

## Ionics Mass Spectrometer Command Codes

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Messages and commands have the following general format:



Command or Message Type	Data Field Length in Bytes	Byte Count Length Data Field
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Some messages do not require a data field and therefore will not have a byte count field. The message set as defined currently is:

Message Type	Code	Description
Poll	0x20	Communications Poll
Ack	0x21	Acknowledge
Nak	0x22	Negative Acknowledge
Block_Update	0x23	Update all Lens Parameters
Single_Update	0x24	Update a single set of Lens Parameters
Status	0x26	Status Info
Status_Poll	0x27	Read back all Operating parameters
Ion_Count	0x28	Mass Ion Count Pairs
Run	0x2a	Start Machine using current parameters
Pause	0x2b	Stop and hold the current parameters
Cancel	0x2c	Stop and go to Rest state parameters
Set_Accumulate	0x2d	Set the Accumulation Method for Ion Counting
Set_Filter	0x2e	Set the filter method for the spectral data
Set_Method	0x2f	Set Method for next run (includes all parameters)
Request_ID	0x30	Ask for Instrument ID and Parameters
Instrument_Type	0x31	Instrument ID
Instrument_param	0x32	Instrument Parameters and Limits
Set_Control	0x33	Set control parameters

Starting with the messages which have no data attached to them the details for each message are presented here.

Communications Poll (Poll)

This message is used to check that contact with an instrument is being maintained. The expected response is an Acknowledge message.

#### Acknowledge (Ack)

This is the response to any message except an Negative Acknowledge. This message indicates to the sender that the message was received and understood.

#### Negative Acknowledge (Nak)

This response is given for a message which contains an unknown message code or which does not match the expected size.

#### Status Poll

Requests a reporting of all operational parameters. That is all Dac readbacks, valve states etc. Will be acknowledged. And the Status message will be sent shortly thereafter, this timing depends on what the instrument is doing at the time.

#### Run

Start a scan or set of scans as previously set up. Will be acknowledged. Ion\_Count messages will follow.

#### Ion\_Count

Message consists of from 1 to N packets of 153 bytes each. Following the format above 1 byte command code, 4 byte integer value telling max number of mass, ion count pairs to be transmitted, and 148 bytes containing pairs of mass and ion counts as integers. Mass is in AMUs. Each packet will be acknowledged.

#### Pause

This is for diagnostic purposes only and is a command to the instrument to hold values of parameters, where ever it is in a scan. Operations may be subsequently resumed by sending a Run command. Will be acknowledged.

#### Cancel

Stop the instrument and set it to rest state. New parameters and methods must be loaded after this

command before another run may be started. Will be acknowledged.

#### Request\_ID

Sent to let the Instrument know that it is to identify itself and send its required parameters and limits. Will be acknowledged with data message to follow. (Not Implemented in the demo version)

Messages from this point on have data fields associated with them. Descriptions and details of data will now be presented.

#### Set\_Accumulate

For a multiple scan setup tell the instrument to use accumulate, average or dual mode in counting ions. The data field will consist of the letters A for accumulate, V for Average or D for dual mode. In dual mode a 4 byte integer will indicate how many scans to accumulate for before averaging. That is the number must evenly divide into the number of scans specified or the instrument will set it to the closest appropriate value. The instrument will then accumulate for that number of scans then add the number of ions counted to the averaging total, repeating until all scans have completed then averaging based on the number of additions to the averaging total. Message will be acknowledged. (Not currently implemented.)

#### Set\_Filter

Set filtering type to use for the spectral envelope. (Not Currently Implemented)

#### Set\_method

Load a complete set of parameters for one or multiple runs. (Not Currently Implemented)

#### Instrument\_Type

Identifies the instrument type, model number and serial number. (Not Currently Implemented)

#### Instrument\_Params

Identifies all the instrument parameters as a number, name, type and limits. (Not Currently Implemented)

#### Set\_Control

Set one or more instrument parameters. (Not Currently Implemented)

Currently only Poll through to and including Cancel have been implemented on the demo machine, primarily due to a shortage of memory on the off the shelf boards used in its construction.