CME Group
A CME/Chicago Board of Trade Company

Historical Market Depth Service

RLC Message Specifications

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1.0 Introduction

The message specifications in this document describe the message formats for the CME Group Market Data Platform. In some message fields CME Group applies “masks” to keep certain information confidential; this specification denotes such instances with the Attribute “CME Internal Data” and the Description “Non-Customer Serviceable Data.”

IMPORTANT NOTE: All prices derived from RLC messages must have their respective decimal locator applied before any further price manipulation is performed. This ensures that the raw price (a dynamic field) is converted to the CME Globex price (a static price).

2.0 Book Messages

MA Message – 5 Best Limits

This message informs customers of changing prices for the given instrument. This message has repeating groups of fields for each book level and therefore has a maximum length of 512 bytes (5 book levels) and minimum length of 152 bytes (1 book level). Shaded fields indicate the repeating group.

Note: Order count is supported with the non-implied book via the MA message - Number of Buy Orders at Buy Limit Price (positions 95-98) and Number of Sell Orders at Sell Limit Price (positions 137-140). The implied book (MY) does not support order count.

Max Length = 512

Min Length = 152

Note: If you receive a space in the Decimal Locator field and all 9s for the 18-byte price field, then price = null. This means that there is not a price or the previous price should be cleared.

Position	Attribute	Lng	Description
1 - 12	CME Globex internal ID	(12)	ISIN Code for the given instrument.
13 - 17	Host Timestamp	(5)	Time CME Globex originated message. Format is 'sscc' where: ss = seconds cc = centiseconds **Disregard position 17** **Note**: Customers should use the Message TimeStamp in the Wire Format Message for latency checks. Refer to the *Message Wire Format* section of Core Functionality.
18 - 31	Date/Time	(14)	This is the date and time the message was generated by the host. Format: yyyymmddhhmmss. **Note**: Customers should use the Message TimeStamp in the Wire Format Message for latency checks. Refer to the *Message Wire Format* section of Core Functionality.
32 - 33	CME Internal Data	(2)	Non-Customer Serviceable data
34 - 35	Message Type	(2)	This is the message type, MA.
36 - 41	CME Internal Data	(6)	Non-Customer Serviceable Data
42 - 49	Trading Date	(8)	This is the current trading date. Format: yyyymmdd.

Position	Attribute	Lng	Description
50 - 69	Complete Instrument Code	(20)	Instrument identifier. This field is left-justified and followed by spaces if the instrument code contains fewer characters than the maximum length. **Future Example** 'GEZ7 ' **Option Example** GE0:XTH7C980 985 990
70	Trading Origin Indicator	(1)	B = Book
71	Trading Mode	(1)	0 = Pre-opening mode 1 = Opening mode 2 = Continuous trading mode
72 - 76	CME Internal Data	(5)	Non-Customer Serviceable Data
77-82	Change of Limit Flag	(6)	This field is a series of 6 characters, where each character position can be either a '0' or '1'. '0' indicates no change for the book level represented by that character position. '1' indicates the corresponding level values have been modified. Levels are determined by counting character positions from the left. For example, '001010' indicates that values have changed for levels 3 and 5. (6th occurrence is insignificant in continuous trading mode [if Position 71=2])
83 - 94	Buy Limit Quantity	(12)	This is the sum of all displayed quantities of all orders present at the Buy Limit price.
95 - 98	Number of Buy Orders at Buy Limit Price	(4)	This is the count of buy orders at the specified Buy Limit Price.
99 - 117	*Buy Limit Price	(19)	Buy limit price for book level as indicated in Change of Limit Field. This value is in the 19-byte decimal locator format.
118 - 136	*Sell Limit Price	(19)	Sell limit price for book level as indicated in Change of Limit Field. This value is in the 19-byte decimal locator format.
137 - 140	Number of Sell Orders at Sell Limit Price	(4)	This is the count of sell orders at the specified Sell Limit Price.
141 - 152	Sell Limit Quantity	(12)	Sum of all displayed quantities of all orders present at the Sell Limit price.
153 - 154	Book Level Separator	(2)	Two spaces separate next modified limit repeating group (if applicable).

*See Appendix A, *Decimal Locator Values*.

MY Message – Modification to the First 5 Implied Orders

This message provides all modifications brought to the first five implied orders associated with an instrument. This message is updated every time the limits change.

Note: If you receive a space in the Decimal Locator field and all 9s for the 19-byte price field, then the actual price = null. This means that there is not a price or the previous price should be cleared.

This is a new market data message introduced to provide implied spreading for Eurodollars.

Note: Although the MY message specification supports 20 price levels (implied occurrences), CME Globex implied spreading only supports an order book depth of five levels.

Note: The **implied book (MY) does not support order count**. Order count is supported with the non-implied book via the MA message - Number of Buy Orders at Buy Limit Price (positions 95-98) and Number of Sell Orders at Sell Limit Price (positions 137-140).

Min Length = 159

Max Length = 1336

Position	Attribute	Lng	Description
1 - 12	CME Globex internal ID	(12)	ISIN Code for the given instrument.
13 - 17	Host Timestamp	(5)	†Time CME Globex originated message. Format is 'sscc' where: ss = seconds cc = centiseconds **Disregard position 17** **Note**: Customers should use the Message TimeStamp in the Wire Format Message for latency checks. Refer to the *Message Wire Format* section of Core Functionality.
18 - 31	Date/Time	(14)	††This is the date and time the message was generated by the host. Format: yyyymmddhhmmss (see note below). **Note**: Customers should use the Message TimeStamp in the Wire Format Message for latency checks. Refer to the *Message Wire Format* section of Core Functionality.
32 - 33	CME Internal Data	(2)	Non-Customer Serviceable Data
34 - 35	Message Type	(2)	This is the CME Globex market data message type - MY.
36 - 41	CME Internal Data	(6)	Non-Customer Serviceable Data
42 - 49	Trading Date	(8)	This is the current trading date, Format: yyyymmdd.

Position	Attribute	Lng	Description
50 - 69	Complete Instrument Code	(20)	Instrument identifier. This field is left-justified and followed by spaces if the instrument code contains fewer characters than the maximum length. **Future Example** 'GEZ7 ' **Option Example** GE0:XTH7C980 985 990
70	Matching Type	(1)	This data should not be used (it will contain the value of Blank or "B")
71	Trading Mode	(1)	1 = Opening Mode 2 = Continuous Trading Mode
72 - 76	CME Internal Data	(5)	Non-Customer Serviceable Data
77 - 96	Change of Implied Order Flag	(20)	Maximum of 20 occurrences, which are each 1 byte in length. For the occurrence N (1-20): 0 = The Nth limit is not modified 1 = The Nth limit is modified
97 – 1336	Implied Occurrence	(1240)	Maximum of 20 occurrences, which are each 62 bytes in length. Appears for each modified implied order (thus implies variable number of occurrences) One Implied Occurrence equals the sum of: • Buy Limit Quantity • Decimal Locator for Buy Limit Price • Buy Limit Price • Decimal Locator for Sell Limit Price • Sell Limit Price • Sell Limit Quantity
	Buy Limit Quantity	(12)	
	*Buy Limit Price	(19)	Buy limit price in 19-byte decimal locator format.
	*Sell Limit Price	(19)	Sell limit price in 19-byte decimal locator format.
	Sell Limit Quantity	(12)	

*See Appendix A, *Decimal Locator Values*.

†**NOTE:** In certain scenarios it may be possible for the Host Timestamp value to be out-of-sync with the Date/Time value. In such an event, client systems should override the value in position 26-31 with the value from position 13-16. For example a Time value of '103002' could have a value of '0300' in position 13-16. In this case, the time should be noted as '10300300'.

††**EXCEPTIONAL NOTE:** There is an exceptional event that may occur in the event that position 28-31 Date/Time contains the value '5959' and position 13-16 contains '0000'. This time value should be represented with the value '000000'.

3.0 Pricing Messages

M0 (zero) Message – Last Best Price

This message represents the reference price, the theoretical opening price, the price of the last trade, or a best sell/buy price. Only the M0 (zero) message should be used to determine the last best price.

Max Length = 163

Note: If you receive a space in the decimal locator field and all 9s for the 18-byte price field then the actual price is null. This means that there is not a price or the previous price should be cleared.

Position	Attribute	Lng	Description
1 - 12	CME Globex internal ID	(12)	ISIN Code for the given instrument.
13 - 17	Host Timestamp	(5)	Time CME Globex originated message. Format is 'sscc' where: ss = seconds cc = centiseconds **Disregard position 17** **Note**: Customers should use the Message TimeStamp in the Wire Format Message for latency checks. Refer to the *Message Wire Format* section of Core Functionality.
18 - 31	Date/Time	(14)	This is the date and time the message was generated by the host. Format: yyyymmddhhmmss. **Note**: Customers should use the Message TimeStamp in the Wire Format Message for latency checks. Refer to the *Message Wire Format* section of Core Functionality.
32 - 33	CME Internal Data	(2)	Non-Customer Serviceable data.
34 - 35	Message Type	(2)	This is the message type, M0.
36 - 41	CME Internal Data	(6)	Non-Customer Serviceable Data
42 - 49	Trading Date	(8)	This is the current trading date. Format: yyyymmdd.
50 - 69	Complete Instrument Code	(20)	Instrument identifier. This field is left-justified and followed by spaces if the instrument code contains fewer characters than the maximum length. **Future Example** 'GEZ7 ' **Option Example**

Position	Attribute	Lng	Description
			GE0:XTH7C980 985 990
70 - 88	*Last Price	(19)	This is the last price in the 19-byte decimal locator format (e.g. 0000000000000104475). Price at which the instrument has most recently traded.
89	Last Price Type Flag	(1)	A = Best Buy Limit V = Best Sell Limit I = Theoretical Opening Price S = Reference Price Blank = Last Trading Order
90 - 108	*Highest Price	(19)	This is the highest price in the 19-byte decimal locator format (e.g. 0000000000000104925). The highest price of the session for a particular instrument.
109	Highest Price Type Flag	(1)	See values for Position 89.
110 - 128	*Lowest Price	(19)	This is the lowest price of the session for the instrument in the 19-byte decimal locator format (e.g. 0000000000000103425).
129	Lowest Price Type Flag	(1)	See values for Position 89.
130 - 141	Last Traded Quantity	(12)	Last traded quantity if the last is due to a trade, otherwise the quantity is zero.
142	Trading Mode	(1)	0 = Pre-opening Mode 1 = Opening Mode 2 = Continuous Trading Mode
143	Net Change/Limits Expression	(1)	1 = Offset from previous day's settlement price
144 - 162	*Actual Net Change	(19)	Difference from previous settlement price in 19-byte decimal locator format.
163	Side variation in relation to preceding	(1)	Whether the last trade is higher (+), lower (-), or unchanged (0) from the previous last trade. " " Blank may occur during post session.

*See Appendix A, *Decimal Locator Values*.

M5 Message – Opening Trade

This message informs customers of the first trade or trades occurring for an instrument during a trading day.

Max Length = 167

Position	Attribute	Lng	Description
1 - 12	CME Globex internal ID	(12)	ISIN Code for the given instrument.
13 - 17	Host Timestamp	(5)	Time CME Globex originated message. Format is 'sscc' where: ss = seconds cc = centiseconds **Disregard position 17** **Note**: Customers should use the Message TimeStamp in the Wire Format Message for latency checks. Refer to the *Message Wire Format* section of Core Functionality.
18 - 31	Date/Time	(14)	This is the date and time the message was generated by the host. Format: yyyymmddhhmmss. **Note**: Customers should use the Message TimeStamp in the Wire Format Message for latency checks. Refer to the *Message Wire Format* section of Core Functionality.
32 - 33	CME Internal Data	(2)	Non-Customer Serviceable Data.
34 - 35	Message Type	(2)	This is the message type, M5.
36 - 41	CME Internal Data	(6)	Non-Customer Serviceable Data.
42 - 49	Trading Date	(8)	This is the current trading date. Format: yyyymmdd.
50 - 69	Complete Instrument Code	(20)	Instrument identifier. This field is left-justified and followed by spaces if the instrument code contains fewer characters than the maximum length. **Future Example** 'GEZ7 ' **Option Example** GE0:XTH7C980 985 990
70 - 81	Trade Quantity	(12)	Number of shares/lots traded.
82 - 100	*Trade Price	(19)	Trade price in 19-byte decimal locator format.
101 - 116	CME Internal Data	(16)	Non-Customer Serviceable Data.
117 - 128	Total Traded Daily Quantity	(12)	Total number of shares/lots traded for a particular instrument.
129	Net Change Format Type	(1)	1 = Offset from previous day's settlement price
130 - 148	*Net Change	(19)	Difference from previous settlement price in 19-byte decimal locator format.

Position	Attribute	Lng	Description	
149	Trade Type Indicator	(1)	0 = Normal Trade generated for Spread/Future/Outright	Indicates normal trade (not an Ex-Pit transaction) on spread or outright contract (not a CME Globex-assigned leg price).
			Note: Values 2, 3, 4 indicate price may be outside the market.	
			2 = Normal Trade generated for spread leg	Indicates normal trade (not an Ex-Pit transaction) at CME Globex-assigned leg price.
			3 = Ex-Pit transaction generated for Spread/Future/Outright	Indicates the trade is an Ex-Pit transaction on a spread or outright contract (not a CME Globex-assigned leg price).
			4 = Ex-Pit transaction generated for spread leg	Indicates the trade is an Ex-Pit transaction on a CME Globex-assigned leg price.
150	Last Trade at Same Price Indicator	(1)	0 = Trade at same price 1 = End of trade at same price	
151	Price Variation vs. Last Trade	(1)	There can be multiple trades involved in an opening and an M5 is generated for each of these trades. Position 151 signals when the last trade from the opening has been sent. It will be a 0 if there are additional trades and the last trade reported should be populated with a 1.	
152 - 167	CME Internal Data	(16)	Non-Customer Serviceable Data; varies in length by 11 or 12.	

*See Appendix A, *Decimal Locator Values*.

M6 Message – Trade

This message informs customers of any trades on an instrument occurring during the day, except the first trade. This message **should not** be used to determine the last best price. This message should be used to obtain volume information.

Max Length = 208

Note: If you receive a space in the decimal locator field and all 9s for the 18-byte price field then the actual price is null. This means that there is not a price or the previous price should be cleared.

Position	Attribute	Lng	Description
1 - 12	CME Globex internal ID	(12)	ISIN Code for the given instrument.
13 - 17	Host Timestamp	(5)	Time CME Globex originated message. Format is 'sscc' where: ss = seconds cc = centiseconds **Disregard position 17** **Note**: Customers should use the Message TimeStamp in the Wire Format Message for latency checks. Refer to the *Message Wire Format* section of Core Functionality.
18 - 31	Date/Time	(14)	This is the date and time the message was generated by CME Globex. Format: yyyymmddhhmmss. **Note**: Customers should use the Message TimeStamp in the Wire Format Message for latency checks. Refer to the *Message Wire Format* section of Core Functionality.
32 – 33	CME Internal Data	(2)	Non-Customer Serviceable Data
34 – 35	Message Type	(2)	Message type = M6
36 – 41	Message Sequence Number	(6)	Sequence number for message
42 – 49	Trading Date	(8)	Current trading date. Format: yyyymmdd.
50 – 69	Complete Instrument Code	(20)	Instrument identifier. This field is left-justified and followed by spaces if the instrument code contains fewer characters than the maximum length. **Future Example** 'GEZ7 ' **Option Example** GE0:XTH7C980 985 990
70 – 81	Trade Quantity	(12)	Quantity of traded instruments.
82 – 100	*Trade Price	(19)	Trade price in 19-byte decimal locator format.
101 – 116	Blocked Data	(16)	Customer system should disregard this data.
117 – 128	Total Traded Daily Quantity	(12)	Trading volume for the current trading day for the given instrument
129	Net Change Format Type	(1)	1 = Offset from previous settlement price

Position	Attribute	Lng	Description	
130 – 148	*Net Change	(19)	Difference from previous settlement price in 19-byte decimal locator format.	
149 – 167	*Highest Price	(19)	Highest price in 19-byte decimal locator format.	
168 – 186	*Lowest Price (1)	(19)	Lowest price in 19-byte decimal locator format.	
187 – 188	Trade Trend Flag	(2)	00 = Cancellation 07 = Trading	
189	Trade Type Indicator	(1)	0 = Normal Trade generated for Spread/Future/Outright	Indicates normal trade (not an Ex-Pit transaction) on spread or outright contract (not a CME Globex-assigned leg price).
			Note: Values 2, 3, 4 indicate price may be outside the market.	
			2 = Normal Trade generated for spread leg	Indicates normal trade (not an Ex-Pit transaction) at CME Globex-assigned leg price.
			3 = Ex-Pit transaction generated for Spread/Future/Outright	Indicates the trade is an Ex-Pit transaction on a spread or outright contract (not a CME Globex-assigned leg price).
			4 = Ex-Pit transaction generated for spread leg	Indicates the trade is an Ex-Pit transaction on a CME Globex-assigned leg price.
190	Last Trade at Same Price Indicator	(1)	0 = Trade at same price 1 = End of trade at same price	
191	Trade Origin Indicator	(1)	B = Book	
192	Price Variation vs. Last Trade	(1)	Indicates difference as ‘+’, ‘-‘, or ‘0’	
193 - 208	CME Internal Data	(16)	Non-Customer Serviceable Data.	

*See Appendix A, *Decimal Locator Values*.

Appendix A: Decimal Locator Values

The first byte in the field is the decimal locator, which indicates where to position the decimal in the 19-byte field as follows:

0 = Positive amount with no decimals	A = Negative amount with no decimals
1 = Positive amount with 1 decimal	B = Negative amount with 1 decimal
2 = Positive amount with 2 decimals	C = Negative amount with 2 decimals
3 = Positive amount with 3 decimals	D = Negative amount with 3 decimals
4 = Positive amount with 4 decimals	E = Negative amount with 4 decimals
5 = Positive amount with 5 decimals	F = Negative amount with 5 decimals
6 = Positive amount with 6 decimals	G = Negative amount with 6 decimals
7 = Positive amount with 7 decimals	H = Negative amount with 7 decimals
	" " = Positive amount with no decimals

Example: the value '0000000000000103425' indicates the value in this field is positive with no decimal.

Appendix B: RLC Depth of Book Message Processing

The 5 Best Limits (MA) message reports modifications to prices and quantities and the First 5 Implied Orders (MY) message reports implied orders. To create the top of book, the 5 best limits (MA) book and the modification to first 5 implied orders (MY) book must be built and managed separately, then consolidated to reflect the current state of the market.

Table B.1 Best Limits (MA) Message

Bid Quantity	Bid Price	Ask Price	Ask Quantity
10	9680	9710	20
20	9670	9720	30
40	9660	9730	100
20	9650	9740	40
20	9640	9750	50

Table B.2 Modification to First 5 Implied Orders (MY) Message

Bid Quantity	Bid Price	Ask Price	Ask Quantity
20	9675	9685	30
10	9665	9700	50
30	9650	9710	100
50	9640	9720	30
20	9635	9730	50

After building the MA and MY books, the actual 5-deep book can be built by merging the MA and MY tables.

Table B.3 5-Deep Book

Bid Quantity	Bid Price	Ask Price	Ask Quantity
10	9680	9685	30
20	9675	9700	50
20	9670	9710	120
10	9665	9720	60
40	9660	9730	150

Note: Quotes from Mass Quote messages are disseminated with top of book only via the 5 Best Limits (MA) message.

The system sends Last Best Price (M0) and Trade (M6) messages upon processing each individual order when applicable. However, the 5 Best Limits (MA) message is only sent at the completion of the processing. Since the 5 Best Limits (MA) message will only reflect the state of the market book at the end of processing, not all market movement that occurred during the processing is indicated.

Notes:

Under certain conditions, 5 Best Limits (MA) message processing can give the appearance that orders have traded at higher than actual prices. In addition, since all orders are processed in the order received, front-end software utilizing the 5 Best Limits (MA) message to update the market book may not display prices of some bids, offers, or trades to the end user.

The Last Best Price (M0) message can be used to process real-time best bid and best offer prices. The following scenarios provide more detail on the conditions noted above.

Scenario 1: Market moves up and then returns to original price

Point A Trader sends Order Number 1 Market price is X

Point B Market price quickly moves to X+5 CME Globex begins processing Order Number 1 Order Number 1 trades at price of X+5 CME Globex sends Last Best Price (M0) and Trade (M6) messages with order fill price of X+5

Point C Market returns to price of X CME Globex completes processing Order Number 1 CME Globex sends 5 Best Limits (MA) message updating the data reflected at the end of the processing, price of X

Explanation of Results:

In this scenario the market moved up and then returned to the original price during the processing. Since the 5 Best Limits (MA) message does not reflect all market movement, the trader could perceive that the market did not reach the price at which Order Number 1 was filled.

Scenario 2: Market moves significantly upward during processing

Point A Trader sends Order Number 2 Market price is X CME Globex begins processing Order Number 2

Point B Market moves to X+3 Order Number 2 trades at price of X+3 CME Globex sends Last Best Price (M0) and Trade (M6) messages with trade price of X+3

Point C Market price moves to X+5 CME Globex completes processing Order Number 2 CME Globex sends 5 Best Limits (MA) message updating the data reflected at the end of the processing, price of X+5

Explanation of Results:

In this scenario the market moved significantly upward during the process. Since the 5 Best Limits (MA) message does not reflect all prices in the market movement, the trader could be concerned that the market moved significantly without market data updates on the different price levels.

Scenario 3: Market moves significantly downward during processing

Point A Trader sends Order Number 3 Market price is XCME Globex begins processing Order Number 3

Point B Market moves to X-7Order Number 3 trades at price of X-7CME Globex sends Last Best Price (M0) and Trade (M6) messages with trade price of X-7

Point C Market price moves to X-10CME Globex completes processing Order Number 3 CME Globex sends 5 Best Limits (MA) message updating the data reflected at the end of the processing, price of X-10

Explanation of Results: In this scenario the market moved significantly downward during the process. Since the 5 Best Limits (MA) message does not reflect all prices in the market movement, the trader could be concerned that the marketmoved significantly without market data updates on the different price levels.

Revision History

Revision Date	Version	Author	Revision Description
4/28/2008	1.0	DJ	Initial version of document based on version 3.5 of RLC Message Spec