

## *Atlas platform (Ap)*

# Market Data Feed Specification

SIGMA X MTF & SIGMA X Europe MTF

Equities

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Version	Description	Publication Date
1.0	Initial version of Atlas platform Market Data Specification	27/05/2021
1.01	Update to Offset value in Trade Cancellation message – Transaction Time and subsequent fields.  Update to Security Reference Data Message Type description.	03/06/2021
1.02	Removed <i>Execution Currency</i> from Trade Message and Trade Cancellation message – Offset values updated accordingly.  Added an appendix describing Pause and Stop reasons.	11/06/2021
1.03	Updated description of MIC to clarify this refers to Primary Exchange MIC	07/07/2021
1.04	The ASCII Alphanumeric type of Transport Layer Messages has changed to right padded with spaces, and not left padded.  The ASCII Alphanumeric type of Application Level Messages has changed to right padded with spaces, and not right padded with zeroes.	09/09/2021
1.05	Heartbeat Timeout clarification in the Login Request Packet  Added recommendations for Requested Sequence Number field in Login Request packet.  Added clarification that consumers must support Security Reference Data updates to enable auction/dark support	17/09/2021

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# 1 Introduction

This document describes the protocol for market data feeds from SIGMA X MTF and SIGMA X Europe MTF. Both MTFs are operated separately but built on Goldman Sachs' Atlas platform ("Ap"). The Ap market data feed uses an application-level binary protocol on top of the SoupBinTCP 4.1 transport layer. Market data subscribers initiate a connection by opening a TCP/IP socket to the MTF market data gateway. For each venue, a Dark Book and an Auction Book are available for trading; the Ap market data protocol supports publication of market data for both books.

## 1.1 Intended Audience

This Atlas platform Market Data specification document is intended for developers and other interested parties in consuming pre-trade and post-trade market data publication. It assumes the reader is familiar with SoupBinTCP 4.1.

## 1.2 Supporting Documentation

This document should be read in conjunction with the latest SIGMA X MTF and SIGMA X Europe MTF documents on <http://gset.gs.com/Sigmaxmtf/InfoParticipants>. For initial go-live please refer to the Member-Migration document.

## 1.3 Segment and Operator MICs

The MICs for SIGMA X MTF and SIGMA X Europe MTF are:

MIC	Operating MIC	Market	Country
SGMX	SGMX	SIGMA X MTF Non-Displayed Book	United Kingdom
SGMY	SGMX	SIGMA X MTF Auction Book	United Kingdom
SGMU	SGMU	SIGMA X Europe MTF Non-Displayed Book	France
SGMV	SGMU	SIGMA X Europe MTF Auction Book	France

## 1.4 Contact Information

Please reach out to the SIGMA X team via [GSSIGMAXMTF@gs.com](mailto:GSSIGMAXMTF@gs.com) for assistance with the migration.

## 2 Market Data Feed

### 2.1 Transport Layer Messages

Transport layer messages follow the SoupBinTCP 4.1 protocol. The subscriber initiates a session by opening a TCP/IP socket and using the Login Request Packet. Credentials for login (username, password) should be provided by SIGMA X MTF and SIGMA X Europe MTF contacts.

The messages below use the following data types:

Category	Type	Description
Integer	Int	Binary big-endian; left padded with spaces
Alphanumeric	ASCII Alphanumeric	A-Z, a-z, 0-9 (ASCII characters); right padded with spaces
	Numeric	0-9 (ASCII characters); left padded with spaces

#### 2.1.1 Login Request Packet

The subscriber must send a Login Request Packet within 30 seconds of establishing a connection to the market data gateway.

Field	Offset	Length (Bytes)	Data Type	Description
<b>Packet Length</b>	0	2	Int	Number of bytes after this field until the next packet
<b>Packet Type</b>	2	1	ASCII Alphanumeric	L – Login Request Packet
<b>Username</b>	3	6	ASCII Alphanumeric	Username
<b>Password</b>	9	10	ASCII Alphanumeric	Password
<b>Requested Session</b>	19	10	ASCII Alphanumeric	Specifies the session the subscriber would like to log into  For the first login request, this field should be blank; active Session Name will be provided in Login Accepted message  If there is a disconnect, the subscriber should use the active Session Name provided in the Login Accepted message along with the Requested Sequence Number when reconnecting
<b>Requested Sequence Number</b>	29	20	Numeric	Specifies the next sequence number in ASCII that the subscriber wants to receive upon connection. Set to 1 on first logon to ensure retrieval of all messages. On reconnection set to the next sequence number of the last message processed. Set to 0 to start receiving the most recently generated message, but note you will not receive messages published since disconnection.

Field	Offset	Length (Bytes)	Data Type	Description
Heartbeat Timeout	49	5	Numeric	Client heartbeat timeout in milliseconds. This value must be set to 2000 (2 seconds). The client must send either a message or heartbeat during this period. The server will disconnect the client connection after 5 misses.

### 2.1.2 Login Accepted Packet

In response to receiving a Login Request Packet from the subscriber, the gateway sends a Login Accepted Packet. Once this message is sent, the connection is established and will continue until the session is terminated or the socket is broken.

Field	Offset	Length (Bytes)	Data Type	Description
Packet Length	0	2	Int	Number of bytes after this field until the next packet
Packet Type	2	1	ASCII Alphanumeric	A – Login Request Packet
Session Name	3	10	ASCII Alphanumeric	The name of the session that is now logged into. Left padded with spaces.
Sequence Number	13	20	Numeric	The sequence number in ASCII of the next Sequenced Message to be sent. Left padded with spaces.

### 2.1.3 Login Rejected Packet

If the subscriber sends an invalid Login Request Packet (e.g. invalid credentials), the gateway sends a Login Rejected Packet. This indicates that the session has not been established successfully.

Field	Offset	Length (Bytes)	Data Type	Description
Packet Length	0	2	Int	Number of bytes after this field until the next packet
Packet Type	2	1	ASCII Alphanumeric	J – Login Rejected Packet
Reject Reason Code	3	1	ASCII Alphanumeric	A – Not authorized; invalid username and password combination in Login Request Message S – Session not available; the Requested Session is invalid or unavailable

### 2.1.4 Sequenced Data Packet

Once the session is established, the market data gateway will send Sequenced Data Packets containing various types of trade and instrument reference data. Sequence numbering is specified initially in the Login Accepted Packet and subsequently incremented by 1 for each sequenced message. If the session is terminated, any missed Sequence Data Packets will be transmitted upon login from the sequence number specified in the Login Request Packet. Note that the sequence number is not included in the message packet; both the subscriber and the gateway are responsible for locally determining the sequence number by counting the number of Sequenced Data Packets transmitted, starting from 1.

Field	Offset	Length (Bytes)	Data Type	Description
Packet Length	0	2	Int	Number of bytes after this field until the next packet
Packet Type	2	1	ASCII Alphanumeric	S – Sequenced Data Packet
Message	3	Variable	Any	Refer to <b>Section 2.2</b> for specification of application level messages

### 2.1.5 Server Heartbeat Packet

For an established session, the gateway must send a message at least every second to the subscriber for the session to remain active. If no other messages are sent, then a Gateway Heartbeat Packet will be sent. If the subscriber does not receive any message for a period of time, the session may have been terminated.

Field	Offset	Length (Bytes)	Data Type	Description
Packet Length	0	2	Int	Number of bytes after this field until the next packet
Packet Type	2	1	ASCII Alphanumeric	H – Server Heartbeat Packet

### 2.1.6 Client Heartbeat Packet

For an established session, the subscriber must send a Client Heartbeat Packet to the market data gateway for the session to remain active. If the gateway does not receive any message for a period of time, the session may have been terminated.

Field	Offset	Length (Bytes)	Data Type	Description
Packet Length	0	2	Int	Number of bytes after this field until the next packet
Packet Type	2	1	ASCII Alphanumeric	R – Client Heartbeat Packet

### 2.1.7 Logout Request Packet

To terminate the session, the subscriber may send a Logout Request Packet. Upon receipt, the gateway will close the TCP/IP socket.

Field	Offset	Length (Bytes)	Data Type	Description
Packet Length	0	2	Int	Number of bytes after this field until the next packet
Packet Type	2	1	ASCII Alphanumeric	O – Logout Request Packet

### 2.1.8 End of Session Packet

Immediately prior to termination of a session, the gateway will send an End of Session Packet.



Field	Offset	Length (Bytes)	Data Type	Description
Packet Length	0	2	Int	Number of bytes after this field until the next packet
Packet Type	2	1	ASCII Alphanumeric	Z – End of Session Packet

## 2.2 Application Level Messages

All application messages are contained within a Sequenced Data Packet (**Section 2.1.4**).

The messages below use the following data types:

Category	Type	Description
Integer	Byte	Signed 8 bits; left padded with zeroes
	Short	Signed 16 bits little-endian; left padded with zeroes
	Int	Signed 32 bits little-endian; left padded with zeroes
	Long	Signed 64 bits little-endian; left padded with zeroes
Alphanumeric	ASCII Alphanumeric	A-Z, a-z, 0-9 (ASCII characters); right padded with spaces
	ASCII Character (Byte)	ASCII Character value from 32-126
	ISO ASCII Timestamp	Date and time per <a href="#">ISO 8601</a> (YYYY-MM-DDThh:mm:ss.dddddZ)

**Note:** The gateway may send message not listed in the sections below. The subscriber should be prepared to ignore such messages. Additionally, the subscriber should ignore any bytes for a given message type that exceed the lengths described below.

### 2.2.1 Periodic Auction Pre-Trade Publication

Message providing summary of details (e.g. indicative price; indicative volume) at the commencement of and during the Auction call phase for an instrument. Instruments are uniquely identified by a combination of Symbol, Currency and MIC.

Field	Offset	Length (Bytes)	Data Type	Description
Timestamp	0	8	Long	Time of message in nanoseconds since Epoch
Message Type	8	1	Byte	0x1
Currency	9	3	ASCII Alphanumeric	<a href="#">ISO currency code</a> (e.g. EUR, CHF, GBP) or GBX for Penny Sterling
MIC	12	4	ASCII Alphanumeric	Primary Market MIC Code (e.g. XLON, XSTO)
Symbol	16	12	ASCII Alphanumeric	Instrument ID ( <a href="#">ISIN</a> )
Indicative Volume	28	8	Long	Indicative volume
Indicative Price	36	8	Long	Indicative Price; use in conjunction with Price Scalar field

Field	Offset	Length (Bytes)	Data Type	Description
Price Scaler	44	1	Byte	Used to indicate number of decimals implied in Indicative Price field $\text{Actual Indicative Price} = \frac{\text{Indicative Price}}{10^{\text{Price Scaler}}}$
Entity	45	1	Byte	<ul style="list-style-type: none"> <li>0 – UK</li> <li>1 – EU</li> </ul>
Reserved1	46	2	Short	
Auction Call Timestamp	48	27	ISO ASCII Timestamp	Date and time of message publication
Reserved2	75	1	Byte	

## 2.2.2 Auction Summary

Message providing summary of details (e.g. price; volume) of each auction at the time of the auction uncross. Instruments are uniquely identified by a combination of Symbol, Currency and MIC.

If an auction results in executions, the corresponding Trade Messages (see **Section 2.2.3**) will follow after the Auction Summary.

Field	Offset	Length (Bytes)	Data Type	Description
Timestamp	0	8	Long	Time of message in nanoseconds since Epoch
Message Type	8	1	Byte	0x2
Currency	9	3	ASCII Alphanumeric	ISO currency code (e.g. EUR, CHF, GBP) or GBX for Penny Sterling
MIC	12	4	ASCII Alphanumeric	Primary Market MIC Code (e.g. XLON, XSTO)
Symbol	16	12	ASCII Alphanumeric	Instrument ID (ISIN)
Volume	28	8	Long	Executed shares at the indicative price; zero if no executions occur If Volume is 0, no trades took place during the auction
Price	36	8	Long	Price at which auction will uncross on completion; used in conjunction with Price Scaler field If Price is 0, no trades took place during the auction
Price Scaler	44	1	Byte	Used to indicate number of decimals implied in Price field $\text{Actual Execution Price} = \frac{\text{Price}}{10^{\text{Price Scaler}}}$
Entity	45	1	Byte	<ul style="list-style-type: none"> <li>0 – UK</li> <li>1 – EU</li> </ul>
Reserved1	46	2	Short	
Auction Uncross or End Timestamp	48	27	ISO ASCII Timestamp	Date and time of message publication
Reserved2	75	1	Byte	

## 2.2.3 Trade Messages

Messages providing details of executed trades. Instruments are uniquely identified by a combination of Symbol, Currency and MIC.

Field	Offset	Length (Bytes)	Data Type	Description
<b>Timestamp</b>	0	8	Long	Time of message in nanoseconds since Epoch
<b>Message Type</b>	8	1	Byte	0x3
<b>Currency</b>	9	3	ASCII Alphanumeric	ISO currency code (e.g. EUR, CHF, GBP) or GBX for Penny Sterling
<b>MIC</b>	12	4	ASCII Alphanumeric	Primary Market MIC Code (e.g. XLON, XSTO)
<b>Symbol</b>	16	12	ASCII Alphanumeric	Instrument ID (ISIN)
<b>Segment</b>	28	4	ASCII Alphanumeric	<ul style="list-style-type: none"> <li>• SGMX – UK Dark Book</li> <li>• SGMY – UK Auction Book</li> <li>• SGMU – EU Dark Book</li> <li>• SGMV – EU Auction Book</li> </ul>
<b>Volume</b>	32	8	Long	Total executed shares at execution price
<b>Price</b>	40	8	Long	Price at which execution took place; used in conjunction with Price Scalar field
<b>Price Scalar</b>	48	1	Byte	Used to indicate number of decimals implied in Price field Actual Execution Price = $\frac{\text{Price}}{10^{\text{Price Scalar}}}$
<b>Transaction Identification Code</b>	49	12	ASCII Alphanumeric	Unique transaction identifier code
<b>Transaction Time</b>	61	27	ISO ASCII Timestamp	Date and time of trade
<b>Publication Date and Time</b>	88	27	ISO ASCII Timestamp	Date and time of message publication
<b>Reserved1</b>	115	1	Byte	
<b>MMT Trading Flag</b>	116	14	ASCII Alphanumeric	Trade detail flags based on <a href="#">MMT 3.04</a> efficient encoding Refer to <b>MMT Trading Flag</b> table below for supported values
<b>Is Large in Scale</b>	130	1	Byte	Only applicable for Dark Book <ul style="list-style-type: none"> <li>• 1 – Large in Scale trade</li> <li>• 0 – Not Large in Scale trade or Auction book trade</li> </ul>
<b>Reserved2</b>	131	1	Byte	

The **MMT Trading Flag** field for Trade Messages is based on standard [MMT 3.04](#) efficient encoding. The table below lists values supported for Trade Messages. All code values returned in Trade Messages will be in ASCII Alphanumeric format.

Level	Level Name	Code	Description
<b>Level 1</b>	Market Mechanism	'3'	Dark Order Book
		'5'	Periodic Auction
<b>Level 2</b>	Trading Mode	'U'	Unscheduled Auction (Auction Book)
		'2'	Continuous Trading (Dark Book)
<b>Level 3.1</b>	Transaction Category	'D'	Dark Trade

Level	Level Name	Code	Description
		'Q'	None apply
Level 3.2	N/A	'Q'	No Negotiated Trade
Level 3.3	N/A	'Q'	No Agency Cross Trade
Level 3.4	Modification Indicator	'Q'	New Trade
Level 3.5	Reference Price Indicator	'S'	Reference Price Trade
		'Q'	No Benchmark or Reference Price Trade
Level 3.6	N/A	'Q'	No Special Dividend Trade
Level 3.7	N/A	'Q'	Unspecified or does not apply
Level 3.8	Price Contribution Indicator	'P'	Plain-Vanilla Trade
Level 3.9	Algorithmic Indicator	'H'	Algorithmic Trade
		'Q'	Non-Algorithmic Trade
Level 4.1	N/A	'Q'	Immediate Publication
Level 4.2	N/A	'Q'	Not Applicable
Level 5	N/A	'Q'	Unique Trade Report

Note ESMA prescribes specific post-trade transparency flags in the [annex to RTS 1](#). The industry-accepted MMT 3.04 efficient encoding standards does not support all of these transparency flags. However, the values listed above can be uniquely translated to an ESMA-specified flag. The mapping between the efficient code and the ESMA-stipulated code is shown in the [Appendix: MMT Conversion](#).

## 2.2.4 Trade Cancellation

Messages providing details of trade cancellations (e.g. in case of erroneous, invalid, deceptive, or fraudulent trades). Instruments are uniquely identified by a combination of Symbol, Currency and MIC.

Field	Offset	Length (Bytes)	Data Type	Description
Timestamp	0	8	Long	Time of message in nanoseconds since Epoch
Message Type	8	1	Byte	0x3
Currency	9	3	ASCII Alphanumeric	ISO currency code (e.g. EUR, CHF, GBP) or GBX for Penny Sterling
MIC	12	4	ASCII Alphanumeric	Primary Market MIC Code (e.g. XLON, XSTO)
Symbol	16	12	ASCII Alphanumeric	Instrument ID (ISIN)
Segment	28	4	ASCII Alphanumeric	<ul style="list-style-type: none"> <li>SGMX – UK Dark Book</li> <li>SGMY – UK Auction Book</li> <li>SGMU – EU Dark Book</li> <li>SGMV – EU Auction Book</li> </ul>
Volume	32	8	Long	Total executed shares at execution price
Price	40	8	Long	Price at which execution took place
Price Scaler	48	1	Byte	Used to indicate number of decimals implied in Price field Actual Execution Price = $\frac{\text{Price}}{10^{\text{Price Scaler}}}$
Transaction Identification Code	49	12	ASCII Alphanumeric	Unique transaction identifier code
Transaction Time	61	27	ISO ASCII Timestamp	Time of original trade Transaction time

Field	Offset	Length (Bytes)	Data Type	Description
Publication Date and Time	88	27	ISO ASCII Timestamp	Date and time of Trade bust message publication
Reserved1	115	1	Byte	
MMT Trading Flag	116	14	ASCII Alphanumeric	Trade detail flags based on <a href="#">MMT 3.04</a> efficient encoding Refer to <b>MMT Trading Flag</b> table below for supported values
Is Large in Scale	130	1	Byte	Only applicable for Dark Book <ul style="list-style-type: none"> <li>1 – Large in Scale trade</li> <li>0 – Not Large in Scale trade or Auction book trade</li> </ul>
Reserved2	131	1	Byte	

The **MMT Trading Flag** field for Trade Cancellations is based on standard [MMT 3.04](#) efficient encoding. The table below lists values supported for Trade Cancellations. All code values returned in Trade Cancellations will be in ASCII Alphanumeric format.

Level	Level Name	Code	Description
Level 1	Market Mechanism	'3'	Dark Order Book
		'5'	Periodic Auction
Level 2	Trading Mode	'U'	Unscheduled Auction (Auction Book)
		'2'	Continuous Trading (Dark Book)
Level 3.1	Transaction Category	'D'	Dark Trade
		'.'	None apply
Level 3.2	N/A	'.'	No Negotiated Trade
Level 3.3	N/A	'.'	No Agency Cross Trade
Level 3.4	Modification Indicator	'C'	Trade Cancellation
Level 3.5	Reference Price Indicator	'S'	Reference Price Trade
		'.'	No Benchmark or Reference Price Trade
Level 3.6	N/A	'.'	No Special Dividend Trade
Level 3.7	N/A	'.'	Unspecified or does not apply
Level 3.8	Price Contribution Indicator	'P'	Plain-Vanilla Trade
Level 3.9	Algorithmic Indicator	'H'	Algorithmic Trade
		'.'	Non-Algorithmic Trade
Level 4.1	N/A	'.'	Immediate Publication
Level 4.2	N/A	'.'	Not Applicable
Level 5	N/A	'.'	Unique Trade Report

Note ESMA prescribes specific post-trade transparency flags in the [annex to RTS 1](#). The industry-accepted MMT 3.04 efficient encoding standards does not support all of these transparency flags. However, the values listed above can be uniquely translated to an ESMA-specified flag. The mapping between the efficient code and the ESMA-stipulated code is shown in the [Appendix: MMT Conversion](#).

## 2.2.5 Stock State Change

Message indicating that the status of an instrument has changed for a particular segment (e.g. instrument has closed or has been halted in the Dark or Auction book). Instruments are uniquely identified by a combination of Symbol, Currency and MIC.

Field	Offset	Length (Bytes)	Data Type	Description
<b>Timestamp</b>	0	8	Long	Time of message in nanoseconds since Epoch
<b>Message Type</b>	8	1	Byte	0x4
<b>Currency</b>	9	3	ASCII Alphanumeric	ISO currency code (e.g. EUR, CHF, GBP) or GBX for Penny Sterling
<b>MIC</b>	12	4	ASCII Alphanumeric	Primary Market MIC Code (e.g. XLON, XSTO)
<b>Symbol</b>	16	12	ASCII Alphanumeric	Instrument ID (ISIN)
<b>Segment</b>	28	4	ASCII Alphanumeric	<ul style="list-style-type: none"> <li>• SGMX – UK Dark Book</li> <li>• SGMY – UK Auction Book</li> <li>• SGMU – EU Dark Book</li> <li>• SGMV – EU Auction Book</li> </ul>
<b>Status</b>	32	1	ASCII Character (Byte)	<ul style="list-style-type: none"> <li>• T – Trading</li> <li>• C – Closed</li> <li>• S – Stopped; orders will be rejected</li> <li>• P – Paused; orders will be accepted but no matching until Pause Reason is removed</li> </ul>
<b>Pause Reason</b>	33	1	Byte	<ul style="list-style-type: none"> <li>• 0x0 – Not Paused (default value)</li> <li>• 0x1 – Paused/Non-Continuous Trading Phase</li> <li>• 0x2 – Halted</li> <li>• 0x3 – Invalid Spread</li> <li>• 0x4 – Manually Paused</li> <li>• 0x5 – Not Specified</li> <li>• 0x6 – Stale Market Data</li> <li>• 0x7 – NCA Suspended</li> </ul>
<b>Stopped Reason</b>	34	1	Byte	<ul style="list-style-type: none"> <li>• 0x0 – Not Stopped (default value)</li> <li>• 0x1 – Manually Stopped</li> <li>• 0x2 – Reserved</li> <li>• 0x3 – Not Specified</li> <li>• 0x4 – Manually Blocked</li> <li>• 0x5 – Trading Hours Ended</li> </ul>
<b>Reserved</b>	35	1	Byte	

Pause and Stop Reason Description - [Appendix: Pause and Stop Reason](#)

## 2.2.6 Security Reference Data

Message providing reference data for an instrument. Instruments are uniquely identified by a combination of Symbol, Currency and MIC. Consumers should handle intraday updates to enable auction/dark support. After a segment has been enabled, however, support will never be disabled using this message.

Note that reference data will be the same for all sessions of a particular venue. However, reference data may differ across venues (e.g. an instrument may be supported for the UK venue but not EU venue).

Field	Offset	Length (Bytes)	Data Type	Description
<b>Timestamp</b>	0	8	Long	Time of message in nanoseconds since Epoch
<b>Message Type</b>	8	1	Byte	0x6 (0x5 is reserved and unused)
<b>Currency</b>	9	3	ASCII Alphanumeric	ISO currency code (e.g. EUR, CHF, GBP) or GBX for Penny Sterling
<b>MIC</b>	12	4	ASCII Alphanumeric	Primary Market MIC Code (e.g. XLON, XSTO)
<b>Symbol</b>	16	12	ASCII Alphanumeric	Instrument ID (ISIN)
<b>Listed Country</b>	28	2	ASCII Alphanumeric	ISO country code
<b>Dark Support</b>	30	1	Byte	<ul style="list-style-type: none"> <li>• 0 – Disabled</li> <li>• 1 – Enabled</li> </ul>
<b>Periodic Auction Support</b>	31	1	Byte	<ul style="list-style-type: none"> <li>• 0 – Disabled</li> <li>• 1 – Enabled</li> </ul>
<b>Minimum LIS</b>	32	8	Long	
<b>Capping Status</b>	40	1	ASCII Character (Byte)	<ul style="list-style-type: none"> <li>• 0x0 – Not Capped</li> <li>• 0x1 – 4% limit Venue specific cap</li> <li>• 0x2 – 8% limit Pan Venue cap</li> <li>• 0x3 – Capped at discretion of Sigma X MTF or Sigma X Europe MTF</li> </ul>
<b>Entity</b>	41	1	Byte	<ul style="list-style-type: none"> <li>• 0 – UK</li> <li>• 1 – EU</li> </ul>
<b>Reserved</b>	42	2	Short	
<b>Class ID</b>	44	4	Int	ClassID associated with list of products If ClassID is 0, the product is not associated with any class

### 3 Appendix: MMT Conversion

The table below shows mapping between industry standard [MMT 3.04](#) values for efficient encoding, encoding with ESMA stipulations and display codes. Note that that only values supported by SIGMA X MTF and SIGMA X Europe MTF are included.

Level	Level Name	Efficient Code	Encoding with ESMA Stipulations	Display Code	Description
Level 1	Market Mechanism	'3'	'3'	'DB'	Dark Order Book
		'5'	'5'	'PA'	Periodic Auction
Level 2	Trading Mode	'U'	'U'	'UA'	Unscheduled Auction (Auction Book)
		'2'	'2'	'CT'	Continuous Trading (Dark Book)
Level 3.1	Transaction Category	'D'	'D'	'D'	Dark Trade
		'2'	'2'	<i>nothing</i>	None apply
Level 3.2	N/A	'2'	'2'	<i>nothing</i>	No Negotiated Trade
Level 3.3	N/A	'2'	'2'	<i>nothing</i>	No Agency Cross Trade
Level 3.4	Modification Indicator	'2'	'2'	<i>nothing</i>	New Trade
		'C'	'CANC'	'CANC'	Trade Cancellation
Level 3.5	Reference Price Indicator	'S'	'RFPT'	'RFPT'	Reference Price Trade
		'2'	'2'	<i>nothing</i>	No Benchmark or Reference Price Trade
Level 3.6	N/A	'2'	'2'	<i>nothing</i>	No Special Dividend Trade
Level 3.7	N/A	'2'	'2'	<i>nothing</i>	Unspecified or does not apply
Level 3.8	Price Contribution Indicator	'P'	'P'	'P'	Plain-Vanilla Trade
Level 3.9	Algorithmic Indicator	'H'	'ALGO'	'ALGO'	Algorithmic Trade
		'2'	'2'	<i>nothing</i>	Non-Algorithmic Trade
Level 4.1	N/A	'2'	'2'	<i>nothing</i>	Immediate Publication
Level 4.2	N/A	'2'	'2'	<i>nothing</i>	Not Applicable
Level 5	N/A	'2'	'2'	<i>nothing</i>	Unique Trade Report



## 4 Appendix: Pause and Stop Reason

Pause Reason	Description
<b>0x0 – Not Paused (default value)</b>	Product is not in paused state
<b>0x1 – Paused/Non-Continuous Trading Phase</b>	Product is not in a Continuous Trading phase on primary market - e.g. pre-open, scheduled auction, volatility auction etc
<b>0x2 – Halted</b>	Product in halted state on primary market
<b>0x3 – Invalid Spread</b>	Bid > Ask in primary market
<b>0x4 – Manually Paused</b>	Product manually paused by Trading platform
<b>0x5 – Not Specified</b>	Unknown/Unspecified reason - paused by Trading platform
<b>0x6 – Stale Market Data</b>	No market data update from primary market for a period of time
<b>0x7 – NCA Suspended</b>	Product suspended by NCA

Stop Reason	Description
<b>0x0 – Not Stopped (default value)</b>	Product is not in stopped state
<b>0x1 – Manually Stopped</b>	Product manually stopped by Trading platform
<b>0x2 – Reserved</b>	Not used
<b>0x3 – Not Specified</b>	Unknown/Unspecified reason - stopped by Trading platform
<b>0x4 – Manually Blocked</b>	Product manually blocked by Trading platform
<b>0x5 – Trading Hours Ended</b>	Primary market trading ended based on static closing time info