



Data Packets

A full communication packet is defined as a contiguous string of bytes starting with a **Start Word** and terminated by a **Stop Word**.

Start Word

Each packet is started with **Start Hi , Start Lo** (0x11 , 0x55)

Stop Word

Each packet is terminated with **Stop Hi , Stop Lo** (0x13 , 0x55)

Byte Stuffing

Byte stuffing is used to ensure that **Start Words** and **Stop Words** do not occur within the body of the communication string.

If a value equal to **Start Hi** or **Stop Hi** occurs anywhere in the packet **Data Body** then the transmitting device will insert (stuff) a **Stuff Byte** (0xAA) in the packet immediately after the **Start Hi** or **Start Lo** byte.

The receiving device will remove the **Stuff Bytes** from the packet before processing.

Timeout

Bytes should normally be transmitted with minimum time between characters. A receiving device will set a timeout value, which will be used to detect an unrecoverable break in a communication packet.

The value of the timeout will be determined by the hardware topology used to carry the communication packets

Date/Time Format

All date/time values read/written from/to the logger are formatted as a 32 bit unsigned integer. This number represents the number of seconds elapsed since 01/01/1970.

The number 1 represents 01/01/1970 at 00:00:01

The largest 32 bit number (

Header

All **commands** and **replies** have an associated header immediately following the **Start Word**. All headers have the same length and format as:

Packet Offset	Bytes	Notes
0	Intended Receivers ID	Note 1
1	Transmitting ID	Note 1
2	Function Type	Note 2
3	Number of bytes in main body of packet (N)	Note 3
4	NULL	Note 4

Notes.

1. Valid remote unit addresses are 1-200. This is the full range allowed by the generic protocol but may be restricted within a particular product family. A value of 255 is used for the network host (normally a PC). As all commands are from/to the Host then bytes 2-3 can never be equal to a **Start Word** or a **Stop Word**.
2. The Function Type defines the type of request/reply as one of a valid number of pre-defined functions. No function type exists identified by any byte found in a **Start Word** or a **Stop Word**.
3. The number of bytes reported does not include the **Start Word** or **Stop Word** or the number of bytes in the header.
4. A Null Byte (0) is added to ensure a **Start Word** or a **Stop Word** never occurs in the packet as a result of a **Start Hi** or **Stop Low** value in byte 5.

Packet Data Body (optional)

The Packet Data Body format is variable dependant on the Function type. Some functions may not require a Packet Data Body in which case N=0.

Checksum

All **commands** and **replies** have an associated CRC Checksum immediately following the Data Body. A receiving device should calculate a checksum locally and compare it with the value in the packet. This should be used to determine if the packet has been transported over the transmission medium free of errors. All CRCs have the same length and format as:

Packet Offset	Bytes	Notes
N + 5	CRC High Byte	Note 1
N + 6	<i>Null</i>	Note 2
N + 7	CRC Low Byte	Note 1

Notes.

1. The CRC is calculated on all bytes of the **Header** and **Data Body** combined.
2. A Null Byte (0) is used to ensure CRC-Hi, CRC_Lo does not produce a **Start Word** or a **Stop Word**

Function 1 Ping

This function is used by the host to detect the presence of a logger device, with a specific address, on the serial network.

Host Transmit Command Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0x01	To Logger ID=1
1	Transmitting ID	0xFF	From Host
2	Function Type	0x01	Function = Ping
3	No of bytes in main body of packet (N)	0	No Data Body Required
4	Null (0)	0x00	Null

Packet Data Body (host)

This function does not require a host data body.

Remote Device Reply Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0xFF	Reply to Host
1	Transmitting ID	0x01	Reply from Logger ID=1
2	Function Type	0x01	Function = Ping
3	No of bytes in main body of packet (N)	0	No Data Body Required
4	Null (0)	0x00	Null

Packet Data Body (remote)

This function does not require a remote data body.

Function 2 Read Logging Information Table

This function is used by the host to read the status and setup of an individual logger.

Host Transmit Command Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0x01	To Logger ID=1
1	Transmitting ID	0xFF	From Host
2	Function Type	0x02	Function = Read Logging Info
3	No of bytes in main body of packet (N)	0	No Data Body Required
4	Null (0)	0x00	Null

Packet Data Body (host)

This function does not require a host data body.

Remote Device Reply Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0xFF	Reply to Host
1	Transmitting ID	0x01	Reply from Logger ID=1
2	Function Type	0x02	Function = Read Logging Info
3	No of bytes in main body of packet (N)	0x13	Size of logger info table
4	Null (0)	0x00	Null

Packet Data Body (remote)

Bytes	Description
Logger Type	Type of logger (10 = Pulse Logger PL8)
Run Status	0=Stopped, 1=Logging, 2=Awaiting Delayed Start, 3=Paused
Logging Mode	1=Continuous, 2=Single Log
Period (Hi)	Logging Period (in seconds)
Period (Lo)	
Logged Periods (Hi)	Number of logged periods saved in current session
Logged Periods (Lo)	
Memory Size (Hi)	Memory Capacity. (Total number of logged periods)
Memory Size (Lo)	
Logger Issue	Logger Software Issue (e.g. 1)
Logger Sub Issue	Logger Software Sub Issue (e.g. .03)
Date/Time (Hi)	Logger current Date/Time
Date/Time	
Date/Time	
Date/Time (Lo)	
Earliest Period (Hi)	Date/Time of earliest logged period
Earliest Period	
Earliest Period	
Earliest Period (Lo)	

Note: The size of the data body may be increased by the addition of stuff bytes.

Function 3 Start New Logging Session

This function is sent by the host to start a fresh logging session at a preset time.

Host Transmit Command Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0x01	To Logger ID=1
1	Transmitting ID	0xFF	From Host
2	Function Type	0x03	Function = Start New Log session
3	No of bytes in main body of packet (N)	0x08	Data Body length in bytes
4	Null (0)	0x00	Null

Packet Data Body (host)

Bytes	Description
Logging Mode	1=Log Continuously 2=Single Log
Immediate/Delayed Start	0=Start Log Immediately, 1=Use Delayed Time
Period (Hi)	Logging Period (in seconds)
Period (Lo)	
Delayed Start Date/Time (Hi)	Date/Time for delayed log (Only used if Delayed Start Selected)
Delayed Start Date/Time	
Delayed Start Date/Time	
Delayed Start Date/Time (Lo)	

Note: The size of the data body may be increased by the addition of stuff bytes.

Remote Device Reply Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0xFF	Reply to Host
1	Transmitting ID	0x01	Reply from Logger ID=1
2	Function Type	0x03	Function = Start New Log session
3	No of bytes in main body of packet (N)	0x0	No Data Body Required
4	Null (0)	0x00	Null

Packet Data Body (remote)

This function does not require a remote data body.

NOTE:

Previously logged data is lost when this command is executed. This data is erased and may not be recovered. It is recommended that logger data is downloaded before this command is used.

Function 4 Set Logger Clock

This function is sent by the host to set a new time for the logger RTC.

Host Transmit Command Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0x01	To Logger ID=1
1	Transmitting ID	0xFF	From Host
2	Function Type	0x04	Function = Set Logger Clock
3	No of bytes in main body of packet (N)	0x04	Data Body length in bytes
4	Null (0)	0x00	Null

Packet Data Body (host)

Bytes	Description
Logger Date/Time (Hi)	New date/time setting for logger
Logger Date/Time	
Logger Date/Time	
Logger Date/Time (Lo)	

Note: The size of the data body may be increased by the addition of stuff bytes.

Remote Device Reply Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0xFF	Reply to Host
1	Transmitting ID	0x01	Reply from Logger ID=1
2	Function Type	0x04	Function = Set Logger Clock
3	No of bytes in main body of packet (N)	0x0	No Data Body Required
4	Null (0)	0x00	Null

Packet Data Body (remote)

This function does not require a remote data body.

NOTE:

Previously logged data is lost when this command is executed. This data is erased and may not be recovered. It is recommended that logger data is downloaded before this command is used.

Function 5 Read Data Table

This function is used by the host to read part or all of a table of information from the logger.

Host Transmit Command Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0x01	To Logger ID=1
1	Transmitting ID	0xFF	From Host
2	Function Type	0x05	Function = Read Data Table
3	No of bytes in main body of packet (N)	0x03	Bytes in request data body
4	Null (0)	0x00	Null

Packet Data Body (host)

Bytes	Description
Table Number	The number of the loggers Data Table
Table Offset	The offset, in the data table, of the first byte required.
Number of bytes	The number of bytes required

Note: The size of the data body may be increased by the addition of stuff bytes.

Remote Device Reply Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0xFF	Reply to Host
1	Transmitting ID	0x01	Reply from Logger ID=1
2	Function Type	0x05	Function = Read Data Table
3	No of bytes in main body of packet (N)	0x0A	Bytes in reply data body
4	Null (0)	0x00	Null

Packet Data Body (remote)

Bytes	Description
Error Code	0 = Data Table Read OK 1 = Data Table Not Available from this device 2 = Offset/Number of bytes Invalid for this Data Table
Table Data Type	0 = Byte 1 = Unsigned 16-bit Integer 2 = Signed 16 Bit Integer 3 = Unsigned 32 bit Integer 4 = Signed 32 bit Integer 5 = Floating Point
Data Byte 1	If applicable
Data Byte 2	If applicable
Data Byte 3	If applicable
Data Byte 4	If applicable
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Data Byte n	If applicable

Note: The size of the data body may be increased by the addition of stuff bytes.

Function 6 Write to Data Table

This function is used by the host to write new data/settings to a single table in the logger.

Host Transmit Command Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0x01	To Logger ID=1
1	Transmitting ID	0xFF	From Host
2	Function Type	0x06	Function = Write to Data Table
3	No of bytes in main body of packet (N)	0x0D	Bytes in request data body
4	Null (0)	0x00	Null

Packet Data Body (host)

Bytes	Description
Table Number	The number of the loggers Data Table
Table Offset	The offset, in the data table, of the first byte required.
Number of bytes	The number of bytes required
Data Byte 1	If applicable
Data Byte 2	If applicable
Data Byte 3	If applicable
Data Byte 4	If applicable
-----	-----
Data Byte n	If applicable

Note: The size of the data body may be increased by the addition of stuff bytes.

Remote Device Reply Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0xFF	Reply to Host
1	Transmitting ID	0x01	Reply from Logger ID=1
2	Function Type	0x06	Function = Write to Data Table
3	No of bytes in main body of packet (N)	0x02	Bytes in reply data body
4	Null (0)	0x00	Null

Packet Data Body (remote)

Bytes	Description
Error Code	0 = Data Table Written OK 1 = Data Table Not Available from this device 2 = Offset/Number of bytes Invalid for this Data Table 3 = Data Error During Write
Bytes Written	Number of bytes written before error

Note: The size of the data body may be increased by the addition of stuff bytes.

Function 7 Change Logger ID

This function is sent by the host to set a new value for the logger ID.

Host Transmit Command Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0x01	To Logger ID=1
1	Transmitting ID	0xFF	From Host
2	Function Type	0x07	Function = Set Logger ID
3	No of bytes in main body of packet (N)	0x01	Data Body length in bytes
4	Null (0)	0x00	Null

Packet Data Body (host)

Bytes	Description
New Logger ID	New ID logger

Note: The size of the data body may be increased by the addition of stuff bytes.

Remote Device Reply Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0xFF	Reply to Host
1	Transmitting ID	0x0A	Reply from Logger New ID=10
2	Function Type	0x07	Function = Set Logger Clock
3	No of bytes in main body of packet (N)	0x0	No Data Body Required
4	Null (0)	0x00	Null

Note: The return header contains the New ID as confirmation of a change.

Packet Data Body (remote)

This function does not require a remote data body.

Function 8 Initiate Logged Data Download

This function is used to initiate a download of multiple pages of logged data from the logger. This is used in conjunction with Function 9 to get multiple pages of logged data.

Host Transmit Command Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0x01	To Logger ID=1
1	Transmitting ID	0xFF	From Host
2	Function Type	0x08	Function = Initiate Data Download
3	No of bytes in main body of packet (N)	0x02	Data Body length in bytes
4	Null (0)	0x00	Null

Packet Data Body (host)

Bytes	Description
Start Period Hi	Number of time periods back to be downloaded.
Start Period Lo	

Note: The size of the data body may be increased by the addition of stuff bytes.

Remote Device Reply Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0xFF	Reply to Host
1	Transmitting ID	0x0A	Reply from Logger New ID=10
2	Function Type	0x08	Function = Initiate Data Download
3	No of bytes in main body of packet (N)	0x0A	Data Body length in bytes
4	Null (0)	0x00	Null

Note: The return header contains the New ID as confirmation of a change.

Packet Data Body (remote)

Bytes	Description
Start Period Hi	Number of time periods back in time which will be downloaded. (This may be less than those requested)
Start Period Lo	
Channel 0 Type	1=Pulse, 2=On Time. 100=Analogue Avg. 101=Analogue Peak, 102=Analogue Min. 103=Analogue Snap Shot.
Channel 1 Type	1=Pulse, 2=On Time. 100=Analogue Avg. 101=Analogue Peak, 102=Analogue Min. 103=Analogue Snap Shot.
Channel 2 Type	1=Pulse, 2=On Time. 100=Analogue Avg. 101=Analogue Peak, 102=Analogue Min. 103=Analogue Snap Shot.
Channel 3 Type	1=Pulse, 2=On Time. 100=Analogue Avg. 101=Analogue Peak, 102=Analogue Min. 103=Analogue Snap Shot.
Channel 4 Type	1=Pulse, 2=On Time. 100=Analogue Avg. 101=Analogue Peak, 102=Analogue Min. 103=Analogue Snap Shot.
Channel 5 Type	1=Pulse, 2=On Time. 100=Analogue Avg. 101=Analogue Peak, 102=Analogue Min. 103=Analogue Snap Shot.
Channel 6 Type	1=Pulse, 2=On Time. 100=Analogue Avg. 101=Analogue Peak, 102=Analogue Min. 103=Analogue Snap Shot.
Channel 7 Type	1=Pulse, 2=On Time. 100=Analogue Avg. 101=Analogue Peak, 102=Analogue Min. 103=Analogue Snap Shot.

Note: The size of the data body may be increased by the addition of stuff bytes.

Function 9 Download Next Period(s) of Logged Data

This function is repeated multiple times following a Function 8 call to download multiple pages of logged data. The first call with Function 9 downloads N periods starting at the offset set with Function 8. Subsequent calls retrieve the Next N periods following on from the last Function 9 call.

Host Transmit Command Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0x01	To Logger ID=1
1	Transmitting ID	0xFF	From Host
2	Function Type	0x09	Function = Get Next Period(s)
3	No of bytes in main body of packet (N)	0x01	Data Body length in bytes
4	Null (0)	0x00	Null

Packet Data Body (host)

Bytes	Description
Offset from Start Period (O)	Offset from Start Period set with Function 8
Number of Periods (N)	Number of time periods to download

Note: The size of the data body may be increased by the addition of stuff bytes.

Remote Device Reply Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0xFF	Reply to Host
1	Transmitting ID	0x0A	Reply from Logger New ID=10
2	Function Type	0x09	Function = Get Next Period(s)
3	No of bytes in main body of packet (N)	0x82	Data Body length in bytes
4	Null (0)	0x00	Null

Note: The return header contains the New ID as confirmation of a change.

Packet Data Body (remote)

Bytes	Description
Error Code	0 = Data is available for download as requested 1 = Invalid start period 2 = Logger does not support this number of download Periods
Number of Download Periods	Normally = Number requested As the request reaches current logged period this may be 0-N
Download Data (Period O)	1 Page of download data for first requested period (if available)
Download Data (Period O+1)	1 Page of download data for next requested period (if available)
Download Data (Period O+2)	1 Page of download data for next requested period (if available)
Download Data (Period O+3)	1 Page of download data for next requested period (if available)
etc	

Note: The size of the data body may be increased by the addition of stuff bytes.

Function 10 Adjust Clock While Logging

This function is used to adjust the loggers RTC by a small time ($< \frac{1}{4}$ PeriodT) without stopping the logging process. The adjustment value is sent as a signed integer representing the number of seconds adjustment required.

The logger waits till half way through its next period then adds the adjustment to the RTC. This results in a period, which is shorter/longer than the normal period by the adjustment value.

Host Transmit Command Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0x01	To Logger ID=1
1	Transmitting ID	0xFF	From Host
2	Function Type	0x0A	Function = Adjust RTC
3	No of bytes in main body of packet (N)	0x03	Data Body length in bytes
4	Null (0)	0x00	Null

Packet Data Body (host)

Bytes	Description
RTC Adjust Hi	Number of seconds of adjustment required (Signed)
RTC Adjust Lo	
RTC Adjust Direction	0=Add Offset to RTC 1= Subtract Offset From RTC

Note: The size of the data body may be increased by the addition of stuff bytes.

Remote Device Reply Header

Packet Offset	Bytes	Eg	Description
0	Intended Receivers ID	0xFF	Reply to Host
1	Transmitting ID	0x01	Reply from Logger ID=1
2	Function Type	0x0A	Function = Initiate Data Download
3	No of bytes in main body of packet (N)	0x01	Data Body length in bytes
4	Null (0)	0x00	Null

Packet Data Body (remote)

Bytes	Description
Err Code	0 = RTC Adjusted as requested 1 = RTC value too large

Note: The size of the data body may be increased by the addition of stuff bytes.