LTSE

MEMO SBE (US Equities)

v2.0

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Table of Contents

1 Overview **6**

2 Architecture **6**

3 Encoding **6**
3.1 SBE Data Types 6
3.1.1 Price 7
3.1.2 UTCTimestampNanos 7
3.2 SBE Header 7

4 Message Field Types **8**
4.1 CancelReasonCode (custom FIX tag 21004) 8
4.2 StpGroupIDType (FIX tag 2362) 9
4.3 CancelRejectReasonCode (FIX tag 102) 9
4.4 CxlRejResponseToType (FIX tag 434) 11
4.5 MassCancelRejectReasonCode (custom FIX tag 21028) 11
4.6 DispMethodType (FIX tag 1084) 12
4.7 ReserveReplenishTimingType (custom FIX tag 21006) 12
4.8 ExecInstType Bitset (FIX tag 18) 12
4.9 ExtendedExecInst (custom FIX tag 21041) 12
4.10 ExecRestatementType (FIX tag 378) 13
4.11 ExtendedRestatementReasonType (Custom FIX tag 21022) 13
4.12 LastLiquidityIndType (FIX tag 851) 13
4.13 ExecutionDetailsType Bitset (custom FIX tag 21038) 14
4.14 AuctionType (custom FIX tag 21039) 15
4.15 AuctionId (custom FIX tag 21040) 15
4.16 OrdStatusType (FIX tag 39) 15
4.17 OrdType (FIX tag 40) 15
4.18 OrderCapacityType (FIX tag 528) 16
4.19 CustOrderCapacityType (FIX tag 582) 16
4.20 OrderRejectReasonCode (FIX tag 103) 16
4.21 PegType(FIX tag 1094) 20
4.22 RepriceFrequencyType (custom FIX tag 21020) 20
4.23 RepriceBehaviorType(custom FIX tag 21021) 20
4.24 SelfTradePreventionType (custom FIX tag 21001) 20
4.25 SideType (FIX tag 54) 21
4.26 TimeInForceType (FIX tag 59) 21
4.27 PartyRoleType (FIX tag 452) 21

5 Repeating Groups **22**
5.1 RepeatingGroupDimensions Field 22
5.2 Parties Group (Repeating Group 453) 22

6 Messages **22**
6.1 Client To Server 23
6.1.1 NewOrderSingle 23
6.1.2 OrderCancelReplaceRequest 25
6.1.3 OrderCancelRequest 26
6.1.4 MassCancelRequest 27
6.2 Server To Client 27
6.2.1 ExecutionReport 27
6.2.2 PendingMassCancel 42
6.2.3 MassCancelReject 43
6.2.4 MassCancelDone 44
6.2.5 OrderCancelReject 44

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7 Appendices 45
7.1 Reserve Orders 45
7.1.1 Display Method Initial 45
7.1.2 Display Method Random 46
7.1.3 ReserveReplenishTimingType Random 46
7.1.4 Display Method Undisclosed 46
7.2 Mass Cancel Flow 46
7.3 Encoding Examples 47
7.3.1 Client to Server Requests: 47

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1 Overview

MEMO is a binary protocol used by members to submit orders to the exchange.

2 Architecture

A MEMO session is a sequenced messaging protocol that uses fixed width binary messages.

The MEMO wire format uses an SBE-encoded subset of FIX 5.0 SP2 tags and messages.
More information about the FIX protocol and associated tag numbers can be found on the Financial Information Exchange (FIX) Protocol version 5.0 Service Pack 2 page.

MEMO messages are transported using the MEMX-TCP protocol to provide reliable ordered transmission of messages between clients and servers. Connected clients should always use the streaming mode of MEMX-TCP.
Making MEMX-TCP requests for message replay will result in the client being disconnected, as per the MEMX-TCP specification. Heartbeat and heartbeat timeout intervals for a MEMO connection may be configured via the MEMO port support request process.

3 Encoding

The MEMO protocol uses the FIX Trading Community's Simple Binary Encoding (SBE) to specify message encoding. More information about SBE can be found at the FIX SBE XML Primer.

MEMO is always encoded in Big Endian byte order.

In order to support clients with hardware word alignment restrictions, MEMO SBE will allow clients to supply up to 7 extra bytes after the content of the SBE message. These extra bytes should be added in the MEMX-TCP framing protocol's message length prefix, and not in the message's SBE header.

3.1 SBE Data Types

All encoding and decoding for SBE is centered around a set of basic primitive types.

For more information on primitive type encoding, see the SBE specification.

Type	Length (bytes)	Description	Value Range	Null Value	Null Value (Hex)
CHAR	1	ASCII Character	`32` to `126` (printable ASCII)	`0`	`0x00`
INT8	1	Signed Integer	`-127` to `127`	`-128`	`0x80`
INT16	2	Signed Integer	`-32767` to `32767`	`-32768`	`0x8000`
INT32	4	Signed Integer	`-2^31 + 1` to `2^31 - 1`	`-2^31`	`0x80000000`
INT64	8	Signed Integer	`-2^63 + 1` to `2^63 - 1`	`-2^63`	`0x8000000000000000`
UINT8	1	Unsigned Integer	`0` to `254`	`255`	`0xFF`
UINT16	2	Unsigned Integer	`0` to `65534`	`65535`	`0xFFFF`
UINT32	4	Unsigned Integer	`0` to `2^32-2`	`2^32 - 1`	`0xFFFFFFFF`

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Type	Length (bytes)	Description	Value Range	Null Value	Null Value (Hex)
UINT64	8	Unsigned Integer	0 to 2^64 - 2	2^64 - 1	0xFFFFFFFFFFFFFFFF

The MEMO specification does not use the SBE floating point data types.

3.1.1 Price

Prices are encoded as a fixed-point scaled decimal, consisting of a signed long (INT64) mantissa and a constant exponent of -6.

Type Name	Length	Type	Description
Mantissa	8	INT64	The fixed-point decimal representation of the price
Exponent	N/A	INT8	MEMO uses a constant exponent of -6 for all prices.

For example, a mantissa of 1234567 (0x12D687) with the constant exponent of -6 represents the decimal number 1.234567, and would appear encoded on the wire as the hex value 000000000012D687.

3.1.2 UTCTimestampNanos

Fields with the UTCTimestampNanos type represent a timestamp in Coordinated Universal Time (UTC) which began on the UNIX epoch (January 1, 1970 at 00:00:00 UTC). UTCTimestampNanos has the time unit of nanoseconds and is encoded as follows:

Type Name	Length	Type	Description
Time	8	UINT64	UTC timestamp since unix epoch with nanosecond precision.
Unit	N/A	UINT8	Unit of time. UTCTimestampNanos are represented in nanoseconds. This field is constant (value=9) and as such will not be transferred on the wire.

3.2 SBE Header

SBE includes a header for each message. The SBE header is followed by the SBE body for the message.

The SBE message header contains the fields that allows the decoder to identify what codec should be used for a message.

1. **blockLength**: The length of the message. Note: this does not include the header length.
2. **templateID**: The identifier for the template type of the message that is to follow.
3. **schemaID**: The identifier for the schema the message belongs to.
4. **version**: The version of the schema allowing for extension. Two pieces of information are packed into the (UINT16) version field: a major version and a minor update version. For example, a version of 258 = 0x0102 indicates major version 1, minor update 2.
5. **numGroups**: A count of repeating groups at the root level of the message. The count does not include nested repeating groups.

The MEMO SBE header appears on the wire as:

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Field	Offset	Length	Type	Description
BlockLength	0	2	UINT16	The number of bytes in the message body (does not include the header bytes). Note that MEMO messages do not use variable-length fields.
TemplateID	2	1	UINT8	Identifier of the message template (ie. the message type)
SchemaID	3	1	UINT8	The identifier of a message schema. SchemaID=1 for MEMO.
Version	4	2	UINT16	The version number of the message schema that was used to encode a message. Two pieces of information are packed into the UNIT16 version field, a major version and a minor update version. For example, a version of 258 = 0x0102 indicates major version 1, minor update 2.
NumGroups	6	1	UINT8	A count of repeating groups at the root level of the message. The count does not include nested repeating groups.

Note: In versions 1.9 and above, the version must be set to the expected version. For 1.9 this value is 0x0109. If the version does not match the expected version, the client connection will be dropped and the message will not be processed.

4 Message Field Types

All messages are composed of fields. Each field has a type. This section defines the non-primitive field types, their underlying type on the wire, acceptable values, and their descriptions.

4.1 CancelReasonCode (custom FIX tag 21004)

CancelReasonCode represents the reason the order was canceled by the system.

CancelReasonCode is a 1-byte UINT8 value.

Value	Name	Description
0	Other	This order was canceled for some other reason not listed.
1	UserRequestedCancel	The client sent a OrderCancelRequest or OrderMassCancelRequest for this order.
4	EndOfTrading	The order was sent with the DAY time in force set, and the DAY trading session completed.
5	LimitUpLimitDown	The price of the order fell outside market LULD bands, and the re-pricing modifier was not specified on the order.
6	Halted	The market on the order's security was halted.
7	ExchangeSupervisory	Operational or supervisory actions taken by the echange resulted in the cancellation of this order.
8	OrderExpired	The order was sent with an expiration time and had the "good for time" time in force set, and the supplied expiration time passed.
9	LockOrCrossBook	The order was not externally routable, and market conditions would have resulted in this order crossing or locking the order book.
10	SelfTradePrevention	This or another associated order's specified self trade prevention behavior triggered the cancellation of this order.

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Value	Name	Description
11	InsufficientQuotes	The order was cancelled because there are insufficient quotes on the book for the symbol.
12	NonCompliantRegNmsPrice	The order was cancelled because the price in the order was non-compliant in regards to RegNMS.
13	ParticipantDisconnect	The participant directed that their orders should be canceled when the trading system detects a disconnection, and the participant disconnected.
14	OrderNotBookable	Order is not of bookable type (this may include market orders, IOC, FOK, etc)
15	TradeProtectionLimits	The price of the order fell outside market trade protection limits rule, and the re-pricing modifier was not specified on the order.
16	UnableToRoute	Order was canceled because it was externally routable but could not be routed.
17	FirmDisabled	Order was canceled because the firm was disabled
18	MPIDDisabled	Order was canceled because the MPID was disabled
19	AccountDisabled	Order was canceled because the Account was disabled
20	NotionalExposure RiskBreached	Order was canceled because a Notional Exposure Risk Rule was breached
21	InvalidClOrdId	Order was canceled because invalid ClOrdId
22	NoContraLiquidity	Order was canceled because no liquidity was available
23	OutsideCollarPriceRange	Order was canceled because price was not within the collar price range
24	NonCompliantRegShoPrice	The order was cancelled because the price in the order was non-compliant in regards to RegSHO.

4.2 StpGroupIDType (FIX tag 2362)

This field uniquely identifies the self trade prevention group. Several of the values are reserved values while other values are treated as custom values and are at the discretion of the client.

StpGroupID is a 2-byte UINT16 value.

Value	Name	Description
0	Firm Scope	Prevents orders from the same firm trading with each other
1	MPID Scope	Prevents orders from the same MPID trading with each other
2	Account Scope	Prevents orders from the same account trading with each other
3-65534	Custom Scope	Prevents orders with matching StpGroupID across the firm from trading with each other
65535	NULL	The UINT16 Null value (0xFFFF) disables custom self-trade prevention grouping.

4.3 CancelRejectReasonCode (FIX tag 102)

Identifies the reason why an order cancellation request was rejected.

CancelRejectReasonCode is a 1-byte UINT8 value.

Value	Name	Description
0	TooLateToCancel	The requested order can no longer be canceled

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Value	Name	Description
1	UnknownOrigOrder	An order with the specified OrigOrderID was not found.
3	OrderInPendingState	There is a pending request on this order.
6	DuplicateClOrdID	The supplied ClOrderID duplicated another order for this account.
18	InvalidLimitPriceIncrement	Request Limit Price increment is invalid.
99	Other	This cancel request was rejected for some other reason not listed.
100	MissingSymbol	The cancel request is rejected because the Symbol/SymbolSfx was not specified.
101	MissingLocate	The cancel request is malformed, missing the LocateReqd field.
102	MissingClOrdId	The cancel request is rejected because the ClOrdID was not specified.
103	InvalidOrderQuantity	The supplied order's quantity was invalid.
104	InvalidSymbol	Requested symbol is not traded on the exchange or does not exist.
105	InvalidLimitPrice	Request Limit Price is invalid.
107	SymbolHaltedOrPaused	The order was rejected because the symbol is halted or paused.
108	OrderSizeExceedsLimit	The supplied order's quantity exceeds exchange-level order size limits.
109	ExceededMaxNotionalOrderAmt	This order violated one or more notional risk checks.
110	MissingOrigOrderIdentifiers	The order is rejected because the OrigOrderID was not specified.
111	AmbiguousOrigOrderIdentifiers	The order is rejected because the OrigOrderID was ambiguous, does not uniquely identify an order in the system.
112	OrigOrderSymbolNotMatching RequestSymbol	The order is rejected because the Symbol/SymbolSfx does not match the Symbol/SymbolSfx on the original order.
113	UnsupportedDisplayQuantityChange	Change of DisplyQty in replace request not supported.
114	UnsupportedOrdTypeChange	Change of OrdType in replace request not supported.
115	UnsupportedSideChange	Change of side in replace request not supported.
116	UnsupportedQuantityChange	Change of quantity in replace request not supported.
117	InvalidLocate	The order request is malformed. Request must contain LocateReqd = 'N' field for short sales.
118	ExchangeClosed	The order was rejected because the exchange is closed.
119	BlockSessionRiskRuleViolated	Session Risk Rule was violated
120	BlockSellShortRiskRuleViolated	Sell Short Risk Rule was violated
121	MaxSharesPerOrderRiskRuleBreach	Max Shares Per Order Risk Rule was violated
122	NoNBBOAvailable	No NBBO available
123	MaxNotionalValuePerOrderRiskRuleBreach	Max Notional Value Per Order Risk Rule was violated
124	MaxADVPercentPerOrderRiskRuleBreach	Max ADV Percent Per Order Risk Rule was violated

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Value	Name	Description
125	PricePercentCollarRiskRuleViolated	Price Percent Collar Risk Rule was violated
126	PriceValueCollarRiskRuleViolated	Price Value Collar Risk Rule was violated
127	HardToBorrowSecurityRiskRuleViolated	HardToBorrowSecurityRiskRuleViolated
128	InvalidSide	Missing or invalid side for replace request.
129	InvalidOrdType	Missing or invalid OrdType for replace request.
130	InvalidClOrdId	The ClOrdID is invalid and cannot be used.
131	InvalidLnkId	The order was rejected for an invalid LnkId (non printable ASCII chars)
132	MissingLocateBroker	The Locate Broker is required for a short sell replace.
133	InvalidLocateBroker	The specified Locate Broker is invalid (non printable chars)

4.4 CxlRejResponseToType (FIX tag 434)

CxlRejResponseToType identifies the request type that a cancel reject was issued for.

CxlRejResponseToType is a 1-byte CHAR value.

Value	Name	Description
'1'	OrderCancelRequest	This response is for a cancel request.
'2'	OrderCancelReplaceRequest	This response is for a replace request.

4.5 MassCancelRejectReasonCode (custom FIX tag 21028)

Identifies the reason why a mass cancellation request was rejected.

MassCancelRejectReasonCode is a 1-byte UINT8 value.

Value	Name	Description
0	Other	This order was rejected for some other reason not listed.
1	UnknownProduct	Unknown requested Symbol + Suffix combination
2	UnknownSide	Unknown requested Side
3	UnknownGroupId	Unknown request GroupId for firm
4	HigherPriceLowerOrEqualToLowerPrice	When both HigherThanPrice and LowerThanPrice fields are configured on MassCancelRequest HigherThanPrice must be greater than LowerThanPrice.
5	ProductMissingForPriceRestriction	Cancel per price restriction (HigherPrice / LowerPrice) requires presence of valid product on the request.
6	DuplicateClOrdID	The ClOrdID is a duplicate and cannot be reused.
7	MalformedRequestMissingClOrdIdField	The request is malformed, it is missing the ClOrdId field.
8	InvalidCancelGroupId	The cancel group id supplied is invalid for the account.

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Value	Name	Description
9	InvalidClOrdId	Request was rejected for invalid CHAR value in ClOrdId field.
10	InvalidLowerPrice	Lower price, if present, must be a positive value.
11	InvalidHigherPrice	Higher price, if present, must be a positive value.

4.6 DispMethodType (FIX tag 1084)

DispMethodType indicates the method used when refreshing displayed quantity. Undisclosed should be specified for Pegged and Market orders. This field should be set to the null value for a fully displayed Limit order. Currently if the null value is specified for a Pegged or Market order it will be interpreted as Undisclosed but this is not recommended as this behavior may change in a future revision of the specification.

DispMethodType is a 1-byte CHAR value.

Value	Name	Description
'1'	Initial	Use the DisplayQty specified on the order.
'3'	Random	Use the random algorithm to refresh the displayed quantity after a fill.
'4'	Undisclosed	This order will never be displayed. The DisplayQty field is ignored.

4.7 ReserveReplenishTimingType (custom FIX tag 21006)

Defines the replenishment timing behavior for a reserve order.

ReserveReplenishTimingType is a 1-byte UINT8 value.

Value	Name	Description
1	Immediate	Update the reserve order immediately after a fill.
2	Random	Update the reserve order a random time interval after a fill.

4.8 ExecInstType Bitset (FIX tag 18)

The ExecInstType provides instructions for order handling on exchange.

ExecInstType is a 2-byte UINT16 value.

Type Name	Length	Type	Values	Description
ExecInstType	2	UINT16	Bit 0 - ParticipateDoNotInitiate (Post only) Bit 1 - IntermarketSweep (ISO) Bit 2 - ExternalRoutingNotAllowed (Book Only)	Enable an execution instruction by setting a bit. Disable an execution instruction by clearing the bit. Bit 0 is the least significant bit.

4.9 ExtendedExecInst (custom FIX tag 21041)

The ExtendedExecInst provides additional instructions for order handling on exchange.

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ExtendedExecInst is a 2-byte UINT16 value.

Type Name	Length	Type	Values	Description
ExtendedExecInstType	2	UINT16	Bit 0 - LateAuction Bit 1 - NonAttestedRetail	Enable an execution instruction by setting a bit. Disable an execution instruction by clearing the bit. Bit 0 is the least significant bit.

4.10 ExecRestatementType (FIX tag 378)

Defines the reason for a restatement.

ExecRestatementType is a 1-byte UINT8 value.

Value	Name	Description
3	OrderReprice	The order's booking price was updated.
5	SelfTradePrevention	The order quantity was reduced to prevent a wash trade.
99	Other	More information is supplied in tag 21022 ExtendedExecRestatementReason.

4.11 ExtendedRestatementReasonType (Custom FIX tag 21022)

Defines the extended reason for a restatement.

ExtendedRestatementReasonType is a 1-byte UINT8 value.

Value	Name	Description
0	None	No additional information.
1	SetNBBO	The order set a new NBBO.
2	JoinedNBBO	The order joined the NBBO.
3	SelfTradeCancelNewest	Restatement due to SelfTradePrevention - CancelNewest
4	SelfTradeCancelOldest	Restatement due to SelfTradePrevention - CancelOldest
5	SelfTradeDecrementAndCancel	Restatement due to SelfTradePrevention - DecrementAndCancel
6	SelfTradeCancelBoth	Restatement due to SelfTradePrevention - CancelBoth
7	SelfTradeCancelSmallest	Restatement due to SelfTradePrevention - CancelSmallest

4.12 LastLiquidityIndType (FIX tag 851)

Indicates the liquidity code for this execution.

LastLiquidityIndType is a 1-byte UINT8 value.

Value	Name	Description
1	Add	The order that filled added liquidity to the book.
2	Removed	The order that filled removed liquidity from the book.
3	Routed	The order that filled was routed to another market, where it removed liquidity.
4	Auction	The order was filled during an auction event.

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4.13 ExecutionDetailsType Bitset (custom FIX tag 21038)

The ExecutionDetailsType gives additional information about the execution.

ExecutionDetailsType is a 2-byte UINT16 value.

Type Name	Length	Type	Values	Description
ExecutionDetailsType	2	UINT16	Bit 0 - (0x01) OnEntry (The order immediately removed liquidity upon entry) Bit 1 - (0x02) NBBOJoiner (The order resulted in a quote that is joining the NBBO) Bit 2 - (0x04) NBBOSetter (The order resulted in a quote that is setting the NBBO) Bit 3 - (0x08) HiddenQuantity (The quantity executed on the order was hidden) Bit 4 - (0x10) DisplayedQuantity (The quantity executed on the order was displayed) Bit 5 - (0x20) MidpointOrder (The order is a midpoint peg order) Bit 6 - (0x40) ImmediateOrder (The order is a non-bookable type that must interact immediately, e.g. a market or IOC order) Bit 7 - (0x80) RetailOrder (the order is a retail order) Bit 8 - (0x100) TradedAtMidpoint (The trade occurred at the midpoint) Bit 9 - (0x200) PriceImprovement (the order received price improvement on this trade) Bit 10 - (0x400) TradedAgainstRetail (the trade executed on a retail order) Bit 11 - (0x800) TradedAgainstHidden (the executed on a non-displayed order)	Enable an execution instruction by setting a bit. Disable an execution instruction by clearing the bit. Bit 0 is the least significant bit.

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Type Name	Length	Type	Values	Description
			Bits 12-15 - Reserved For Future Use	

4.14 AuctionType (custom FIX tag 21039)

Identifies the auction type if an order was executed in an auction.

AuctionType is a 1-byte CHAR value.

Value	Name	Description
'O'	Open	Opening Auction
'C'	Close	Closing Auction or Volatility Close Auction
'I'	IPO	IPO Auction
'H'	Halt	Regulatory Halt Auction
'P'	VolatilityPause	Volatility Pause Auction

4.15 AuctionId (custom FIX tag 21040)

Unique identifier that identifies the auction for an auction trade.
AuctionId is a 8-byte UINT64 value

4.16 OrdStatusType (FIX tag 39)

Indicates the status of an order.

OrdStatusType is a 1-byte CHAR value.

Value	Name
'0'	New
'1'	PartialFilled
'2'	Filled
'4'	Canceled
'6'	PendingCancel
'8'	Rejected
'C'	Expired
'E'	PendingReplace

4.17 OrdType (FIX tag 40)

Indicates the type of an order.

OrdType is a 1-byte CHAR value.

Value	Name
'1'	Market
'2'	Limit
'P'	Pegged

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4.18 OrderCapacityType (FIX tag 528)

Designates the capacity of the firm placing the order.

OrderCapacityType is a 1-byte CHAR value.

Value	Name
'A'	Agency
'P'	Principal
'R'	Riskless Principal

4.19 CustOrderCapacityType (FIX tag 582)

Capacity of customer placing the order.

CustOrderCapacityType is a 1-byte UINT8 value.

Value	Name
1	MemberTradingOnTheirOwnAccount
5	RetailCustomer

4.20 OrderRejectReasonCode (FIX tag 103)

Identifies the reason why a new order or an order-replace was rejected by the system.

OrderRejectReasonCode is a 1-byte UINT8 value.

Value	Name	Description
1	InvalidSymbol	The order contained an invalid symbol.
2	ExchangeClosed	The order arrived while the exchange was closed.
3	OrderSizeExceedsLimit	The order exceeded exchange size limit.
6	DuplicateClOrdID	The order used a ClOrdId that has been used before.
18	InvalidLimitPriceIncrement	The order contained an invalid limit price increment.
19	NoNBBOAvailable	The order was rejected because there is no NBBO available.
20	OrderNotionalExceedsLimit	The order's notional value exceeded exchange notional value limit.
22	BlockSellShortRiskRuleViolated	The order violated the firm's short sale risk rule.
23	HardToBorrowSecurity RiskRuleViolated	The order was for a symbol on the firm's hard to borrow list.
27	MaxNotionalValuePerOrderRiskRuleBreach	The order breached the firm's max notional value per order risk rule.
99	Other	This order was rejected for some other reason not listed.
100	MissingSymbol	The order did not supply the symbol.
101	MissingLocateReqd	The order did not supply the locateReqd field.
102	InvalidLocateReqd	The order contained an invalid value for the locateReqd field.
103	MissingClOrdId	The order did not supply the ClOrdId.

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Value	Name	Description
104	InvalidClOrdId	The order was rejected for an invalid ClOrdID.
105	MissingSide	The order did not supply the side.
106	InvalidSide	The order contained an invalid side.
107	MissingOrderQuantity	The order did not supply the quantity.
108	InvalidOrderQuantity	The order contained an invalid order quantity.
109	MissingOrderType	The order did not supply the order type.
110	InvalidOrderType	The order contained an invalid order type.
111	MissingTimeInForce	The order did not supply the time in force.
112	InvalidTimeInForce	The order contained an invalid time in force.
113	MissingOrderCapacity	The order did not supply the order capacity.
114	InvalidOrderCapacity	The order contained an invalid capacity.
115	MissingExecInst	The order did not supply the execution instructions
116	MissingLimitPrice	The order did not supply the limit price.
117	InvalidLimitPrice	The order contained an invalid limit price.
118	MissingMaxFloor	The order did not supply the max floor.
119	InvalidMaxFloor	The order contained an invalid max floor.
120	MissingReserveReplenish AmountType	The order did not supply the reserve replenish amount.
121	InvalidReserveReplenishAmountType	The order contained an invalid reserve replenish amount.
122	MissingReserveReplenishTimeType	The order did not supply the reserve replenish time.
123	InvalidReserveReplenishTimeType	The order contained an invalid reserve replenish time.
124	MissingRandomReplenishValue	The order did not supply the random replenish value.
125	InvalidRandomReplenishValue	The order contained an invalid random replenish value.
126	InvalidRandomReplenish ValueForReserveType	The order contained an invalid random replenish for reserve.
127	MissingRepriceFrequencyType	The order did not supply the reprice frequency type.
128	InvalidRepriceFrequencyType	The order contained an invalid reprice frequency type.
129	MissingRepriceBehaviorType	The order did not supply the reprice behavior type.
130	InvalidRepriceBehaviorType	The order contained an invalid reprice behavior type.
131	InvalidRepriceBehavior ForRepriceFrequency	The order contained an invalid reprice behavior for reprice frequency.
132	MissingCustomerCapacityType	The order did not supply the customer capacity type.
133	InvalidCustomerCapacityType	The order contained an invalid customer capacity.
134	MissingExpireTime	The order did not supply the expire time.

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Value	Name	Description
135	InvalidExpireTime	The order contained an invalid expire time.
136	MissingPegType	The order did not supply the peg type.
137	InvalidPegType	The order contained an invalid peg type.
138	InvalidModifierForOrderType	The order contained an invalid modifier for the order type.
139	InvalidModifiersCombination	The order contained a set of modifiers that do not work together.
140	InvalidTradingSessionForOrderType	The order contained an invalid trading session.
141	InvalidTimeInForceForOrderType	The order contained an invalid time in force type.
142	InvalidModifierForPegType	The order contained an invalid modifier for peg type.
143	InvalidMinQuantity	The order contained an invalid min quantity.
144	InvalidExecInst	The order contained an invalid execution instruction
145	InvalidMPID	The order contained an invalid MPID.
146	SymbolHaltedOrPaused	The order was on a symbol that is currently halted or paused.
147	BlockISORiskRuleViolated	The order violated the firm's ISO risk rule.
148	BlockSessionRiskRuleViolated	The order violated the firm's Session risk rule.
149	BlockNonTestSymbolsRiskRuleViolated	The order violated the firm's test symbol trading risk rule.
150	MaxSharesPerOrderRiskRuleBreach	The order breached the firm's max shares per order risk rule.
151	PricePercentCollarRiskRuleViolated	The order violated the firm's price percent collar risk rule.
152	PriceValueCollarRiskRuleViolated	The order violated the firm's value collar risk rule.
153	MaxADVPercentPerOrderRiskRuleBreach	The order violated the firm's max ADV (average daily volume) percentage risk rule.
154	DailyGrossNotionalExposureRiskRuleBreach	The order breached the firm's daily gross notional exposure risk rule.
155	DailyNetNotionalExposureRiskRuleBreach	The order breached the firm's daily net notional exposure risk rule.
156	MaxNumDuplicateOrdersRiskRuleBreach	The order breached the firm's max number of duplicate orders risk rule.
157	MaxOrderRateRiskRuleBreach	The order breached the firm's max number of orders per second risk rule.
158	RestrictedSecurity RiskRuleViolated	The order was for a symbol on the firm's restricted security list.
159	InvalidSelfTradePreventionConfiguration	The order was rejected for a self trade prevention configuration setting.
160	InvalidSelfTradePreventionType	The order was rejected for an invalid self trade prevention value.
161	InvalidRiskGroupId	The order was rejected for an invalid risk group id value.
162	FirmDisabled	The order was rejected because the firm sending the order has been disabled.

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Value	Name	Description
163	MPIDDisabled	The order was rejected because the MPID used in the order has been disabled.
164	AccountDisabled	The order was rejected because the account sending the order has been disabled.
165	CannotTradeNonTestSymbol	The order was rejected because the account is set in Test mode cannot trade non-test symbols.
166	MissingFirm	The order was rejected because the exchange cannot find the firm associated with the order.
167	MissingAccount	The order was rejected because the exchange cannot find the account associated with the order.
168	MissingMPID	The order was rejected because the exchange cannot find the MPID associated with the order.
169	MissingRiskGroup	The order was rejected because the exchange cannot find the risk group associated with the order.
170	DailyMarketOrderGrossNotional ExposureRiskRuleBreach	The order breached the firm's daily market order gross notional exposure risk rule.
171	DailyMarketOrderNetNotional ExposureRiskRuleBreach	The order breached the firm's daily market order net notional exposure risk rule.
172	MissingDispMethodType	The order did not supply the DispMethodType
173	MissingFirmRiskSetting	Risk settings are missing for the firm
174	InvalidAccountMPIDToFirm	Invalid configuration of account and MPID to firm
175	InvalidPegOffsetValue	Peg offset value is set to sub penny
176	InvalidDispMethodType	Display method type is invalid
177	MissingCancelGroupId	The order did not supply the cancel group ID
178	InvalidCancelGroupId	The order was rejected for an invalid cancel group ID value
179	MissingSTPGroupId	The order did not supply the STP group ID
180	InvalidSTPGroupId	The order was rejected for an invalid STP group ID value
181	InvalidLnkId	The order was rejected for an invalid LnkId (Non printable ASCII chars)
182	MissingLocateBroker	The Locate Broker is required for a short sell order.
183	InvalidLocateBroker	The specified Locate Broker is invalid (non printable chars)
184	InvalidExtendedExecInst	The order contained an invalid extended execution instruction

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4.21 PegType(FIX tag 1094)

Defines the type of peg used in a peg order.

PegType is a 1-byte UINT8 value.

Value	Name	Description
2	MidPricePeg	Order price is pegged at the midpoint of the National Best Bid and Offer (NBBO)
5	PrimaryPeg	Order price is pegged to follow the best bid, when buying a security, and the best offer, when selling a security

4.22 RepriceFrequencyType (custom FIX tag 21020)

Defines the type of reprice used when marking an order for regulatory compliance.

The type specified is applied to display-eligible orders for compliance with RegNMS and to both display-eligible and hidden orders for compliance with RegSHO and LULD.

Note: Hidden orders are not re-priced for compliance with RegNMS.

RepriceFrequencyType is a 1-byte UINT8 value.

Value	Name	Description
0	SingleReprice	An order will be repriced upon entry for compliance with RegNMS, RegSHO, and LULD.
1	ContinuousReprice	An order will continuously be repriced after being booked for compliance with RegNMS, RegSHO, and LULD.
2	None	No repricing will be done.

4.23 RepriceBehaviorType(custom FIX tag 21021)

Defines the market conditions for which to apply repricing for.

RepriceBehaviorType is a 1-byte UINT8 value.

Value	Name	Description
1	RepriceLockCancelCross	An order will only be repriced if the market is locked, cancel if market is crossed.
2	RepriceLockRepriceCross	An order will be repriced if the market is locked or crossed.

4.24 SelfTradePreventionType (custom FIX tag 21001)

Defines the self trade operation which will be used if the exchange self-trade-prevention functionality is triggered on this order.

If this order would execute against an opposite side resting interest with the same self-trade prevention identifier, the behavior specified by this value will be triggered.

SelfTradePreventionType is a 1-byte UINT8 value.

Value	Name	Description
0	CancelNewest	If triggered, this order (the incoming order) will be canceled.
1	CancelOldest	If triggered, the resting order will be canceled.

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Value	Name	Description
2	DecrementAndCancel	If triggered and both orders have equivalent size, both will be canceled. If triggered and orders have differing sizes, the smaller order will be canceled, and the larger order will be decremented by the size of the smaller order and the balance will remain on the book.
3	CancelBoth	If triggered, both the incoming and the resting orders will be canceled.
4	CancelSmallest	If triggered and both orders have equivalent size, both will be canceled. If triggered and orders have differing size, the smaller order will be canceled.

4.25 SideType (FIX tag 54)

Defines the side of an order.

SideType is a 1-byte CHAR value.

Value	Name
'1'	Buy
'2'	Sell
'5'	SellShort
'6'	SellShortExempt

4.26 TimeInForceType (FIX tag 59)

Defines the time during which an order is eligible for execution.

TimeInForceType is a 1-byte CHAR value.

Value	Name	Description
'0'	Day	The order is entered for execution during the pre-market and market periods.
'2'	At The Open	The order is entered for execution during an opening auction or during an IPO auction.
'3'	Immediate Or Cancel (IOC)	The order shall be partially or completely executed immediately, or canceled outright.
'4'	Fill or Kill (FOK)	The order shall be completely filled immediately, or canceled.
'7'	At The Close	The order is entered for execution during a closing auction or during a volatility closing auction.
'A'	GoodForTime	The order shall be entered for execution during the supplied time interval.
'F'	Regular Hours Only (RHO)	The order is entered for execution during the market period. custom value - not present in FIX tag 59

4.27 PartyRoleType (FIX tag 452)

Identifies the type or role of the PartyID in the Parties repeating group.

PartyRoleType is a UINT8 value. The following values are supported for this field:

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Value	Name
1	Executing Firm (MPID)

5 Repeating Groups

5.1 RepeatingGroupDimensions Field

Some messages in this specification use repeating groups of fields. A RepeatingGroupDimensions block is inserted prior to each repeating group and contains:

1. The BlockLength representing the total space reserved for a single repeating group entry (not counting any nested repeating groups or variable-length fields). BlockLength only represents message body fields; it does not include the length of the group dimension itself, which is fixed size.
2. A counter representing the number of entries in a repeating group.

Type Name	Length	Type	Description
BlockLength	1	UINT8	The total space reserved for a single repeating group entry.
NumInGroup	1	UINT8	A counter representing the number of entries in a repeating group.

5.2 Parties Group (Repeating Group 453)

The Parties Group repeating group allows for multiple party identifiers to be supplied in a message.

This group is always preceded by RepeatingGroupDimensions field that denotes the length of this group and the number of the items in the group in the message.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
PartyID	0	16	CHAR	448	Y	MPID as stated in the order, or the default MPID for the Account if not specified in the order.
PartyIDSource	16	1	CHAR	447	Y	Identifies class or source of the PartyID (448) value. The exchange currently accepts the following values for this field: • 'C' for Generally Accepted MPID
PartyRole	17	1	PartyRoleType	452	Y	Identifies the type or role of the PartyID (448) specified.

6 Messages

This section defines the messages that make up the protocol.

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6.1 Client To Server

6.1.1 NewOrderSingle

The new order message type is used by institutions wishing to electronically submit securities orders to the exchange for execution.

This message corresponds to FIX message type D

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 1
ClOrdID	7	16	CHAR	11	Y	Unique identifier of the order as assigned by the client.
Symbol	23	6	CHAR	55	Y	CMS symbol tradable instrument.
SymbolSfx	29	6	CHAR	65	N	CMS symbol suffix. Additional information about the security (e.g. preferred, warrants, etc.).
Side	35	1	SideType	54	Y	Side of order.
OrderQty	36	4	UINT32	38	Y	Quantity ordered. This represents the number of shares. Number of shares may not exceed 1MM. The notional value of an order may not exceed $30MM.
OrdType	40	1	OrdType	40	Y	Type of the order.
Price	41	8	Price	44	N	Price per unit of quantity (e.g. per share).
TimeInForce	49	1	TimeInForceType	59	Y	Defines the time during which an order is eligible for execution.
OrderCapacity	50	1	OrderCapacityType	528	Y	Designates the capacity of the firm placing the order.
CustOrderCapacity	51	1	CustOrderCapacityType	582	N	Capacity of the customer placing the order. If not specified, behavior defaults to MemberTradingOnTheirOwnAccount.
ExecInst	52	2	ExecInstType	18	Y	Instructions for order handling on exchange.
ExtendedExecInst	54	2	ExtendedExecInst	21041	Y	Additional instructions for order handling on exchange.
PegOffsetValue	56	8	Price	211	N	Amount(signed) added to the peg for a pegged order.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
PegPriceType	64	1	PegType	1094	N	Defines the type of peg.
ExpireTime	65	8	UTCTimestampNanos	126	N	The expiration time of a GoodForTime TimeInForce order. Expiration time must be at least a 1 millisecond in the future. If omitted, expiration time will be set to the end of the post-market trading session. Specified in UTC timestamp since unix epoch in nanoseconds.
MinQty	73	4	UINT32	110	N	Minimum quantity of an order to be executed.
DisplayQty	75	4	UINT32	1138	N	Quantity of the order to be displayed.
DisplayMethod	81	1	DispMethodType	1084	N	Defines the replenishment size behavior for a reserve order. This should be null for a fully displayed order.
ReserveReplenishTiming	82	1	ReserveReplenishTimingType	21006	N	Defines the replenishment timing behavior for a reserve order.
DisplayMinIncr	83	4	UINT32	1087	N	Defines the minimum increment to be used when calculating a random refresh of DisplayQty.
LocateReqd	87	1	CHAR	114	N	Required on Short Sell and Short Sell Exempt orders only. Only acceptable value is 'N' which indicates the member has secured the required locate.
RepriceFrequency	88	1	RepriceFrequencyType	21020	N	Defines the frequency of a reprice. If this tag is not sent then the order will not be repriced.
RepriceBehavior	89	1	RepriceBehaviorType	21021	N	Defines the reprice behavior when market is locked or crossed.
CancelGroupID	90	2	UINT16	21000	N	Unique identifier of custom cancel group.
StpGroupID	92	2	StpGroupIDType	2362	N	Unique identifier of custom self-trade prevention group.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SelfTradePrevention	94	1	SelfTradePreventionType	21001	N	Defines the desired behavior in the event of a wash. The UINT8 Null (0xFF) value disables self trade prevention.
RiskGroupID	95	2	UINT16	21005	N	Unique identifier of a custom risk control set to be applied to this order. The UINT16 Null value (0xFFFF) disables custom risk controls.
LnkID	97	4	CHAR	583	N	Permits clients to assign a link identifier used for their own order tracking.
LocateBroker	101	4	CHAR	5700	N	For a short sell order, the broker (MPID) that the member shall borrow shares from. Customer ports can be configured to require this field to be set on short sale orders, otherwise it is optional.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.
Parties	-	-	Parties Group	N/A	N	The parties associated with this new order.

6.1.2 OrderCancelReplaceRequest

The order cancel/replace request is used to change the parameters of an existing order.

This message corresponds to FIX message type G

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 2
OrigClOrdID	7	16	CHAR	41	Y	ClOrdID (11) of the previous order (NOT the initial order of the day) .
ClOrdID	23	16	CHAR	11	Y	Unique identifier of the replacement order as assigned by the client. Uniqueness must be guaranteed within a single trading day.
Symbol	39	6	CHAR	55	Y	This field may not change from the value stated in the original order.
SymbolSfx	45	6	CHAR	65	N	This field may not change from the value stated in the original order.
Side	51	1	SideType	54	Y	Side may only change between Sell and SellShort.
OrderQty	52	4	UINT32	38	Y	Quantity ordered. This represents the number of shares for equities.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
OrdType	56	1	OrdType	40	Y	OrderType may only change from Limit order to Market order.
Price	57	8	Price	44	N	Price per unit of quantity (e.g. per share). Changing the price will cause the order to lose its priority in the book.
DisplayQty	65	4	UINT32	1138	N	Quantity of the order to be displayed.
LocateReqd	69	1	CHAR	114	N	Required on Short Sell and Short Sell Exempt orders only. Only acceptable value is 'N' which indicates the member has secured the required locate.
LnkID	70	4	CHAR	583	N	Permits clients to assign a link identifier used for their own order tracking.
LocateBroker	74	4	CHAR	5700	N	For a short sell order, the broker (MPID) that the member shall borrow shares from. Customer ports can be configured to require this field to be set on short sale orders, otherwise it is optional.

6.1.3 OrderCancelRequest

The order cancel request message requests the cancellation all remaining size on an order.

Note: this message can be used to cancel an order for a different account by specifying the order's exchange order ID (`OrderID`), the remote order may have been entered via MEMO or MEMO FIX supported ports.

This message corresponds to FIX message type F

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 3
OrigClOrdID	7	16	CHAR	41	Y*	ClOrdID (11) of the previous order (NOT the initial order of the day) as assigned by the customer.
OrderID	23	8	UINT64	37	Y*	OrderID as assigned by the exchange.
ClOrdID	31	16	CHAR	11	Y	An identifier for the cancel request.
Symbol	47	6	CHAR	55	Y	This must be the same symbol as the order request.
SymbolSfx	53	6	CHAR	65	N	Additional information about the security (e.g. preferred, warrants, etc.).

* Either OrigClOrdID or OrderID fields must be present

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6.1.4 MassCancelRequest

The mass cancel request message requests the cancellation all remaining size on a set of existing orders that match the given criteria.

Note: this message can be used to cancel orders from different accounts. Orders affected by this request may have been entered via either MEMO or MEMO FIX supported protocols.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 4
ClOrdID	7	16	CHAR	11	Y	A unique identifier for the mass cancel request.
Symbol	23	6	CHAR	55	N	For Mass Cancel scenario, providing a value here will result in all orders for that symbol being canceled.
SymbolSfx	29	6	CHAR	65	N	Additional information about the security (e.g. preferred, warrants, etc.).
Side	35	1	SideType	54	N	Side of order. If Null then side is not used as a cancel filter.
LowerThanPrice	36	8	Price	21026	N	For Mass Cancel scenario, Any order with a lower or equal limit price would be included in the cancel filter. This filter can only be used in conjunction with a specific symbol.
HigherThanPrice	44	8	Price	21027	N	For Mass Cancel scenario, Any order with a higher or equal limit price would be included in the cancel filter. This filter can only be used in conjunction with a specific symbol.
CancelGroupID	52	2	UINT16	21000	N	Identifier of custom cancel group.

6.2 Server To Client

6.2.1 ExecutionReport

The MEMO schema defines multiple Execution Report messages each conforming to FIX message type 8.

6.2.1.1 ExecutionReport_New

The ExecutionReport_New is a response to NewOrderSingle request in the event the order was accepted by the exchange. This message echos back to the requester all the fields as been configured on the request with additional information about the state of the order.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 6
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the ExecutionReport was sent. UTC timestamp since unix epoch with nanosecond precision.
OrderID	15	8	UINT64	37	Y	OrderID as assigned by the exchange.
ClOrdID	23	16	CHAR	11	Y	As stated in the order.
ExecID	39	8	UINT64	17	Y	Unique identifier of execution message as assigned by the exchange. Uniqueness is guaranteed within a single trading day.
OrdStatus	47	1	OrdStatusType	39	Y	The status of the order.
Symbol	48	6	CHAR	55	Y	As stated in the order.
SymbolSfx	54	6	CHAR	65	N	As stated in the order.
Side	60	1	SideType	54	Y	As stated in the order.
OrdType	61	1	OrdType	40	Y	As stated in the order.
OrderQty	62	4	UINT32	38	Y	As stated in the order.
Price	66	8	Price	44	N	As stated in the order.
TimeInForce	74	1	TimeInForceType	59	Y	As stated in the order.
OrderCapacity	75	1	OrderCapacityType	528	Y	As stated in the order.
CustOrderCapacity	76	1	CustOrderCapacityType	582	N	As stated in the order.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
ExecInst	77	2	ExecInstType	18	Y	As stated in the order.
ExtendedExecInst	79	2	ExtendedExecInst	21041	Y	As stated in the order.
PegOffsetValue	81	8	Price	211	N	As stated in the order.
PegPriceType	91	1	PegType	1094	N	As stated in the order.
ExpireTime	93	8	UTCTimestampNanos	126	N	As stated in the order.
MinQty	98	4	UINT32	110	N	As stated in the order.
DisplayQty	102	4	UINT32	1138	N	As stated in the order.
DisplayMethod	106	1	DispMethodType	1084	N	As stated in the order.
ReserveReplenishTiming	107	1	ReserveReplenishTimingType	21006	N	As stated in the order.
DisplayMinIncr	108	4	UINT32	1087	N	As stated in the order.
LocateReqd	112	1	CHAR	114	N	As stated in the order.
RepriceFrequency	113	1	RepriceFrequencyType	21020	N	As stated in the order.
RepriceBehavior	114	1	RepriceBehaviorType	21021	N	As stated in the order.
CancelGroupID	115	2	UINT16	21000	N	As stated in the order.
StpGroupID	117	2	StpGroupIDType	2362	N	As stated in the order.
SelfTradePrevention	119	1	SelfTradePreventionType	21001	N	As stated in the order.
RiskGroupID	120	2	UINT16	21005	N	As stated in the order.
LeavesQty	122	4	UINT32	151	Y	Quantity open for further execution.
CumQty	126	4	UINT32	14	Y	Total quantity (e.g. number of shares) filled.
TransactTime	130	8	UTCTimestampNanos	60	Y	The time at which the transaction occurred. UTC timestamp since epoch with nanosecond precision.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
LnkID	138	4	CHAR	583	N	As stated in the order.
LocateBroker	142	4	CHAR	5700	N	As stated on the order.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.
Parties	-	-	Parties Group	N/A	Y	The parties associated with this new order.

6.2.1.2 ExecutionReport_Rejected

The ExecutionReport_Rejected is a response to NewOrderSingle request in the event the order was rejected by the exchange. This message echos back to the requester all the fields as been configured on the request with additional information about the reject reason.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 7
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the ExecutionReport was sent. UTC timestamp since unix epoch with nanosecond precision.
ClOrdID	15	16	CHAR	11	Y	As stated in the order.
ExecID	31	8	UINT64	17	Y	Unique identifier of execution message as assigned by the exchange. Uniqueness is guaranteed within a single trading day.
OrdStatus	39	1	OrdStatusType	39	Y	The status of the order.
Symbol	40	6	CHAR	55	Y	As stated in the order.
SymbolSfx	46	6	CHAR	65	N	As stated in the order.
LeavesQty	52	4	UINT32	151	Y	Quantity open for further execution.
CumQty	56	4	UINT32	14	Y	Total quantity (e.g. number of shares) filled.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
RejectReason	60	1	OrderRejectReasonCode	103	Y	Reason code for order rejection.
LnkID	61	4	CHAR	583	N	As stated in the order.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.
Parties	-	-	Parties Group	N/A	Y	The parties associated with this new order.

6.2.1.3 ExecutionReport_Trade

The ExecutionReport_Trade is an unsolicited response triggered as a result of a trade. The message contains all the data describing the trade.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 8
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the ExecutionReport was sent. UTC timestamp since unix epoch with nanosecond precision.
OrderID	15	8	UINT64	37	Y	OrderID as assigned by the exchange.
ClOrdID	23	16	CHAR	11	Y	The unique identifier as specified by the client.
ExecID	39	8	UINT64	17	Y	Unique identifier of execution message as assigned by the exchange. Uniqueness is guaranteed within a single trading day.
OrdStatus	47	1	OrdStatusType	39	Y	The status of the order.
LastQty	48	4	UINT32	32	Y	Quantity (e.g. shares) bought/sold on this (last) fill.
LastPx	52	8	Price	31	Y	Price of this (last) fill.
LeavesQty	60	4	UINT32	151	Y	Quantity open for further execution.
CumQty	64	4	UINT32	14	Y	Total quantity (e.g. number of shares) filled.
TransactTime	68	8	UTCTimestampNanos	60	Y	The time at which the transaction occurred.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
						UTC timestamp since epoch with nanosecond precision.
LastLiquidityInd	76	1	LastLiquidityIndType	851	Y	Indicator denoting whether the referenced order removed liquidity from or added liquidity to the book.
LastMkt	77	4	CHAR	30	Y	Market of execution for last fill, or an indication of the market where an order was routed. Uses ISO 10383 (MIC).
TrdMatchID	81	8	UINT64	880	Y	Identifier assigned to the Trade by the matching system.
LnkID	89	4	CHAR	583	N	As stated in the order.
SecurityGroup	93	1	CHAR	1151	Y	Security Listing Tape indicator (“A”, “B”, “C”).
ExecutionDetails	94	2	ExecutionDetailsType	21038	Y	Identifies specific details about this trade (see ExecutionDetailsType)
AuctionType	96	1	AuctionType	21039	N	Identifies the auction type if the order was executed in an auction.
AuctionId	97	8	UINT64	21040	N	Identifies the auction for an auction trade.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.
Parties	-	-	Parties Group	N/A	Y	The parties associated with this new order.

6.2.1.4 ExecutionReport_PendingCancel

The ExecutionReport_PendingCancel is a response to OrderCancelRequest request indicating the request has been received by the exchange and is in the process of being handled.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 9

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the ExecutionReport was sent. UTC timestamp since unix epoch with nanosecond precision.
OrderID	15	8	UINT64	37	Y	OrderID as assigned by the exchange.
ClOrdID	23	16	CHAR	11	Y	As stated in the cancel request
OrigClOrdID	39	16	CHAR	41	Y	As stated in the cancel request
ExecID	55	8	UINT64	17	Y	Unique identifier of execution message as assigned by the exchange. Uniqueness is guaranteed within a single trading day.
Symbol	63	6	CHAR	55	Y	As stated on the previous order
SymbolSfx	69	6	CHAR	65	N	As stated on the previous order
OrdStatus	75	1	OrdStatusType	39	Y	The status of the order.
LeavesQty	76	4	UINT32	151	Y	Quantity open for further execution.
CumQty	80	4	UINT32	14	Y	Total quantity (e.g. number of shares) filled.
LnkID	84	4	CHAR	583	N	As stated in the order. For a remote cancel request this field will not be present.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.
Parties	-	-	Parties Group	N/A	N	The parties associated with this new order.

6.2.1.5 ExecutionReport_Canceled

The ExecutionReport_Canceled message is an unsolicited event on an order triggered by a successful handling of cancel / mass cancel request for that order. Orders that are canceled by the exchange because of Time in Force instructions shall have an OrdStatus as Expired. All other cases shall have OrdStatus as Canceled.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 11

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the ExecutionReport was sent. UTC timestamp since unix epoch with nanosecond precision.
ClOrdID	15	16	CHAR	11	Y	The identifier for the cancel request or the canceled order in the event of an unsolicited cancel*
OrigClOrdID	31	16	CHAR	41	N	A Unique identifier for the canceled order if available*
OrderID	47	8	UINT64	37	Y	OrderID as assigned by the exchange to the canceled order.
ExecID	55	8	UINT64	17	Y	Unique identifier of execution message as assigned by the exchange. Uniqueness is guaranteed within a single trading day.
OrdStatus	63	1	OrdStatusType	39	Y	The status of the order.
LeavesQty	64	4	UINT32	151	Y	Quantity open for further execution.
CumQty	68	4	UINT32	14	Y	Total quantity (e.g. number of shares) filled.
CancelReason	72	1	CancelReasonCode	21004	Y	Reason code for order cancellation.
TransactTime	73	8	UTCTimestampNanos	60	Y	The time at which the transaction occurred. UTC timestamp since epoch with nanosecond precision.
LnkID	81	4	CHAR	583	N	As stated on the order. For a remote cancel request this field will not be present.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
Parties	-	-	Parties Group	N/A	N	The parties associated with this new order.

* Orders that are canceled as a result of a mass cancel request will be reported back to customers as Unsolicited cancel i.e. the `ClOrdID`and`OrigClOrdID`fields will contain the canceled order identifier.

6.2.1.6 ExecutionReport_PendingReplace

The ExecutionReport_PendingReplace message is a response to OrderCancelReplaceRequest request indicating the request has been received by the exchange and is in the process of being handled.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 13
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the ExecutionReport was sent. UTC timestamp since unix epoch with nanosecond precision.
OrderID	15	8	UINT64	37	Y	OrderID as assigned by the exchange to the canceled order.
ClOrdID	23	16	CHAR	11	Y	As stated in the replace request
OrigClOrdID	39	16	CHAR	41	Y	As stated in the replace request
ExecID	55	8	UINT64	17	Y	Unique identifier of execution message as assigned by the exchange. Uniqueness is guaranteed within a single trading day.
Symbol	63	6	CHAR	55	Y	As stated on the previous order
SymbolSfx	69	6	CHAR	65	N	As stated on the previous order
Side	75	1	SideType	54	Y	As stated on the previous order
OrderQty	76	4	UINT32	38	Y	As stated on the previous order
OrdType	80	1	OrdType	40	Y	As stated on the previous order
Price	81	8	Price	44	N	As stated on the previous order
DisplayQty	89	4	UINT32	1138	N	As stated on the previous order

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
LocateReqd	93	1	CHAR	114	N	As stated on the previous order
OrdStatus	94	1	OrdStatusType	39	Y	The status of the order. (PendingReplace)
LeavesQty	95	4	UINT32	151	Y	Quantity open for further execution.
CumQty	99	4	UINT32	14	Y	Total quantity (e.g. number of shares) filled.
LnkID	103	4	CHAR	583	N	As stated on the replace request, or the original order if not supplied on the replace request.
LocateBroker	107	4	CHAR	5700	N	As stated on the previous order.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.
Parties	-	-	Parties Group	N/A	Y	The parties associated with this new order.

6.2.1.7 ExecutionReport_Replaced

The ExecutionReport_Replaced is an unsolicited event on an order triggered by a successful handling of OrderCancelReplaceRequest for the original order. The original order can be considered fully cancelled and replaced by the stated replacement order upon receipt of this event.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 14
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the ExecutionReport was sent. UTC timestamp since unix epoch with nanosecond precision.
OrderID	15	8	UINT64	37	Y	OrderID as assigned by the exchange.
ClOrdID	23	16	CHAR	11	Y	As stated in the replace request
OrigClOrdID	39	16	CHAR	41	Y	As stated in the replace request
ExecID	55	8	UINT64	17	Y	Unique identifier of execution message as assigned by the exchange. Uniqueness is guaranteed within a single trading day.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
Symbol	63	6	CHAR	55	Y	As stated in the replace request
SymbolSfx	69	6	CHAR	65	Y	As stated in the replace request
Side	75	1	SideType	54	Y	As stated in the replace request
OrderQty	76	4	UINT32	38	Y	As stated in the replace request
OrdType	80	1	OrdType	40	Y	As stated in the replace request
Price	81	8	Price	44	Y	As stated in the replace request
DisplayQty	89	4	UINT32	1138	Y	As stated in the replace request
LocateReqd	93	1	CHAR	114	Y	As stated in the replace request
OrdStatus	94	1	OrdStatusType	39	Y	The status of the order.
LeavesQty	95	4	UINT32	151	Y	Quantity open for further execution.
CumQty	99	4	UINT32	14	Y	Total quantity (e.g. number of shares) filled.
TransactTime	103	8	UTCTimestampNanos	60	Y	The time at which the transaction occurred. UTC timestamp since epoch with nanosecond precision.
LnkID	111	4	CHAR	583	N	As stated on the replace request, or the original order if not supplied on the replace request.
LocateBroker	115	4	CHAR	5700	N	As stated in the replace request.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.
Parties	-	-	Parties Group	N/A	Y	The parties associated with this new order.

6.2.1.8 ExecutionReport_TradeCorrection

The ExecutionReport_TradeCorrection is an unsolicited event notifying of a change to a price and/or quantity of a previously reported trade.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 15

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the ExecutionReport was sent. UTC timestamp since unix epoch with nanosecond precision.
OrderID	15	8	UINT64	37	Y	OrderID as assigned by the exchange.
ClOrdID	23	16	CHAR	11	Y	The ClOrdID associated with the order.
ExecID	39	8	UINT64	17	Y	Unique identifier of execution message as assigned by the exchange. Uniqueness is guaranteed within a single trading day.
ExecRefID	47	8	UINT64	19	Y	The ExecID of the trade being corrected
TrdMatchID	55	8	UINT64	880	Y	Identifier assigned to the Trade by the matching system.
OrdStatus	63	1	OrdStatusType	39	Y	Order status
LastPx	64	8	Price	31	Y	Corrected trade price.
LastQty	72	4	UINT32	32	Y	Corrected trade quantity.
LeavesQty	76	4	UINT32	151	Y	Quantity open for further execution.
CumQty	80	4	UINT32	14	Y	Total quantity (e.g. number of shares) filled.
LnkID	84	4	CHAR	583	N	As stated in the order.
SecurityGroup	88	1	CHAR	1151	Y	Security Listing Tape indicator (“A”, “B”, “C”).
ExecutionDetails	89	2	ExecutionDetailsType	21038	Y	Identifies execution details.
AuctionType	91	1	AuctionType	21039	N	Identifies the auction type if the order was executed in an auction.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
AuctionId	92	8	UINT64	21040	N	Identifies the auction for an auction trade.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.
Parties	-	-	Parties Group	N/A	Y	The parties associated with this new order.

6.2.1.9 ExecutionReport_TradeBreak

The ExecutionReport_TradeBreak is an unsolicited event notifying of a cancelation of a previously reported trade.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 16
SendingTime	7	8	UTCTimestampNanos	52	Y	UTC timestamp since unix epoch with nanosecond precision.
OrderID	15	8	UINT64	37	Y	OrderID as assigned by the exchange.
ClOrdID	23	16	CHAR	11	Y	The ClOrdID associated with the order.
ExecID	39	8	UINT64	17	Y	Unique identifier of execution message as assigned by the exchange. Uniqueness is guaranteed within a single trading day.
ExecRefID	47	8	UINT64	19	Y	The ExecID of the trade being corrected
TrdMatchID	55	8	UINT64	880	Y	Identifier assigned to the Trade by the matching system.
OrdStatus	63	1	OrdStatusType	39	Y	Order status
LeavesQty	64	4	UINT32	151	Y	Quantity open for further execution.
CumQty	68	4	UINT32	14	Y	Total quantity (e.g. number of shares) filled.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
LnkID	72	4	CHAR	583	N	As stated in the order.
SecurityGroup	76	1	CHAR	1151	Y	Security Listing Tape indicator (“A”, “B”, “C”).
ExecutionDetails	77	2	ExecutionDetailsType	21038	Y	Identifies execution details.
AuctionType	79	1	AuctionType	21039	N	Identifies the auction type if the order was executed in an auction.
AuctionId	80	8	UINT64	21040	N	Identifies the auction for an auction trade.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.
Parties	-	-	Parties Group	N/A	Y	The parties associated with this new order.

6.2.1.10 ExecutionReport_Restatement

The ExecutionReport_Restatement is an unsolicited event to notify the client that an open order has been updated by the exchange. This message may be sent for orders configured for automatic repricing via the RepriceFrequency instruction. This message can also be sent if the order quantity is partially or fully cancelled because of Self Trade Prevention. This message will not be sent for Pegged Orders. In version 1.9 and beyond, clients can elect to receive an optional Restatement execution report when an order is booked and it either sets a new NBBO, or joins the existing NBBO.

NOTE: This message will be sent in the case of an order entered with the SingleReprice instruction, when the system is able to display the order at the booking price, if the order was repriced and displayed away from its booking price upon entry. In this case, the lastPx field will be the same as the previous Restatement, to indicate that the position on order book has not changed, but the message still will be sent to allow for correlation with the displayed orders on the MEMOIR Depth feed.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 17
SendingTime	7	8	UTCTimestampNanos	52	Y	UTC timestamp since unix epoch with nanosecond precision.
OrderID	15	8	UINT64	37	Y	OrderID as assigned by the exchange.

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
ClOrdID	23	16	CHAR	11	Y	The ClOrdID associated with the order.
ExecID	39	8	UINT64	17	Y	Unique identifier of execution message as assigned by the exchange. Uniqueness is guaranteed within a single trading day.
OrdStatus	47	1	OrdStatusType	39	Y	Order status
LastPx	48	8	Price	31	Y	ExecRestatementType(3):The updated booked price. This is the price that the order can match at. It may be different than the displayed price. ExecRestatementType(5): The match price if this order had not been prevented from executing due to STP restrictions.
LeavesQty	56	4	UINT32	151	Y	Quantity open for further execution.
CumQty	60	4	UINT32	14	Y	Total quantity (e.g. number of shares) filled.
LastQty	64	4	UINT32	32	N	ExecRestatementType(5): The number of shares that would have matched if this order had not been prevented from executing due to STP restrictions.
ExecRestatementReason	68	1	ExecRestatementType	378	Y	The reason for the restatement.
TransactTime	69	8	UTCTimestampNanos	60	Y	The time at which the transaction occurred. UTC timestamp since epoch with nanosecond precision.
ExtendedRestatementReason	77	1	ExtendedRestatementReasonType	21022	N	When ExecRestatementReason = 99 (Other)

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
						this field contains additional information about the restatement.
LnkID	78	4	CHAR	583	N	As stated in the order.
NoPartyIDs	-	-	Repeating Group Dimensions	453	Y	The dimensions of the repeating group.
Parties	-	-	Parties Group	N/A	Y	The parties associated with this new order.

6.2.2 PendingMassCancel

The PendingMassCancel is a response to MassCancelRequest request indicating the request has been received by the exchange and is in the process of being handled.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 10
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the ExecutionReport was sent. UTC timestamp since unix epoch with nanosecond precision.
ClOrdID	15	16	CHAR	11	Y	The identifier for this mass cancel, as stated in the mass cancel request.
Symbol	31	6	CHAR	55	N	As stated in the mass cancel request
SymbolSfx	37	6	CHAR	65	N	As stated in the mass cancel request
Side	43	1	SideType	54	N	As stated in the mass cancel request
LowerThanPrice	44	8	Price	21026	N	As stated in the mass cancel request
HigherThanPrice	52	8	Price	21027	N	As stated in the mass cancel request

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
CancelGroupID	60	2	UINT16	21000	N	As stated in the mass cancel request

6.2.3 MassCancelReject

The MassCancelReject message is used by the exchange to indicate a mass cancel request cannot be honored as sent.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 20
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the message was sent. UTC timestamp since unix epoch with nanosecond precision.
ClOrdID	15	16	CHAR	11	Y	The identifier for this mass cancel, as stated in the mass cancel request.
Symbol	31	6	CHAR	55	N	As stated in the mass cancel request
SymboSfx	37	6	CHAR	65	N	As stated in the mass cancel request
Side	43	1	SideType	54	N	As stated in the mass cancel request
LowerThanPrice	44	8	Price	21026	N	As stated in the mass cancel request

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
HigherThanPrice	52	8	Price	21027	N	As stated in the mass cancel request
CancelGroupID	60	2	UINT16	21000	N	As stated in the mass cancel request
RejectReason	62	1	MassCancelRejectReasonCode	21028	Y	Code to identify reason for mass cancel rejection

6.2.4 MassCancelDone

The MassCancelDone is sent when all the orders specified in the MassCancelRequest request have been processed.

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 12
SendingTime	7	8	UTCTimestampNanos	52	Y	The time the ExecutionReport was sent. UTC timestamp since unix epoch with nanosecond precision.
ClOrdID	15	16	CHAR	11	Y	The identifier for this cancel, as stated in the cancel request.

6.2.5 OrderCancelReject

The OrderCancelReject message is used by the exchange to indicate a cancel request or cancel-replace request cannot be honored.

This message corresponds to FIX message type 9

Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
SBE Header	0	7	N/A	N/A	Y	SBE Header with templateID = 18
SendingTime	7	8	UTCTimestampNanos	52	Y	UTC timestamp since unix epoch with

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Field	Offset	Length	Type	Tag Ref Num	Req'd	Description
						nanosecond precision.
ClOrdID	15	16	CHAR	11	Y	Unique identifier from the cancel request.
CxlRejResponseTo	31	1	CxlRejResponseToType	434	Y	Identifies the request that this cancel reject is responding to.
CxlRejReason	32	1	CancelRejectReasonCode	102	Y	Code to identify reason for cancel rejection.
LnkID	33	4	CHAR	583	N	As stated in the order as long as the order is a live order.

7 Appendices

7.1 Reserve Orders

7.1.1 Display Method Initial

The DisplayQty field specifies the number of shares of the reserve order to display. If the displayed quantity drops below a round lot, then the displayed portion is replenished to display DisplayQty shares.
The DisplayMinInc field should be Null (`0xFFFF`) on the NewOrderSingle.

7.1.1.1 Example

NewOrderSingle with the following fields OrderQty = 2000, DisplayQty = 1000, DisplayMethod = Initial.

The displayed size after replenishment will always be 1000.

Event	Display	Hidden	Filled
Initial Order	1000	1000	0
Trade 950	50	1000	950
Replenish 950	1000	50	950
Trade 1000	0	50	1950
Replenish	50	0	1950

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7.1.2 Display Method Random

When Random is selected on a NewOrderSingle, the initial displayed size is as specified by the DisplayQty field.
When the size drops below a round lot then the displayed portion of the order is replenished. The new displayed size is determined by randomly choosing a number between (DisplayQty - DisplayMinIncr) and (DisplayQty + DisplayMinIncr). This number is rounded to the nearest round lot and then added to remaining displayed portion of the order. If the replenish size is greater than the remaining size on the order then the remaining size is used as the replenishment amount.

7.1.2.1 Example

NewOrderSingle with the following fields OrderQty = 3000, DisplayQty = 1000, DisplayMinIncr = 600, DisplayMethod = Random.

The replenish size will be randomly selected between (DisplayQty - DisplayMinInc) = 400 and (DisplayQty + DisplayMinInc) = 1600, in 100 share increments (the round lot size).

Event	Display	Hidden	Filled
Initial Order	1000	2000	0
Trade 950	50	2000	950
Random Replenish size 700	750	1300	950
Trade 750	0	1300	1700
Random Replenish size 1500 (only 1300 remains)	1300	0	1700

7.1.3 ReserveReplenishTimingType Random

When Random is selected, the replenish function happens at a random time up to 1 millisecond after the execution that triggered the replenishment. The displayed size after replenishment is the minimum of remaining hidden size and the DisplayQty specified in the NewOrderSingle.

7.1.4 Display Method Undisclosed

Select Undisclosed to make the order completely hidden on the book for the lifetime of the order.

7.2 Mass Cancel Flow

The Mass Cancel feature provides customers with a way to cancel a group of orders belonging to the firm that match a set of parameters provided in the MassCancelRequest message.

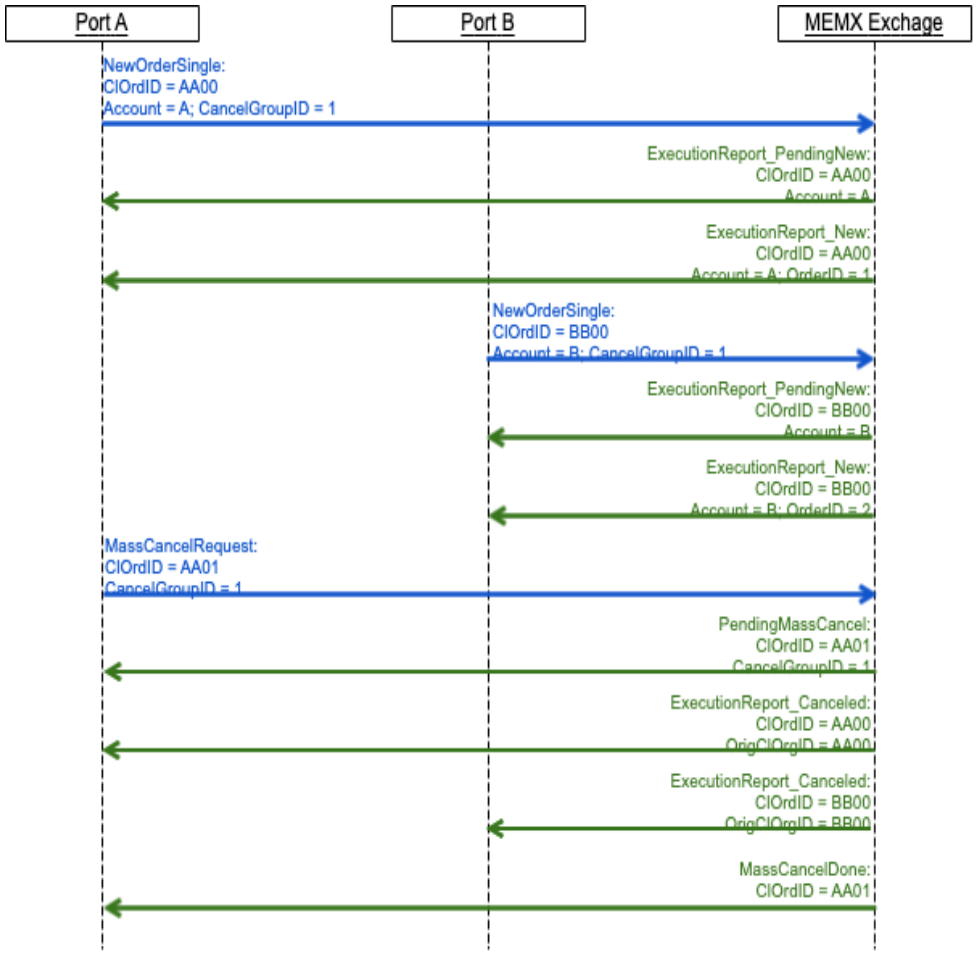
The orders matching the set of parameters may come through any port belonging to the customer regardless of which protocol was used to enter them.

Once a MassCancelRequest is sent, the following sequence of messages will follow:

1. A PendingMassCancel response is sent down the requesting port to indicate that the request has been accepted and is being processed by the exchange.
2. ExecutionReport_Canceled messages are sent for all orders matching the requested criteria down the same port they were originally sent through.
3. A MassCancelDone message is sent down the same port which originated the MassCancelRequest to indicate the process has been completed.

The following message diagram depicts this flow:

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7.3 Encoding Examples

The below examples illustrate complete encoded messages as they will appear on the wire. Note: the code fragments shown are representative of how to set field values in the SBE messages. Your interface may be different.

7.3.1 Client to Server Requests:

7.3.1.1 New Order - Limit Order

```
newOrderSingleEncoder.clOrdID("CID0000000001");
newOrderSingleEncoder.symbol("AAPL");
newOrderSingleEncoder.side(SideType.SellShort);
newOrderSingleEncoder.orderQty(100);
newOrderSingleEncoder.ordType(OrdType.Limit);
newOrderSingleEncoder.price().mantissa(386980000);
newOrderSingleEncoder.timeInForce(TimeInForceType.Day);
newOrderSingleEncoder.orderCapacity(OrderCapacityType.Agency);
newOrderSingleEncoder.custOrderCapacity(CustOrderCapacityType.MemberTradingOn
TheirOwnAccount);
```

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```
newOrderSingleEncoder.execInst().externalRoutingNotAllowed(true);
newOrderSingleEncoder.pegOffsetValue().mantissa(PriceTypeEncoder.mantissaNull
Value());
newOrderSingleEncoder.pegPriceType(PegType.NULL_VAL);
newOrderSingleEncoder.expireTime().time(UTCTimestampNanosEncoder.timeNullValu
e());
newOrderSingleEncoder.minQty(NewOrderSingleEncoder.minQtyNullValue());
newOrderSingleEncoder.displayQty(NewOrderSingleEncoder.displayQtyNullValue())
;
newOrderSingleEncoder.displayMethod(DispMethodType.NULL_VAL);
newOrderSingleEncoder.reserveReplenishTiming(ReserveReplenishTimingType.NULL_
VAL);
newOrderSingleEncoder.displayMinIncr(NewOrderSingleEncoder.displayMinIncrNull
Value());
newOrderSingleEncoder.locateReqd((byte) 'N');
newOrderSingleEncoder.repriceFrequency(RepriceFrequencyType.None);
newOrderSingleEncoder.repriceBehavior(RepriceBehaviorType.NULL_VAL);
newOrderSingleEncoder.cancelGroupID(1);
newOrderSingleEncoder.stpGroupID(2);
newOrderSingleEncoder.selfTradePrevention(SelfTradePreventionType.CancelOldes
t);
newOrderSingleEncoder.riskGroupID(3);
newOrderSingleEncoder.lnkID("LN01");
newOrderSingleEncoder.locateBroker("BRKR");

header.numGroups((short) 1);
NewOrderSingleEncoder.PartiesEncoder parties =
newOrderSingleEncoder.partiesCount(1);
NewOrderSingleEncoder.PartiesEncoder mpidParty = parties.next();
mpidParty.partyID("MPID");
mpidParty.partyIDSource((byte) PartyIDSource.GenerallyAcceptedMPID.value);
mpidParty.partyRole(PartyRoleType.ExecutingFirm);

Hex code:
00000000: 00620101 02000143 49443030 30303030   |.b.....CID000000|
00000010: 30303031 00000041 41504c00 00000000   |0001...AAPL.....|
00000020: 00000035 00000064 32000000 001710d8   |...5...d2.......|
00000030: a0304101 00040000 80000000 00000000   |.0A.............|
00000040: ffffffff ffffffff ffffffff ffffffff   |................|
00000050: ff00ffff ffffff4e 02ff0001 00020100   |.......N........|
00000060: 034c4e30 3142524b 5212014d 50494400   |.LN01BRKR..MPID.|
00000070: 00000000 00000000 00000043 01         |...........C.|
```

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