

# NASDAQ OMX EUROPE TotalView-ITCH

## **Version 1.02**

### **1 Overview**

NASDAQ OMX EUROPE TotalView-ITCH<sup>SM</sup> is a direct data feed product offered by The Pan European Exchange<sup>®</sup>, which features the following data elements:

- **Order level data:** NASDAQ OMX EUROPE will provide its full order depth using the standard ITCH format. ITCH uses a series of messages of order messages to track the life of a customer order.<sup>1</sup>
- **Trade messages:** To ensure that customers have complete information about NASDAQ OMX EUROPE order flow, TotalView-ITCH supports a trade message to reflect all matches which occur in the NASDAQ OMX EUROPE system.
- **Administrative messages,** such trading actions and symbol directory messages:
  - Trading action messages are used to inform market participants when a security is halted or released for trading.
  - Symbol Directory messages provide basic security data such as the market tier and Financial Status Indicator.

### **2 Architecture**

The TotalView-ITCH feed is made up of a series of sequenced messages. Each message is variable in length based on the message type and is composed of non-control ASCII bytes. The messages that make up the Totalview-ITCH protocol are typically delivered using a higher level protocol that takes care of sequencing and delivery guarantees.

NASDAQ OMX EUROPE offers the TotalView-ITCH data feed in three protocol options:

<b>Protocol Option</b>	<b>Number of Outbound Channels</b>
SoupTCP	Single outbound channel for all securities
Compressed via SoupTCP	Single outbound channel for all securities
MoldUDP	Single outbound channel for all securities

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<sup>1</sup> TOTALVIEW-ITCH is an outbound market data feed only. The ITCH protocol does not support order entry. For information on NASDAQ OMX EUROPE order entry protocols, please email [participantsupport@nasdaqomx.com](mailto:participantsupport@nasdaqomx.com)

### 3 Data Types

All numeric fields are composed of a string of ASCII coded digits, right justified and space filled on the left.

All alpha fields are left justified and padded on the right with spaces.

Prices are given in decimal format with 6 whole number places followed by 4 decimal digits. The whole number portion is padded on the left with spaces; the decimal portion is padded on the right with zeros. The decimal point is implied by position; it does not appear inside the price field. The currency is implied by the stock symbol.

Prices in the Long Form messages are given in decimal format with 12 whole number places followed by 7 decimal digits. The whole number portion is padded on the left with spaces; the decimal portion is padded on the right with zeros. The decimal point is implied by position; it does not appear inside the price field. The currency is implied by the stock symbol.

### 4 Message Formats

The TOTALVIEW-ITCH feed is composed of a series of messages that describe orders added to, removed from, and executed on NASDAQ OMX EUROPE as well as disseminates Stock Directory information.

#### 4.1 Time Messages

For bandwidth efficiency reasons, NASDAQ OMX EUROPE will use separate time stamp messages for the TotalView-ITCH product. The messages will be sequenced so that data feed recipients can apply the time stamps properly. The time stamp is broken into two separate messages: seconds and milliseconds. Please note that the timestamp for new seconds will always be immediately followed by a time stamp for new milliseconds.

##### 4.1.1 Seconds Message

This message is sent every second for which at least one TotalView-ITCH message is being generated.

SECONDS MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	"T"	Seconds Message.
Second	1	5	Numeric	Number of second since midnight.

##### 4.1.2 Milliseconds Message

This message is sent every millisecond for which at least one TotalView-ITCH message is being generated.

MILLISECONDS MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	"M"	Milliseconds Message.
Millisecond	1	3	Numeric	Number of milliseconds since last second.

## 4.2 System Event Messages

### 4.2.1 NEURO Event Messages

The Neuro event message type is used to signal a market or data feed handler event. The format is as follows:

NEURO EVENT MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	"S"	Neuro Event Message.
Event Code	1	1	Alphanumeric	See Neuro Event Codes below.

NEURO EVENT CODES	
Code	Explanation
"O"	<i>Start of Messages.</i> Outside of time stamp messages, the start of day message is the first message sent in any trading day.
"S"	<i>Start of System hours.</i> This message indicates that PAN-EUROPEAN MARKET is open and ready to start accepting orders.
"E"	<i>End of System hours.</i> It indicates that PAN-EUROPEAN MARKET is now closed and will not accept any new orders today. It is still possible to receive Broken Trade messages and Order Delete messages after the End of Day.
"C"	<i>End of Messages.</i> This is always the last message sent in any trading day.

### 4.2.2 Market Event

The market event message type is used to signal a system event associated with an away market. The format is as follows:

MARKET EVENT MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	"Z"	Market Event Message.
Event Code	1	1	Alphanumeric	See Market Event Codes below.
Market Center	2	4	Alphanumeric	Market Identifier Code (ISO 10383)

MARKET EVENT CODES	
Code	Explanation
"O"	<i>Start of Market Hours</i>
"C"	<i>End of Market Hours</i>

## 4.3 Stock Related Messages

### 4.3.1 Symbol Directory

At the start of each trading day, the NASDAQ OMX EUROPE disseminates symbol directory messages for all symbols active for the trading day.

SYMBOL DIRECTORY				
Name	Offset	Length	Value	Notes
Message Type	0	1	"R"	Symbol Directory Message
Symbol	1	6	Alphanumeric	Denotes the symbol used by the NASDAQ OMX EUROPE for identifying the trading instrument.
ISIN	7	12	Alphanumeric	ISIN code identifying security
Currency	19	3	Alphabetic	Currency in which the instrument trades. Supported values include  GBX = Pence Sterling GBP = Pound Sterling SEK = Swedish Krona EUR = Euro CHF = Swiss Franc
MIC	22	4	Alphabetic	Market Identifier Code (ISO 10383) of the listing exchange
Reserved	26	6	Numeric	

### 4.3.2 Stock Trading Action

NASDAQ OMX EUROPE uses this administrative message to indicate the current trading status of a security to the trading community.

Prior to the start of system hours, NASDAQ OMX EUROPE will send out a Trading Action spin. In the spin, NASDAQ OMX EUROPE will send out a Stock Trading Action message with the "T" (Trading Resumption) for all NASDAQ OMX EUROPE traded securities that are eligible for trading at the start of the system hours. If a security is absent from the pre-opening Trading Action spin, firms should assume that the security is being treated as halted in the NASDAQ OMX EUROPE platform at the start of the system hours. Please note that securities may be halted in the NASDAQ OMX EUROPE system for both regulatory and operational reasons.

After the start of system hours, NASDAQ OMX EUROPE will use the Trading Action message to relay changes in trading status for an individual security. Messages will be sent when a stock is halted, is released for order entry or is released for trading.

STOCK TRADING ACTION				
Name	Offset	Length	Value	Notes
Message Type	0	1	"H"	Stock Trading Action Message.
Stock	1	6	Alphanumeric	Stock symbol right padded with spaces.
Trading State	7	1	Alphabetic	"H" = Halted "T" = Trading on NASDAQ OMX EUROPE
Reserved	8	1	Alphanumeric	Reserved.
Reason	9	4	Alphanumeric	Trading Action reason.

## 4.4 Add Order Message

An Add Order Message indicates that a new order has been accepted by the NASDAQ OMX EUROPE system and was added to the displayable book. The message includes a day-unique Order Reference Number used by NASDAQ OMX EUROPE to track the order.

### 4.4.1 Add Order

This message will be generated for orders in the NASDAQ OMX EUROPE system.

<b>ADD ORDER MESSAGE</b>				
<b>Name</b>	<b>Offset</b>	<b>Length</b>	<b>Value</b>	<b>Notes</b>
Message Type	0	1	"A"	Add Order Message.
Order Reference Number	1	9	Numeric	The unique reference number assigned to the new order. The order reference number is Increasing, but not necessarily sequential.
Buy/Sell Indicator	10	1	Alphabetic	The type of order being added.  "B" = buy order. "S" = sell order.
Shares	11	6	Numeric	The total number of shares associated with the order being added to the book.
Stock	17	6	Alphanumeric	The security symbol for which the order is being added.
Price	23	10	Numeric	The display price of the new order. Refer to Data Types for field processing notes.

#### 4.4.2 Add Order – Long Form

This message will be generated for orders entered with a size greater than 999,999 in the NASDAQ OMX Europe system

<b>ADD ORDER – LONG FORM MESSAGE</b>				
<b>Name</b>	<b>Offset</b>	<b>Length</b>	<b>Value</b>	<b>Notes</b>
Message Type	0	1	"a"	Add Order Message.
Order Reference Number	1	9	Numeric	The unique reference number assigned to the new order. The order reference number is Increasing, but not necessarily sequential.
Buy/Sell Indicator	10	1	Alphabetic	The type of order being added.  "B" = buy order. "S" = sell order.
Shares	11	10	Numeric	The total number of shares associated with the order being added to the book.
Stock	21	6	Alphanumeric	The security symbol for which the order is being added.
Price	27	19	Numeric	The display price of the new order. Refer to Data Types for field processing notes.

### 4.5 Modify Order Messages

Modify Order messages always include the Order Reference Number of the Add Order to which the update applies. To determine the current display shares for an order, ITCH subscribers must deduct the number of shares stated in the Modify message from the original number of shares stated in the Add Order message with the same reference number. NASDAQ OMX EUROPE may send multiple Modify Order messages for the same order reference number and the effects are cumulative. When the number of display shares for an order reaches zero, the order is dead and should be removed from the book.

#### 4.5.1 Order Executed Message

This message is sent whenever an order on the book is executed in whole or in part. It is possible to receive several Order Executed Messages for the same order if that order is executed in several parts. The multiple Order Executed Messages on the same order are cumulative.

By combining the executions received separately via two types of Order Executed Messages and Trade Messages, it is possible to build a complete view of all executions that happen on NASDAQ OMX EUROPE.

<b>ORDER EXECUTED MESSAGE</b>				
<b>Name</b>	<b>Offset</b>	<b>Length</b>	<b>Value</b>	<b>Notes</b>
Message Type	0	1	"E"	Order Executed Message.
Order Reference Number	1	9	Numeric	The order reference number associated with the executed order.
Executed Shares	10	6	Numeric	The number of shares executed.
Match Number	16	9	Numeric	The NASDAQ OMX EUROPE generated day-unique Match Number of this execution. The match number is also referenced in the Trade Break Message.

#### 4.5.2 Order Executed – Long Form

This message is sent whenever an order with an executed share size greater than 999,999 on the book is executed in whole or in part. It is possible to receive several Order Executed Messages for the same order if that order is executed in several parts. The multiple Order Executed Messages on the same order are cumulative.

<b>ORDER EXECUTED – LONG FORM MESSAGE</b>				
<b>Name</b>	<b>Offset</b>	<b>Length</b>	<b>Value</b>	<b>Notes</b>
Message Type	0	1	"e"	Order Executed Message.
Order Reference Number	1	9	Numeric	The order reference number associated with the executed order.
Executed Shares	10	10	Numeric	The number of shares executed.
Match Number	20	9	Numeric	The NASDAQ OMX EUROPE generated day-unique Match Number of this execution. The match number is also referenced in the Trade Break Message.

#### 4.5.3 Order Executed With Price Message

This message is sent whenever an order on the book is executed in whole or in part at a price different from the initial display price. Since the execution price is different than the display price of the original Add Order, NASDAQ OMX EUROPE includes a price field within this execution message.

It is possible to receive multiple Order Executed and Order Executed with Price messages for the same order if that order is executed in several parts. The multiple Order Executed messages on the same order are cumulative.

If a firm is looking to use the ITCH data in time-and-sales displays or volume calculations, NASDAQ OMX EUROPE recommends that firms ignore messages marked as non-printable to prevent double counting.

ORDER EXECUTED WITH PRICE MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	"C"	Order Executed Message.
Order Reference Number	1	9	Numeric	The reference number of the order that was executed.
Executed Shares	10	6	Numeric	The number of shares executed.
Match Number	16	9	Numeric	The NASDAQ OMX EUROPE generated day-unique Match Number of this execution. The match number is also referenced in the Trade Break Message.
Printable	25	1	Alphabetic	Indicates if the execution should be reflected on time and sale displays and volume calculations.  "Y" = printable
Execution Price	26	10	Numeric	The price at which the order execution occurred. Refer to Data Types for field processing notes.

#### 4.5.4 Order Executed with Price – Long Form Message

This message is sent whenever an order greater than 999,999 shares on the book is executed in whole or in part at a price different from the initial display price. Since the execution price is different than the display price of the original Add Order, NASDAQ OMX EUROPE includes a price field within this execution message.

ORDER EXECUTED WITH PRICE MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	"c"	Order Executed Message.
Order Reference Number	1	9	Numeric	The reference number of the order that was executed.
Executed Shares	10	10	Numeric	The number of shares executed.
Match Number	20	9	Numeric	The NASDAQ OMX EUROPE generated day-unique Match Number of this execution. The match number is also referenced in the Trade Break Message.
Printable	29	1	Alphabetic	Indicates if the execution should be reflected on time and sale displays and volume calculations.  "Y" = printable
Execution Price	30	19	Numeric	The price at which the order execution occurred. Refer to Data Types for field processing notes.

#### 4.5.5 Order Cancel Message

This message is sent whenever an order on the book is modified as a result of a partial cancellation.

ORDER CANCEL MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	"X"	Order Cancel Message.
Order Reference Number	1	9	Numeric	The reference number of the order being canceled or reduced.
Canceled Shares	10	6	Numeric	The number of shares to be removed from the display size of the order as the result of a cancellation.

#### 4.5.6 Order Cancel – Long Form Message

This message is sent whenever an order on the book greater than 999,999 shares is modified as a result of a partial cancellation.

ORDER CANCEL – LONG FORM MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	"x"	Order Cancel Message.
Order Reference Number	1	9	Numeric	The reference number of the order being canceled or reduced.
Canceled Shares	10	10	Numeric	The number of shares to be removed from the display size of the order as the result of a cancellation.

#### 4.5.7 Order Delete Message

This message is sent whenever an order on the book is being cancelled. All remaining shares are no longer accessible so the order should be removed from the book.

ORDER DELETE MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	"D"	Order Delete Message.
Order Reference Number	1	9	Numeric	The reference number of the order being canceled or reduced. References a previously sent Add Order Message.

#### 4.5.8 Order Replace Message

This message is sent whenever an order on the book is modified as a result of a replace operation.

ORDER REPLACE MESSAGE				
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<b>Name</b>	<b>Offset</b>	<b>Length</b>	<b>Value</b>	<b>Notes</b>
Message Type	0	1	"U"	Order Replace Message.
Order Reference Number	1	9	Numeric	The reference number of the order being replaced.
New Order Reference Number	10	9	Numeric	The new reference number.
Shares	19	6	Numeric	The number of shares.
Price	25	10	Numeric	The price.

#### 4.5.9 Order Replace Message – Long Form Message

This message is sent whenever an order on the book greater than 999,999 shares is modified as a result of a result operation..

<b>ORDER REPLACE MESSAGE – LONG FORM MESSAGE</b>				
<b>Name</b>	<b>Offset</b>	<b>Length</b>	<b>Value</b>	<b>Notes</b>
Message Type	0	1	"u"	Order Replace Message.
Order Reference Number	1	9	Numeric	The reference number of the order being replaced.
New Order Reference Number	10	9	Numeric	The new reference number.
Shares	19	10	Numeric	The number of shares.
Execution Price	29	19	Numeric	The price.

## 4.6 Trade Messages

### 4.6.1 Trade Message

The Trade Message is designed to provide execution details for normal match events involving non-displayable order types. Since no Add Order Message is generated when a non-displayed order is initially received, NASDAQ OMX EUROPE cannot use the Modify Order message for all matches. NASDAQ OMX EUROPE therefore developed this message to indicate when a match occurs between non-displayable order types. A Trade Message is transmitted each time a non-displayable order is executed in whole or in part. It is possible to receive multiple Trade Messages for the same order if that order is executed in several parts. Trade Messages for the same order are cumulative.

Trade Messages should be included in NASDAQ OMX EUROPE time-and-sales displays as well as volume and other market statistics. Since Trade Messages do not affect the book, however, they may be ignored by firms just looking to build and track the NASDAQ OMX EUROPE Single Book display.

<b>TRADE MESSAGE</b>				
<b>Name</b>	<b>Offset</b>	<b>Length</b>	<b>Value</b>	<b>Notes</b>
Message Type	0	1	"P"	Trade Message Identifier

TOTALVIEW-ITCH INTERFACE SPECIFICATION

Order Reference Number	1	9	Numeric	The unique reference number assigned to the order on the book being executed. For Negotiated Trades, the Order Reference Number will always be '0'.
Trade Type	10	1	Alphabetic	B = Execution on NEURO Book D = Execution on NEURO Dark N = Negotiated Trade
Shares	11	6	Numeric	The number of shares being matched in this execution.
Stock	17	6	Alphanumeric	The security symbol associated with the match execution.
Price	23	10	Numeric	The match price of the order. Refer to Data Types for field processing notes.
Match Number	33	9	Numeric	The NASDAQ OMX EUROPE generated session-unique Match Number for this trade. The Match Number is referenced in the Trade Break Message.

#### 4.6.2 Trade – Long Form Message

The Trade Message is designed to provide execution details for normal match events involving non-displayable order types greater than 999,999 shares. Since no Add Order Message is generated when a non-displayed order is initially received, NASDAQ OMX EUROPE cannot use the Modify Order message for all matches. NASDAQ OMX EUROPE therefore developed this message to indicate when a match occurs between non-displayable order types. A Trade Message is transmitted each time a non-displayable order is executed in whole or in part. It is possible to receive multiple Trade Messages for the same order if that order is executed in several parts. Trade Messages for the same order are cumulative.

Trade Messages should be included in NASDAQ OMX EUROPE time-and-sales displays as well as volume and other market statistics. Since Trade Messages do not affect the book, however, they may be ignored by firms just looking to build and track the NASDAQ OMX EUROPE Single Book display.

TRADE – LONG FORM MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	"p"	Trade Message Identifier
Order Reference Number	1	9	Numeric	The unique reference number assigned to the order on the book being executed. For Negotiated Trades, the Order Reference Number will always be '0'.
Trade Type	10	1	Alphabetic	B = Execution on NEURO Book D = Execution on NEURO Dark N = Negotiated Trade
Shares	11	10	Numeric	The number of shares being matched in this execution.
Stock	21	6	Alphanumeric	The security symbol associated with the match execution.
Price	27	19	Numeric	The match price of the order. Refer to Data Types for field processing notes.
Match Number	46	9	Numeric	The NASDAQ OMX EUROPE generated session-unique Match Number for this trade. The Match Number is referenced in the Trade Break Message.

#### 4.7 Broken Trade / Order Execution Message

The Broken Trade Message is sent whenever an execution on NASDAQ OMX EUROPE is broken. An execution may be broken if it is found to be “clearly erroneous” pursuant to NASDAQ OMX EUROPE’s Clearly Erroneous Policy (TBA). A trade break is final; once a trade is broken, it cannot be reinstated.

Firms that use the ITCH feed to create time-and-sales displays or calculate market statistics should be prepared to process the broken trade message. If a firm is only using the ITCH feed to build a book, however, it may ignore these messages as they have no impact on the current book.

BROKEN TRADE MESSAGE				
Name	Offset	Length	Value	Notes
Message Type	0	1	“B”	Broken Trade Message.
Match Number	1	9	Numeric	The NASDAQ OMX EUROPE Match Number of the execution that was broken. This refers to a Match Number from a previously transmitted Order Executed Message, Order Executed With Price Message, or Trade Message.

## 5 Support

For general product support for Pan-European data feeds, please email [participantsupport@nasdaqomx.com](mailto:participantsupport@nasdaqomx.com).

## 6 Version History

January 13, 2010: ITCH version 1.02

- Added Order Replace Message
- Updated Trade Message, renaming the Buy/Sell Indicator field to TradeType
- Added new TradeTypes to the Trade Message – D=Neuro Dark, and N=Negotiated Trade

August 24, 2009: ITCH version 1.01

- Changed definitions of the Buy/Sell Indicator to in the “P” and “p” messages to indicate the value will be defaulted to “B” for all trades.

February 27, 2009: ITCH version 1.01

- Added Long Form ITCH messages

September 23, 2008: ITCH version 1.01

- Removed Tick Size from the Symbol Directory

August 27, 2008: ITCH version 1.00

- Added NEURO Event Messages

June 11, 2008: ITCH version 1.00

- Added Symbol Directory

March 5, 2008: ITCH version 1.00

- Initial Version

TOTALVIEW-ITCH INTERFACE SPECIFICATION