

PILLAR OPTIONS DEEP CLIENT SPECIFICATION

NYSE ARCA OPTIONS DEEP FEED NYSE AMERICAN OPTIONS DEEP FEED

Version 1.0 Date November 10, 2020

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PREFACE

DOCUMENT HISTORY

The following table provides a description of all changes to this document.

VERSION	DATE	CHANGE DESCRIPTION
NO.		
1.0	Nov 10, 2020	Added outright series support for NYSE Arca and American Options

REFERENCE MATERIAL

The following lists the associated documents, which either should be read in conjunction with this document or which provide other relevant information for the user:

- IGN Information
- NYSE Symbology
- IP Addresses

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FURTHER INFORMATION

- For additional information about the product, visit the <u>PILLAR DEEP Feed Product Page</u>
- For updated capacity statistics, visit the <u>Capacity</u> page.

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1. INTRODUCTION

The Deep Feed provides real-time market data in a unified view of events, in sequence, as they appear on the matching engines. The Deep Feed includes depth of book order data, last sale data, opening imbalance data and RFQ data. The Deep Feed also includes status updates (e.g., trade corrections and trading halts) and outright series summary messages.

All message types defined in this document appear only in the main publication channels, except:

- The Options Imbalance and Options Add Order Refresh message types also appear in the Refresh channels.
- The Outright Series Summary message appears only in a dedicated Options Summary channel.

1.1 PUBLICATION TIMES

Please refer to the market open pre-opening, early trading, core trading and late trading session times on:

https://www.nyse.com/markets/hours-calendars

2. CONTROL MESSAGE TYPES USED IN THE DATA FEEDS

MSG TYPE	DESCRIPTION	PUBLISHER CHANNELS	REQUEST CHANNEL	REFRESH CHANNELS
1	Sequence Number Reset	х		х
2	Time Reference	х		x
3	Symbol Index Mapping	х		x
10	Retransmission Request		client	
11	Request Response		server	
12	Heartbeat Response		client	
13	Symbol Index Mapping Request		client	
15	Refresh Request		client	
31	Message Unavailable		server	
32	Symbol Clear	х		
34	Security Status Message	х		x
35	Refresh Header Message			x
50	Outright Series Index Mapping	x		x
51	Options Status Message	х		x

See the Pillar Common Client Specification for details on all control messages.

3. DEEP MESSAGES

3.1 Options Add Order Message – Msg Type 300

An Options Add Order message is published when a new visible order has been received and added to the book. The Order ID is assigned by the matching engine and is good for today only.

See the Pillar Common Client Specification for details on Time Reference and Symbol/Series Index Mapping messages, and Order ID and Price field formats.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 40 bytes
Msg Type	2	2	Binary	The type of message:
				300 – Options Add Order Message
SourceTimeNS	4	4	Binary	The nanosecond offset from the Time Reference second (since Jan 1, 1970 00:00:00 UTC)
SeriesIndex	8	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	12	4	Binary	The sequence number of this message in the set of all messages for this series
OrderID	16	8	Binary	The unique ID assigned by the matching engine to this order . Can be used to match this message to the gateway Order Report.
Price	24	4	Binary	The order price. Use with the Price Scale from the series index mapping.
Volume	28	4	Binary	The order quantity in contracts
Side	32	1	ASCII	The side of the order (Buy/Sell). Valid values: • 'B' – Buy • 'S' – Sell
FirmID	33	5	ASCII	The market participant's firm ID.
				Blank-filled if a firm ID was not specified and/or if the order is not marked as Attributed.
Cabinet Order	38	1	ASCII	Cabinet order indicator: • 'Y' - Cabinet Order • 'N' - Not Cabinet Order
CustIndicator	39	1	ASCII	Capacity of the order: C - Customer N - Non-customer D - Derived Note: For Arca Options, Customer order includes both

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FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
				customer and professional customer orders. For American Options, Customer order does not include professional customer orders

3.2 Options Modify Order Message – Msg Type 301

An Options Modify Order message is sent when the price or volume of an order is changed due to an event other than a cancel-replace, or full or partial execution. The content of the price and volume fields represent the new values after modification.

See the Pillar Common Client Specification for details on Time Reference and Symbol/Series Index Mapping messages, and Order ID and Price field formats.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 35 bytes
Msg Type	2	2	Binary	The type of message: 301 – Options Modify Order Message
SourceTimeNS	4	4	Binary	The nanosecond offset from the Time Reference second (since Jan 1, 1970 00:00:00 UTC)
SeriesIndex	8	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	12	4	Binary	The sequence number of this message in the set of all messages for this series
OrderID	16	8	Binary	The unique ID assigned by the matching engine to the order to be modified
Price	24	4	Binary	The new order price. Use the Price scale from the series index mapping.
Volume	28	4	Binary	The new order quantity in contracts.
PositionChange	32	1	Binary	 0 – Kept position in book 1 – Lost position in book If the price of the Modify Order didn't change, order always keeps the position in the book. If the price of the Modify Order message changed, the order always loses position.
Reserved	33	1	Binary	Reserved for future use
Reserved	34	1	Binary	Reserved for future use

3.3 Options Replace Order Message – Msg Type 304

An Options Replace Order message is published when a cancel/replace order is received and executed. The sitting order is replaced with a new one containing the same outright or complex series, side and attribution, a new Order ID, and the price and size specified. The sitting order must be removed from the book and replaced with the new order.

See the Pillar Common Client Specification for details on Time Reference and Symbol/Series Index Mapping messages, and Order ID and Price field formats.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 43 bytes
Msg Type	2	2	Binary	The type of message:
				304 – Options Replace Order Message
SourceTimeNS	4	4	Binary	The nanosecond offset from the Time Reference second (since Jan 1, 1970 00:00:00 UTC)
SeriesIndex	8	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	12	4	Binary	The sequence number of this message in the set of all messages for this series
OrderID	16	8	Binary	The unique ID assigned by the matching engine to the existing order to be replaced
NewOrderID	24	8	Binary	The new Order ID of the replacement order
Price	32	4	Binary	The new order price. Use the Price scale from the series mapping index.
Volume	36	4	Binary	The new order quantity in contracts.
Cabinet Order	40	1	Binary	The new order Cabinet order indicator:
				• 'Y' - Cabinet Order
				• 'N' - Not Cabinet Order
PositionChange	41	1	Binary	The new order position change:
				• 0 – Kept position in book
				 1 – Lost position in book
CustIndicator	42	1	ASCII	Capacity of the new order:
				C - Customer
				N - Non-customerD - Derived
				Note: For Arca Options, Customer order includes both
				customer and professional customer orders. For American Options, Customer order does not include

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
				professional customer orders

3.4 Options Delete Order Message – Msg Type 302

An Options Delete Order message is published when an order is taken off of the book for any reason except for full execution, in which case an Options Order Execution message is sent. If the order is replaced, a delete order message will not be published, rather an Options Replace Order message.

Pillar will publish an Options Delete Order message for each displayable resting order that is expired due to the start of a new trading session. These Options Delete Order messages shall be disseminated PRIOR to the publication of the Options Status message.

Please note that when trading in an option is closed for the day, a Series Status 'X' is sent and unexecuted orders are cancelled, but explicit Options Delete Order Messages are not sent.

See the Pillar Common Client Specification for details on Time Reference and Symbol/Series Index Mapping messages, and Order ID field format.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 25 bytes
Msg Type	2	2	Binary	The type of message: 302 – Options Delete Order Message
SourceTimeNS	4	4	Binary	The nanosecond offset from the Time Reference second (since Jan 1, 1970 00:00:00 UTC)
SeriesIndex	8	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	12	4	Binary	The sequence number of this message in the set of all messages for this series
OrderID	16	8	Binary	The unique ID assigned by the matching engine to the existing order to be deleted
Reserved	24	1	Binary	Reserved for future use

3.5 Options Order Execution Message – Msg Type 303

An Options Order Execution message is sent when an order is partially or fully executed. If the Price field is different from the price of the order, any remaining contracts keep their original price. If the Volume field equals the number of contracts previously remaining in the order, then the order has been fully executed and should be removed from the book. If the order has been partially executed, further Options Order Execution messages for this Order ID may be published.

See the Pillar Common Client Specification for details on Time Reference and Symbol/Series Index Mapping messages, and Order ID, Trade ID and Price field formats.

Field Name	Offset	Size (Bytes)	Format	Description
Msg Size	0	2	Binary	Size of the message: 42 bytes
Msg Type	2	2	Binary	The type of message:
				303 – Options Order Execution Message
SourceTimeNS	4	4	Binary	The nanosecond offset from the Time Reference second (since Jan 1, 1970 00:00:00 UTC)
SeriesIndex	8	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	12	4	Binary	The sequence number of this message in the set of all messages for this series
OrderID	16	8	Binary	The unique ID assigned by the matching engine to the partially or fully executed order .
TradeID	24	4	Binary	Unique ID assigned by the matching engine to this execution. Used by any subsequent Trade Cancel message to identify this execution. Can be matched to the Deal ID field in the gateway Execution Report.
Price	28	4	Binary	The execution price of this trade. Use the Price Scale from the series index mapping.
Volume	32	4	Binary	The executed quantity in contracts.
PrintableFlag	36	1	Binary	 0 = Not Printed to the OPRA 1 = Printed to the OPRA
				When resting displayable live order participates in any of the auction trades, the flag shall be set to 0 (Cross Trade message sent to XDP for the auction trade (see P100.12.26 Cross Trade Message section), will have PrintableFlag set to 1, therefore in order to not over-count the execution quantity, Order Execution messages for orders executed in the auction, should have this flag set to 0)
				 When two resting displayable orders execute against each other in a non-auction trade (execution upon re-pricing), PrintableFlag shall be set as follows: The order participating on the initiating side of the trade shall have PrintableFlag set to 0 The order participating on the

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Field Name	Offset	Size (Bytes)	Format	Description
				 contra side of the trade shall have PrintableFlag set to 1 Otherwise (when resting displayable order executes on one side in a non-auction trade), PrintableFlag shall be set to 1 Note: Cabinet Order should show 0
Reserved	37	1	Binary	Filler Reserved for future use
Reserved	38	4	Binary	Filler Reserved for future use

3.6 Options Non-Displayed Trade Message – Msg Type 310

An Options Non Displayed Trade message is sent as a result of a match between two non-displayed orders.

Customers who are only interested in building a book of displayed orders may safely ignore Options Non-Displayed Trade messages. Customers who are creating statistics or displays requiring the full record of trades in this market will need to process Options Non-Displayed Trade messages.

See the Pillar Common Client Specification for details on Time Reference and Symbol/Series Index Mapping messages, and Order ID, Trade ID, DBExecID and Price field formats.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 33 bytes
Msg Type	2	2	Binary	The type of message: 310 – Options Non-Displayed Trade Message
SourceTimeNS	4	4	Binary	The nanosecond offset from the Time Reference second (since Jan 1, 1970 00:00:00 UTC)
SeriesIndex	8	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	12	4	Binary	The sequence number of this message in the set of all messages for this series
TradeID	16	4	Binary	Unique ID assigned by the matching engine to this trade event. Used by any subsequent Trade Cancel message to identify this execution. Can be matched to the Deal ID field in the gateway Execution Report.
Price	20	4	Binary	The execution price of the trade. Use the Price scale from the series index mapping.
Volume	24	4	Binary	Volume of the trade in contracts

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
PrintableFlag	28	1	Binary	 0 = Not Printed to the OPRA 1 = Printed to the OPRA
Reserved	29	4	Binary	Filler Reserved for future use

3.7 Options Trade Cancel Message – Msg Type 312

In the event that an earlier trade has been reported in error, an Options Trade Cancel message is sent. This occurs whether the initial report was an Options Order Execution or an Options Non-Displayed Trade message.

Note that since Options Trade Cancel messages only affect trades that occurred in the past, customers who are only interested in building a book may safely ignore them.

Customers who are building a complete record of today's trades should remove the cancelled trade from their records and subtract its volume from any statistics.

See the Pillar Common Client Specification for details on Time Reference and Symbol/Series Index Mapping messages.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 20 bytes
Msg Type	2	2	Binary	The type of message: 312 – Options Trade Cancel Message
SourceTimeNS	4	4	Binary	The nanosecond offset from the Time Reference second (since Jan 1, 1970 00:00:00 UTC)
SeriesIndex	8	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	12	4	Binary	The sequence number of this message in the set of all messages for this series
TradelD	16	4	Binary	The TradeID of the original Trade or Execution message to be cancelled.

3.8 Options Cross Trade Message – Msg Type 311

An Options Cross Trade message is published on completion of a crossing from the opening and re-opening auction, and shows the bulk volume that traded in the auction. The Reason Code field indicates the auction type. Additionally, a non-printable Order Execution or Non-Displayed Trade message will be published for each order that traded.

See the Pillar Common Client Specification for details on Time Reference and Symbol/Series Index Mapping messages, and Order ID and Price field formats.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 29 bytes
Msg Type	2	2	Binary	The type of message: 311 – Options Cross Trade Message
SourceTimeNS	4	4	Binary	The nanosecond offset from the Time Reference second (since Jan 1, 1970 00:00:00 UTC)
SeriesIndex	8	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	12	4	Binary	The sequence number of this message in the set of all messages for this series
CrossID	16	4	Binary	Unique identifier for this Cross Trade. Used in Cross Correction message to identify the Cross Trade to correct.
Price	20	4	Binary	The execution price. Use the Price scale from the series index mapping.
Volume	24	4	Binary	Volume executed in contracts
CrossType	28	1	ASCII	 Reason for the crossing from the opening and re-opeing auction. Valid values: O – Market Center Opening Auction 5 – Market Center Reopening Auction

3.9 Options Cross Correction Message – Msg Type 313

In the event that an earlier Options Cross Trade has been reported in error, an Options Cross Correction message is sent.

Note that since Options Cross Correction messages only affect cross auctions that occurred in the past, customers who are only interested in building a book may safely ignore them.

Customers who are building a complete record of today's volume should remove the previously reported

volume from their statistics and add the volume of the Options Cross Correction to them.

See the Pillar Common Client Specification for details on Time Reference and Symbol/Series Index Mapping messages.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 24 bytes

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FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Type	2	2	Binary	The type of message:
				313 – Options Cross Trade Message
SourceTimeNS	4	4	Binary	The nanosecond offset from the Time Reference second (since Jan 1, 1970 00:00:00 UTC)
SeriesIndex	8	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	12	4	Binary	The sequence number of this message in the set of all messages for this series
CrossID	16	4	Binary	The CrossID of the original Cross Trade message to be corrected.
Volume	20	4	Binary	The corrected volume of Options Cross Trade message.

3.10 Options Imbalance Message – Msg Type 305

Options Imbalance messages are published once a second during opening and re-opening auctions to update price and volume information. If there is no change to the calculated fields, no message will be generated.

See the Pillar Common Client Specification for details on Symbol/Series Index Mapping messages and Price field format.

FIELD NAME	OFFSET	SIZE	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 65 bytes
MsgType	2	2	Binary	This field identifies the type of message. 305 – Options Imbalance Message
Reserved	4	4	Binary	Reserved for future use
SourceTimeNS	8	4	Binary	The nanosecond offset from the Source Time
SeriesIndex	12	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	16	4	Binary	The sequence number of this message in the set of all messages for this series
Reserved	20	4	Binary	Reserved for Future use
PairedQty	24	4	Binary	The number of contracts paired off at the Indicative Match Price.

TotalImbalanceQty	28	4	Binary	The total imbalance quantity at the
				Indicative Match Price.
MarketImbalanceQty	32	4	Binary	The total market order imbalance quantity at the Indicative Match Price.
Reserved	36	4	Binary	Reserved for Future use
AuctionType	38	1	ASCII	 M – Core Opening Auction H – Reopening Auction (Halt resume)
ImbalanceSide	39	1	ASCII	 The side of the TotalImbalanceQty B – Buy side S – Sell side Space – No imbalance
ContinuousBook ClearingPrice	40	4	Binary	The price at which all interest on the book can trade, including auction and imbalance offset interest, and disregarding auction collars.
AuctionInterest ClearingPrice	44	4	Binary	The price at which all eligible auction-only interest would trade, subject to auction collars.
Reserved	48	4	Binary	Reserved for Future use.
IndicativeMatchPrice	52	4	Binary	The price at which the highest number of contracts would trade, subject to auction collars. It includes the non-displayed quantity of Reserve Orders. See Information on Auctions for details.
Upper Collar	56	4	Binary	Legal width bid for option
Lower Collar	60	4	Binary	Legal width offer for option
AuctionStatus	64	1	Binary	 Indicates whether the auction will run 0 - Will run as always 4 - Auction will not run because legal width quote does not exist 5 - Auction will not run because market maker quote is not received

3.11 Options Add Order Refresh Message – Msg Type 306

The Options Add Order Refresh message can be sent in either of two contexts:

- 1) If a client sends a Refresh Request to the Request Controller, an Options Add Order Refresh message is sent over the Refresh channels as part of the refresh response for every order currently sitting on the book.
- 2) If NYSE Operations refreshes a series, a Symbol Clear message is published, followed by a full refresh. The refresh includes an Options Add Order Refresh message for every order currently sitting on the book of the series.

See the Pillar Common Client Specification for details on Time Reference and Symbol/Series Index Mapping messages, and Order ID and Price field formats.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 44 bytes
Msg Type	2	2	Binary	The type of message:
				306 – Series Add Order Refresh Message
Reserved	4	4	Binary	Reserved for future use
SourceTimeNS	8	4	Binary	The nanosecond offset from the SourceTime
SeriesIndex	12	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	16	4	Binary	The sequence number of this message in the set of all messages for this series
OrderID	20	8	Binary	The unique ID assigned by the matching engine to this order
Price	28	4	Binary	The order price. Use the Price scale from the series index mapping.
Volume	32	4	Binary	The order quantity in contracts.
Side	36	1	ASCII	The side of the order (Buy/sell). Valid values: • 'B' – Buy • 'S' – Sell
FirmID	37	5	ASCII	The participant's firm ID, or blanks if firm ID was not specified OR if the order is not marked as attributed.
Cabinet Order	42	1	Binary	Cabinet order indicator: 'Y' - Cabinet Order 'N' - Not Cabinet Order

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
CustIndicator	43	1	Binary	 Capacity of the order: C – Customer N – Non-customer D - Derived Note: For Arca Options, Customer order includes both customer and professional customer orders. For American Options, Customer order does not include professional customer orders

3.12 Outright Series RFQ Message - Msg 307

The Request for outright series RFQ data is a pass-through message from the matching engine and is published for outright series. It is generated by the ME to solicit interest in an auction or order.

See the Pillar Common Client Specification for details on Symbol/Series Index Mapping messages and Price field format.

FIELD NAME	SIZE	FORMAT	DESCRIPTION
Msg Size	2	Binary	Size of the message: 42 bytes
Msg Type	2	Binary	The type of message 307 - Outright Series RFQ Msg
Reserved	4	Binary	Reserved for future use
SourceTimeNS	4	Binary	The nanosecond offset from the Time Reference second (since Jan 1, 1970 00:00:00 UTC)
SeriesIndex	4	Binary	The unique ID of this series for all products within this market.
SeriesSeqNum	4	Binary	The sequence number of this message in the set of all messages for this series
Side	1	ASCII	Side of the RFQ B = Buy S = Sell
Туре	1	Binary	Order Type of CUBE/Bold P = Price Improvement F = Facilitation S = Solicitation B = Bold (Outright only)

Capacity	1	ASCII	Customer or Firm capacity specified with the order. Values include: • (blank) = information not specified • 0 = Customer • 1 = Firm • 2 = Broker Dealer • 3 = Market Maker • 8 = Professional Customer Note: This field is only used for BOLD only
Total quantity	2	Binary	Total quantity
Working Price	4	Binary	RFQ Price
Participant	4	Binary	OCC Number for the Clearing firm specified with the order Blank = No OCC Number was specified Note: This field is only used for BOLD only
AuctionID	8	Binary	Auction ID for CUBE
RFQ Status	1	ASCII	 O - Start of RFQ Auction Q - End of RFQ Auction Note: This field is used for CUBE only

4. OUTRIGHT SERIES SUMMARY MESSAGE – MSG TYPE 323

The outright series summary message is sent every 60 seconds, on a separate multicast channel from the main feed.

The message is sent regardless of whether there has been a change to the series in the last 60 seconds or not. If no trades are published for a series during a given day, no Outright Series Summary message is generated.

Note: only outright series will publish the Outright Series Summary message. Outright Series Summary Message (with the exception of the Opening trade) will not include any cancelled trades and routed trades which were not published.

The Outright Series Summary message must provide the following trade statistics per series: high, low, open, close and total volume

- a) High shall correspond to the highest trade price of the day
- b) Low shall correspond to the lowest trade price of the day
- c) Open shall correspond to the first trade price of the day
- d) Close shall correspond to the last trade price of the day
- e) Total number of contracts traded for the day

If a trade has been corrected, only the corrected value will be taken into account for the Series summary.

The Opening or First trade shall always be considered as the First trade even if it is cancelled. In other words, if the Opening trade is cancelled, the next trade will not be considered as the new Opening trade. Furthermore, the Opening trade price published will be used as the First price in the Series summary message.

4.1 Message Structure for Outright Series Summary Message

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Msg Size	0	2	Binary	Size of the message: 36 bytes
Msg Type	2	2	Binary	 The type of message: 323 – Outright Series Summary Message
Reserved	4	4	Binary	Reserved for future use
SourceTimeNS	8	4	Binary	The nanosecond offset from the Source Time
SeriesIndex	12	4	Binary	The unique ID of this series for all products within this market.
HighPrice	16	4	Binary	The Highest price of the series for the day. Use the Price scale from the series index mapping.
LowPrice	20	4	Binary	The Lowest price of the series for the day. Use the Price scale from the series index mapping.

FIELD NAME	OFFSET	SIZE (BYTES)	FORMAT	DESCRIPTION
Open	24	4	Binary	The First price of the series for the day. Use the Price scale from the series index mapping.
Close	28	4	Binary	The Last price of the series for the day. Use the Price scale from the series index mapping.
TotalVolume	32	4	Binary	The cumulative volume for the series throughout the day.