memory.

Type: Broadcast or to single slave.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	00…FFh	0-255		Byte	NetAddr
1	ACh	172		Byte	Checksum
2	54h	84	T	Byte	Command: MarkRead
3	00h	0		Byte	Words in data field

This command marks all records as read by setting the Read Record Pointer equal to the Write Record Pointer. It is useful as a way to discard data collected, e.g., during tests or setup procedures, without having to download them.

This command can be safely broadcast over an RS-485 network.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	54h	84	T	Byte	Command: MarkRead
3	00h	0		Byte	Words in data field

No response is sent if the command is addressed to NetAddr 00h over an RS-485 network, but a response is always sent if USB is used regardless of NetAddr (since that value is ignored by the LogDator).

Erase Internal Memory, V

Purpose: To clear the internal memory of the LogDator from previously recorded data.

Type: To a single slave.

Note: The data will be permanently deleted. In standard operation it is not necessary or recommended to erase the memory using this command. Using the standard round-robin routines prolongs the lifespan of the memory. This command is intended for, e.g., clearing the memory before transferring the instrument to a new project.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	AAh	170		Byte	Checksum
2	56h	86	V	Byte	Command: Erase
3	00h	0		Byte	Words in data field

This command causes the LogDator to erase all previously used memory locations. It will not erase memory locations that are marked as un-read. The data records must be read first (using the Download, D, command) before the LogDator accepts a command to erase them. Alternatively, the Mark As Read (T) command can be used first.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	56h	86	V	Byte	Command: Erase
3	01h	1		Byte	Words in data field
4	00…03h	0-3		Byte	Memory Flags*
5	00h	0		Byte	Reserved

*Bit 0 gets set when there are records in memory that have not yet been read. Remaining bits are zero (0).

This confirmation reply will be sent once the erase has been successfully completed, or abandoned. If the flag byte equals zero the operation was successful.

Set Wiper, W

Purpose: Set the net address of a single slave connected to the master.

Type: Broadcast (therefore *only one slave must be connected* if on RS-485).

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	00h	0		Byte	NetAddr, zero for broadcast
1	00…FFh	0-255		Byte	Checksum
2	57h	87	W	Byte	Command: SetWiper
3	03h	3		Byte	Words in data field
4	00…FFh	1-255		Word	Wipe Interval
6	00h	0		Word	Next Wiping
8				Byte	Flags, bit 3…7 of moreFlags
9				Byte	Reserved

The slave will respond as follows, using its newly assigned Net Address.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	A9h	169		Byte	Checksum
2	57h	87	W	Byte	Command: SetWiper
3	00h	0		Byte	Words in data field

The NetAddr from the slave should match the New NetAddr sent by the master.

Get RS-485 NetAddr, X

Purpose: Find out the net address of a single instrument, or to poll an entire network to see which network addresses are represented.

Type: Broadcast or to single slave.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	00h	0		Byte	NetAddr, zero for broadcast
1	A8h	168		Byte	Checksum
2	58h	88	X	Byte	Command: GetNetAddr
3	00h	0		Byte	Words in data field

Each instrument that receives this command will respond at the same time.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	A8h	168		Byte	Checksum
2	58h	88	X	Byte	Command: GetNetAddr
3	00h	0		Byte	Words in data field

An alternative method to find the NetAddr is to send any command over USB, since the instrument will always start a reply with its RS-485 network address.

The LogDator in Master mode uses the GetDelay command instead. The X command thus has no real value and may be eliminated or re-defined in the future, so it is not recommended to implement in any new code. Use cmd A instead.

Get Wiper, Y

Purpose: Find out the net address of a single instrument, or to poll an entire network to see which network addresses are represented.

Type: Broadcast or to single slave.

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	00h	0		Byte	NetAddr, zero for broadcast
1	A7h	167		Byte	Checksum

2	59h	89	Y	Byte	Command: GetWiper
3	00h	0		Byte	Words in data field

Each instrument that receives this command will respond at the same time.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	00…FFh	0-255		Byte	Checksum
2	59h	89	Y	Byte	Command: GetWiper
3	00h	0		Byte	Words in data field
4	00…FFh	1-255		Word	Wipe Interval
6	00h	0		Word	Next Wiping
8				Byte	Flags, bit 3…7 of moreFlags
9				Byte	Reserved

An alternative method to find the NetAddr is to send any command over USB, since the instrument will always start a reply with its RS-485 network address.

The LogDator in Master mode uses the GetDelay command instead. The X command thus has no real value and may be eliminated or re-defined in the future, so it is not recommended to implement in any new code. Use cmd A instead.

Set RS-485 NetAddr, Z

Purpose: Set the net address of a single slave connected to the master.

Type: Broadcast (therefore *only one slave must be connected* if on RS-485).

From Master

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	00h	0		Byte	NetAddr, zero for broadcast
1	00…FFh	0-255		Byte	Checksum
2	5Ah	90	Z	Byte	Command: SetNetAddr
3	01h	1		Byte	Words in data field
4	01…FFh	1-255		Byte	New NetAddr
5	00h	0		Byte	Reserved

The slave will respond as follows, using its newly assigned Net Address.

From Slave

Position	Hex Value	Decimal Value	Char(s)	Type	Meaning
0	01…FFh	1-255		Byte	NetAddr
1	A6h	166		Byte	Checksum
2	5Ah	90	Z	Byte	Command: SetNetAddr
3	00h	0		Byte	Words in data field

The NetAddr from the slave should match the New NetAddr sent by the master.