



US Equity Buy/Sell Pressure and Retail Indicators Minute Bar Guide

Version 1.0.0 (Feb 2025)



algoseek | the market data company

We provide research market data for machine learning and quantitative trading



CONTACT US

We are here to help you do great things with our market and reference data. For questions, feedback, and other concerns, you may reach our team of experts using the following contact information:

algoseek customer support

✉ support@algoseek.com

☎ (+1) 646 583 1832

algoseek sales

✉ sales@algoseek.com

☎ (+1) 646 583 1832



TABLE OF CONTENTS

REVISION SUMMARY 4

INTRODUCTION 5

DATA ORGANIZATION AND FILE FORMAT 5



REVISION SUMMARY

Effective Date	Version	Revision Type	Description
Feb 4, 2025	1.0.0	Release	An initial version of the dataset



INTRODUCTION

Identifying retail trades in Trade and Quote (TAQ) pricing data, specifically using the SIP (Securities Information Processor) feed, can be challenging because the SIP feed aggregates and normalizes data from multiple exchanges and doesn't directly label whether a trade is retail or institutional. However, some indicators can be used to identify whether a trade is retail with high probability. For example, trade size, trade price, or the exchange where the trade happened can provide some information to identify retail trades.

The US Equity Buy/Sell Pressure and Retail Indicators Minute Bar dataset is built from top-of-book intraday quotes and trades for all listed stocks, ETNs, ETFs, ADRs, and funds from 15+ US exchanges and marketplaces. It provides a list of retail indicators and other analytics that can be helpful in such an analysis. The main approach to identifying retail trades is to analyze sub-penny pricing for FINRA/TRF trade reports ([Tracking Retail Investor Activity](#)).

DATA SOURCE

algoseek Buy/Sell Pressure and Retail Indicators Minute Bar dataset is built from "as-is" tick data collected from live SIP feed algoseek's co-located ticker plant servers in Equinix NY2 and NY4 data centers, connected with 10Gb fiber for low latency.

The Securities Information Processor (SIP) includes Tape A and Tape B covered by the Consolidated Tape Association (CTA) plan and Tape C covered by the Unlisted Trading Privileges (UTP) plan. The SIP links the US markets by processing and consolidating all protected bid/ask quotes and trades from every trading venue into a single and easily consumable data feed.

The SIP disseminates and calculates critical regulatory information, including the National Best Bid and Offer (NBBO) and Limit Up Limit Down (LULD) price bands, among other important regulatory information such as short sale restrictions and regulatory halts. In the highly fragmented world of US equities, the SIP is an easy way for people to get a view of the current state of the market.

FINRA TRF AND ODD LOT TRADES

FINRA TRF

Equity trades are executed on Public Exchanges (e.g., NASDAQ, BATS, NYSE, ARCA, etc.) and off the public exchanges in Dark Pools, Broker-Dealer internal crossing, and Block Trades.



Regulation National Market System (NMS) requires all trades to be reported. There are currently three FINRA Trade Reporting Facilities (TRF) affiliated with registered national securities exchanges and provide FINRA members with a mechanism for reporting transactions affected otherwise than on an exchange.

Regulation NMS allows up to 10 seconds after the Trade execution time for the trade report to be sent to an exchange's TRF for publication. The delay can result in TRF Trade reports printed on the market data feed being out of the current NBBO.

Round Lot and Odd Lot

A round lot (or board lot) is a normal unit of trading of a security, which currently is 100 shares of stock in the US. Any quantity less than 100 shares is referred to as an odd lot. Odd lots are not subject to the Regulation NMS rules requiring execution to be within the current NBBO. Broker-dealers send odd lots to the exchange paying the most rebate per share and not the best execution price. *Odd lot executions can create unrealistic high/low trade prices in an OHLC bar.*

MINUTE BAR CALCULATIONS

Continuous Bar Time

algoseek Buy/Sell Pressure and Retail Indicators dataset provides continuous bars from pre-market opening (4 am EST), regular market hours, and post-market until the last exchange closes, which means there will always be a bar even if there are no events during the bar period.

Carrying Forward of Current NBBO Bid/Ask

If there are no changes to the Bid/Ask in the NBBO during a bar period, the current NBBO Bid/Ask from the previous bar period will be carried forward.

Quote Price Filter

When trading and quoting activities are inactive, for example, during extended trading hours or with an illiquid stock, bid prices can be extremely low, and ask prices can be extremely high. An exchange can also send a bad price, for example, a stock has a bid of \$12.05 then an exchange sends a bid of \$212.05.

To make this Minute Bar dataset usable for illiquid stocks and ETFs/ETNs, algoseek filters out extreme quotes by the following two criteria:

Bid price < (0.05 x average price of last 10 days)

Ask price > (10 x average price of last 10 days)



Separating Exchange and Finra Volume

The bars have trade volume separated into fields:

ExchangeVolume: Trades done on the listed exchanges

FinraVolume: Trades done in Dark Pools, internally by Broker-Dealers, or on an Over-the-Counter (OTC) market reporting to FINRA

The volume data is separated to make it easy to understand the trading in a bar period for either the public-listed exchanges or private non-public trading.

DATA ORGANIZATION AND FILE FORMAT

algoseek provides Equity market data in plain text CSV files. The first row of CSV file is a fixed header and then rows of data corresponding to individual bars. By default, data is organized into one file per symbol per trading day. For example, all trade and quote bars for ticker AAPL on Mar 3, 2020, are stored in one CSV file.

Due to their large data sizes, CSV files are gzip-compressed (with a csv.gz extension) with a compression ratio of about 8:1.

Table 1 demonstrates the full list of data fields in the Equity Buy/Sell Pressure and Retail Indicators file with sample contents for the AAPL symbol.

Table 1: Equity Buy/Sell Pressure and Retail Indicators Sample Data

Date	20241204	20241204	20241204
Ticker	AAPL	AAPL	AAPL
TimeBarStart	09:30	09:31	09:32
OpenBarTime	09:30:00.000000000	09:31:00.000000000	09:32:00.000000000
MinSpread	0.01	0.01	0.01
MaxSpread	0.25	0.1	0.09
ExchangeVolume	782172	154750	85395
FinraVolume	166665	98094	55095
TotalVolume	948837	252844	140490



TotalTrades	11932	3542	2207
TotalQuoteCount	63761	37371	28399
ExchangeTradeCount	4923	2258	1143
FinraTradeCount	7009	1284	1064
OddLotTradeCount	9959	2612	1616
OddLotTotalShares	97184	39549	28124
RelativeSpreadAverage	0.00019	0.00015	0.00015
TradeCumulDistributionTo Bid	86012:90593:95163: 118459:156132:224 128:262617:275348: 278183:413208	75988:83203:84476: 92509:109844:1393 12:152189:158191:1 58462:240628	51715:52502:54761: 60900:67483:97662: 106461:108136:109 726:134166
RetailTRFBuySize	104	42	8
RetailTRFSellSize	144	403	472
RetailOddLotBuySize	38581	9969	6757
RetailOddLotSellSize	24427	15101	9081
TRFRetailPress	0.00026	0.00176	0.00342
OddLotPress	0.06641	0.09915	0.11273
TRFRetailOddLotPress	0.06667	0.10091	0.11615
OddLotTRFRetailRatio	0.99608	0.98256	0.97058
TRFRetailBuySellRatio	0.72222	0.10422	0.01695
OddLotBuySellRatio	1.57944	0.66015	0.74408
TRFRetailOddLotBuySellR atio	1.57442	0.6457	0.70815
RelNetTRFRetailFlow	-0.16129	-0.81124	-0.96667



RelNetOddLotFlow	0.22464	-0.20471	-0.14674
RelNetTRFRetailOddLotFlow	0.22313	-0.21529	-0.17085
TRFRetImbalance	0.41935	0.09438	0.01667
OddLotImbalance	0.61232	0.39765	0.42663
TRFRetOddLotImbalance	0.61156	0.39236	0.41457
TRFRetSentiment	0.10484	0.00305	-0.09392
OddLotSentiment	0.07704	0.05974	0.06461
TRFRetOddLotSentiment	0.07373	0.05625	0.06072

Table 2 (below) provides the name, base event, default value, brief description, and data type for each data field (column) in the Equity Buy/Sell Pressure and Retail Indicators Minute Bar CSV file.

Table column “Missing” indicates a default behavior in case the data field value is not present or cannot be calculated. The column value “Never” means that the data field value is always present.

The table column “Base Event” indicates what type of events are included for data field calculation. Quote: bid/ask event, Trade-X: trades on the exchange, Trade-F: trades on FINRA/TRF, Trade: trades on both exchange and FINRA/TRF.

Table 2: Equity Buy/Sell Pressure and Retail Indicators CSV File Fields Schema

Field	Base Event	Type (Format)	Missing	Description
TradeDate	-	string (yyyymmdd)	Never	Trading date in yyyymmdd format
Ticker	-	string	Never	Symbol name
TimeBarStart	-	string (time)	Never	Start time of the bar. For a minute bar, the format is HH:MM. For a second bar, the format is HH:MM:SS
OpenBarTime	Quote	string (timestamp)	Never	Open time of the bar, for example, one minute bar: 11:03:00.000000000



MinSpread	Quote	decimal	Never	Minimum Bid-Ask spread size. This may be 0 if the market was crossed during the bar. If there is a negative spread due to a back quote, make it zero
MaxSpread	Quote	decimal	Never	Maximum NBBO Bid-Ask spread in a bar
ExchangeVolume	Trade-X	integer	0	Share volume on public exchanges only. That is number of shares traded Excluding FINRA/TRF reported trades, see field "FinraVolume" for FINRA trades. TotalVolume = Volume + FinraVolume
FinraVolume	Trade-F	integer	0	Number of shares traded reported by FINRA/TRF. Trades reported by FINRA are from broker-dealer internalization, dark pools, over-the-counter, etc. FINRA trades represent volume that is hidden or not publicly available to trade
TotalVolume	Trade	integer	Blank	Total number of shares traded during the bar period from both public exchanges and off-exchange FINRA/TRF trades
TotalTrades	Trade	integer	0	Total number of trades
TotalQuoteCount	Quote	integer	Blank	Total count top-of-book Bid and Ask from public exchanges for bar period
ExchangeTradeCount	Trade-X	integer	Blank	Total number of trades on public exchanges for bar period
FinraTradeCount	Trade-F	integer	Blank	Total number of FINRA/TRF trades for bar period
OddLotTradeCount	Trade-X	integer	Blank	Total number of Odd Lot trades during the bar period from public exchanges only
OddLotTotalShares	Trade-X	integer	Blank	Total number of Odd Lot shares traded during the bar period from public exchanges only
RelativeSpreadAverage	Quote Trade	decimal	Blank	The Relative Spread is the Bid/Ask spread relative to the midpoint price at time t for a trade. It shows how wide the spread is compared to the price. For each minute, the average of the Relative Spreads for each trade is calculated. See below "RelativeSpreadAverage"



TradeCumulDistributionToBid	Quote Trade	string	Blank	<p>Cumulative distribution volume of Trade price relative to the Bid during the bar period with 0 being trade at Bid and 1 being trade at Ask. Cumulative distribution created with percentage probabilities of 0:0.05:0.1:0.20:0.40:0.60:0.80:0.90:0.95:1.</p> <p>See below “TradeCumulDistributionToBid”</p>
RetailTRFBuySize	Trade-F Quote	integer	Blank	<p>Estimated number of shares that are Buy retail TRF order flow. That is trades outside of public exchanges reported as TRF. Retail trades are identified using trades executed sub-penny within a specific range.</p> <p>See the “RetailTRFBuySize” notes below with reference to the paper.</p>
RetailTRFSellSize	Trade-F Quote	integer	Blank	<p>Estimated number of shares that are Sell retail TRF order flow. That is trades outside of public exchanges reported as TRF. Retail trades are identified using trades executed sub-penny within a specific range.</p> <p>See the “RetailTRFSellSize” notes below with reference to the paper.</p>
RetailOddLotBuySize	Trade-X Quote	integer	Blank	<p>Estimated number of shares that are Buy retail order flow. Retail trades are identified using odd lot trades executed at a price on a specific side of the midpoint on public exchanges.</p> <p>See “RetailOddLotBuySize” below.</p>
RetailOddLotSellSize	Trade-X Quote	integer	Blank	<p>Estimated number of shares that are Sell retail order flow. Retail trades are identified using odd lot trades executed at a price on a specific side of the midpoint on public exchanges.</p> <p>See “RetailOddLotSellSize” below.</p>
TRFRetailPress	Trade-F	decimal	Blank	<p>The metric measures the proportion of TRF retail trades’ size to the total market volume</p>
OddLotPress	Trade-X Quote	decimal	Blank	<p>The metric measures the proportion of odd lot (on public exchanges) trades’ size to the total market volume</p>



TRFRetailOddLotPress	Trade Quote	decimal	Blank	The metric measures the proportion of TRF retail plus odd lot (on public exchanges) trades' size to the total market volume
OddLotTRFRetailRatio	Trade Quote	decimal	Blank	This metric measures the odd lot (on public exchanges) volume compared to the total TRF retail plus odd lot (on public exchanges) volume
TRFRetailBuySellRatio	Trade-F	decimal	Blank	This metric measures the TRF retail buy size to the TRF retail sell size
OddLotBuySellRatio	Trade-X Quote	decimal	Blank	This metric measures the odd lot (on public exchanges) buy size to the odd lot (on public exchanges) sell size
TRFRetailOddLotBuySellRatio	Trade Quote	decimal	Blank	This metric measures the TRF retail plus odd lot (on public exchanges) buy size to the TRF retail plus odd lot (on public exchanges) sell size
ReINetTRFRetailFlow	Trade-F	decimal	Blank	The metric measures the relative net difference between TRF retail buy and sell sizes to total TRF retail volume
ReINetOddLotFlow	Trade-X Quote	decimal	Blank	The metric measures the relative net difference between odd lot (on public exchanges) buy and sell sizes to the total odd lot (on public exchanges) volume
ReINetTRFRetailOddLotFlow	Trade Quote	decimal	Blank	The metric measures the relative net difference between TRF retail plus odd lot (on public exchanges) buy and sell sizes to the total TRF retail plus odd lot (on public exchanges) volume
TRFRetailImbalance	Trade-F	decimal	Blank	This metric highlights the imbalance between TRF retail buy and sell sizes
OddLotImbalance	Trade-X Quote	decimal	Blank	This metric highlights the imbalance between odd lot (on public exchanges) buy and sell sizes
TRFRetailOddLotImbalance	Trade Quote	decimal	Blank	This metric highlights the imbalance between TRF retail plus odd lot (on public exchanges) buy and sell sizes
TRFRetailSentiment	Trade-F	decimal	Blank	A sentiment indicator that measures TRF retail pressure cycles based on buy/sell imbalances. For example, 1-week cycles.



OddLotSentiment	Trade-X Quote	decimal	Blank	A sentiment indicator that measures odd lot (on public exchanges) pressure cycles based on buy/sell imbalances. For example, 1-week cycles.
TRFRetOddLot Sentiment	Trade Quote	decimal	Blank	A sentiment indicator that measures TRF retail plus odd lot (on public exchanges) pressure cycles based on buy/sell imbalances. For example, 1-week cycles.

Time Range

The Buy/Sell Pressure and Retail Indicators Minute Bar dataset cover the entire trading day from the start of pre-market trading to the end of after-hours trading (ET time):

Pre-Market Hours: 04:00:00 to 09:29:59

Market Hours: 09:30:00 to 16:00:00

Post-Market Hours: 16:00:01 to 20:00:00

Note: Occasionally minute bars are extended several minutes past 20:00.

Market Holidays and Early Closes

The stock market is closed for trading on most US holidays. For reference, algoseek publishes a list of historical holidays which is available at [s3://us-equity-market-holidays/holidays.csv](https://us-equity-market-holidays/s3.amazonaws.com/holidays.csv) (direct download link: <https://us-equity-market-holidays.s3.amazonaws.com/holidays.csv>).

Markets sometimes close early at 13:00:00 on the day before holidays such as Independence Day and Thanksgiving. You can download algoseek's early close date and time list from AWS S3 storage at [s3://us-equity-market-holidays/earlycloses.csv](https://us-equity-market-holidays/s3.amazonaws.com/earlycloses.csv) (or use a direct link: us-equity-market-holidays.s3.amazonaws.com/earlycloses.csv).

Bar Notes

Time Bar Start Format: One-second bar 13:03:01 is from time greater than 13:03:01 to less than 13:03:02. One-minute bar 11:04 is from time greater than 11:04 to less than 11:05.

Empty Fields: an empty field has no value and is "Blank." For example, "ExchangeTradeCount" and there are no trades during the bar period. The field "TotalTrades" measuring the total number of trades in a bar will be "0" if there are no Trades. Look at the "Missing" column above for each field.



Spread Validation Rules: For fields that include spreads (for example, VolumeWeightSpread), the spread needs to be excluded when it is clearly incorrect.

Pre-Market: Exclude when a bid or ask is further away than 30% of the midpoint. For example, if stock is 100 then

$$\text{bid} \geq (0.7 * 100) = 70 \text{ and Ask} \leq (1.3 * 100) = 130$$

Regular Market: Exclude when a bid or ask is further away than 10% of the midpoint. For example, if stock is 100 then

$$\text{bid} \geq (0.9 * 100) = 90 \text{ and Ask} \leq (1.1 * 100) = 110$$

Use dynamic calculation to move from Pre-Market to Regular Market. When 3 or more Bid/Ask spreads are within 10% of the midpoint after the start of the Regular market (9:30:00), continue to use 10% of the midpoint. After 20 NBBO updates (consider one NBBO update to be two rows with an update for Bid and Ask), move to 10%.

Post Market: Exclude when a bid or ask is further away than 30% of the midpoint. Start immediately after market Close (4 pm or 1 pm for half-days)

Always exclude spread for

- Cross/Locked: If NBBO is crossed/locked, then exclude.
- Missing Bid/Ask: If an NBBO update is missing a Bid/Ask, then ignore the update.

The field "SpreadValidTime" has the total milliseconds for each bar period showing the total number of milliseconds that meet valid criteria based on the requirements listed here.

RelativeSpreadAverage: The relative spread size is the Bid/Ask spread relative to the midpoint price at time t for a trade. It shows how wide the spread is compared to the midpoint price. For each minute, the average of the relative spread sizes for each trade is calculated.

For each trade in the bar:

- t = time of a trade
- b = National Best Bid (NBBO) at t (use last NBBO before time t)
- a = National Best Ask (NBBO) at t (use last NBBO before time t)
- m = midpoint price at t, $m = (b + a) / 2$
- rs = relative spread at t is $\max(a - b, 0) / m$ (max function is used as NBBO spread may be 0 or inverted at times)

$$\text{RelativeSpreadAverage} = \text{sum}(\text{rs}) / \text{count}(\text{rs})$$

TradeCumulDistributionToBid: A distribution of trades relative to the bid and offer. Calculate the distance of each trade to the Bid with 0 executed at the Bid and 1 executed at the Ask. Then calculate the cumulative distribution of the distance from the Bid using the below probabilities.

0, 0.05, 0.1, 0.20, 0.40, 0.60, 0.80, 0.90, 0.95, 1



This shows if there was pressure on either side of the bid offer and if 'retail trade' moves away from the paper – there will be a potential way to recalibrate it without recalculating everything in the history again. As an example: say 1000 shares are traded in the given bin. 100 at a bid, 400 at mid, and 500 at the offer. The distribution above will look as follows

0	100
0.05	100
0.1	100
0.2	100
0.4	100
0.6	500
0.8	500
0.9	500
0.95	500
1	1000

RetailTRFBuySize, RetailTRFSellSize: Identify Retail Buy and Sell trades executed internally by a Broker-Dealer or wholesale to dark-pool based on their sub-penny pricing as a TRF reported trade. These indicators are based on the research paper “Tracking Retail Investor Activity” by E. Boehmer, Ch. M. Jones, X. Zhang, and X. Zhang published in the Journal of Finance ([Tracking Retail Investor Activity](#)).

The field calculations are based on the following description from the paper:

*Based on these institutional arrangements, identifying transactions initiated by retail customers is fairly straightforward. Transactions with a retail seller tend to be reported on a TRF at prices that are just above a round penny due to the small price improvement, while transactions with a retail buyer tend to be reported on a TRF at prices just below a round penny. To be precise, for all trades reported to a FINRA TRF (exchange code “D” in TAQ), let P_{it} be the transaction price in stock i at time t , and let $Z_{it} \equiv 100 * \text{mod}(P_{it}, 0.01)$ be the fraction of a penny associated with that transaction price. Z_{it} can take any value in the unit interval $[0,1)$. If Z_{it} is in the interval $(0,0.4)$, we identify it as a retail sell transaction. If Z_{it} is in the interval $(0.6,1)$, then the transaction is coded as a retail buy transaction. To be conservative, transactions at a round penny ($Z_{it} = 0$) or near the half-penny ($0.4 \leq Z_{it} \leq 0.6$) are not assigned to the retail category.*

- Transactions at or near the half-penny are not assigned to the retail category because, in this case, they are likely to be from institutions.
- Also, transactions with a \$100k dollar-volume and higher are excluded as they can't be retail trades.
- Skip transactions for spreads other than 1 cent.

RetailOddLotBuySize, RetailOddLotSellSize: Identify Retail Buy and Sell trades from odd lots transactions executed on public exchanges. These indicators are based on a comparison of trade price with the NBBO midpoint. If the trade price is higher than the midpoint the



transaction is identified as a buy transaction. If it is lower than the midpoint the transaction is identified as a sell transaction.

Additional Indicators

1. TRF Retail Pressure

Def: This metric measures the proportion of TRF retail trades' size to total market volume.

$$RP = (\text{RetailTRFBuySize} + \text{RetailTRFSellSize}) / \text{TotalVolume}$$

2. Odd Lot Pressure

Def: This metric measures the proportion of odd lot (on public exchanges) trades' size to total market volume.

$$OLP = (\text{RetailOddLotBuySize} + \text{RetailOddLotSellSize}) / \text{TotalVolume}$$

3. TRF Retail + Odd Lot Pressure

Def: This metric measures the proportion of TRF retail trades' size plus odd lot (on public exchanges) trades' size to total market volume.

$$ROLP = (\text{RetailTRFBuySize} + \text{RetailTRFSellSize} + \text{RetailOddLotBuySize} + \text{RetailOddLotSellSize}) / \text{TotalVolume}$$

4. Odd Lot TRF Retail Ratio

Def: This metric measures the odd lot (on public exchanges) volume compared to the total TRF retail plus odd lot (on public exchanges) volume.

$$OLRR = (\text{RetailOddLotBuySize} + \text{RetailOddLotSellSize}) / (\text{RetailTRFBuySize} + \text{RetailTRFSellSize} + \text{RetailOddLotBuySize} + \text{RetailOddLotSellSize})$$

5. TRF Retail Buy-Sell Ratio

Def: This metric measures the TRF retail buy size to the TRF retail sell size.

$$RBSR = \text{RetailTRFBuySize} / \text{RetailTRFSellSize}$$

6. Odd Lot Buy-Sell Ratio

Def: This metric measures the odd lot (on public exchanges) buy size to the odd lot (on public exchanges) sell size.

$$OLBSR = \text{RetailOddLotBuySize} / \text{RetailOddLotSellSize}$$

7. TRF Retail + Odd Lot Buy-Sell Ratio

Def: This metric measures the TRF retail plus odd lot (on public exchanges) buy size to the TRF retail plus odd lot (on public exchanges) sell size.

$$ROLBSR = (\text{RetailTRFBuySize} + \text{RetailOddLotBuySize}) / (\text{RetailTRFSellSize} + \text{RetailOddLotSellSize})$$



8. Relative Net TRF Retail Flow

Def: This metric measures the relative net difference between TRF retail buy and sell sizes to total TRF retail volume. A *positive* RNRF suggests *buying pressure* from retail investors, while a *negative* RNRF indicates *selling pressure*.

$$\text{RNRF} = \frac{(\text{RetailTRFBuySize} - \text{RetailTRFSellSize})}{(\text{RetailTRFBuySize} + \text{RetailTRFSellSize})}$$

9. Relative Net Odd Lot Flow

Def: This metric measures the relative net difference between odd lot (on public exchanges) buy and sell sizes to total odd lot (on public exchanges) volume. A *positive* RNOLF suggests *buying pressure* from retail investors, while a *negative* RNOLF indicates *selling pressure*.

$$\text{RNOLF} = \frac{(\text{RetailOddLotBuySize} - \text{RetailOddLotSellSize})}{(\text{RetailOddLotBuySize} + \text{RetailOddLotSellSize})}$$

10. Relative Net TRF Retail + Odd Lot Flow

Def: This metric measures the relative net difference between TRF retail plus odd lot (on public exchanges) buy and sell sizes to total TRF retail plus odd lot (on public exchanges) volume. A *positive* RNRODF suggests *buying pressure* from retail investors, while a *negative* RNRODF indicates *selling pressure*.

$$\text{RNRODF} = \frac{((\text{RetailTRFBuySize} + \text{RetailOddLotBuySize}) - (\text{RetailTRFSellSize} + \text{RetailOddLotSellSize}))}{(\text{RetailTRFBuySize} + \text{RetailTRFSellSize} + \text{RetailOddLotBuySize} + \text{RetailOddLotSellSize})}$$

11. TRF Retail Imbalance

Def: This metric highlights the imbalance between TRF retail buy and sell sizes. An RI value closer to 1 indicates a strong *buy-side dominance*, while a value closer to 0 indicates *sell-side dominance*. A value around 0.5 suggests *balanced* TRF retail activity.

$$\text{RI} = \frac{\text{RetailTRFBuySize}}{(\text{RetailTRFBuySize} + \text{RetailTRFSellSize})}$$

12. Odd Lot Imbalance

Def: This metric highlights the imbalance between odd lot buy (on public exchanges) and sell (on public exchanges) sizes. An OLI value closer to 1 indicates a strong *buy-side dominance*, while a value closer to 0 indicates *sell-side dominance*. A value around 0.5 suggests *balanced* odd lot activity.

$$\text{OLI} = \frac{\text{RetailOddLotBuySize}}{(\text{RetailOddLotBuySize} + \text{RetailOddLotSellSize})}$$

13. TRF Retail + Odd Lot Imbalance

Def: This metric highlights the imbalance between TRF retail plus odd lot buy (on public exchanges) and TRF retail plus odd lot sell (on public exchanges) sizes. A ROLI value closer to 1 indicates a strong *buy-side dominance*, while a value closer



to 0 indicates *sell-side dominance*. A value around 0.5 suggests *balanced* activity.

$$\text{ROLI} = \frac{(\text{RetailTRFBuySize} + \text{RetailOddLotBuySize})}{(\text{RetailTRFBuySize} + \text{RetailTRFSellSize} + \text{RetailOddLotBuySize} + \text{RetailOddLotSellSize})}$$

14. TRF Retail Sentiment

Def: A sentiment indicator that measures TRF retail pressure 1-hour cycles based on buy/sell imbalances.

$$\text{RS} = \text{MovingAverage}(\text{Relative Net TRF Retail Flow})$$

15. Odd Lot Sentiment

Def: A sentiment indicator that measures odd lot pressure (on public exchanges) 1-hour cycles based on buy/sell imbalances.

$$\text{OLS} = \text{MovingAverage}(\text{Relative Net Odd Lot Flow})$$

16. TRF Retail + Odd Lot Sentiment

Def: A sentiment indicator that measures TRF retail plus odd lot pressure (on public exchanges) 1-hour cycles based on buy/sell imbalances.

$$\text{ROLS} = \text{MovingAverage}(\text{Relative Net TRF Retail} + \text{Odd Lot Flow})$$



APPENDIX A. FREQUENTLY ASKED QUESTIONS

Why are time-based columns not properly recognized when I try importing data to Excel?

Older versions of Excel will automatically convert the TimeBarStart field into an Excel format timestamp, but this fails when TimeBarStart is HHMMSSmmm (millisecond) or HHMMSSmmmmiiinnn (nanosecond). For timestamp with the nanosecond (millisecond) format, import the data using the Excel “From Text” option and set the data type for column “TimeBarStart” to “Text”, so Excel does not automatically try to convert it.



APPENDIX B. BAR CALCULATIONS FROM TRADE AND QUOTE EVENTS

This section describes logic for minute bar calculations based on events from the Trade and Quote dataset. Please also refer to the Equity Trade and Quote Guide for more details on data fields and condition flags used.

There is a separate logic for the Standard Bars dataset and Bars with FINRA/TRF and Odd Lots Excluded.

Standard Trade and Quote Minute Bar

Excluded data

- Exclude any trade with Price = 0 (not applied to Trade Cancel)
- Exclude any trade with Quantity = 0
- Exclude any quote with Price = 0
- Exclude any quote with Quantity = 0

You should also exclude any event with one or more flags listed in Table 2.

Table 2: Flags for Trade and Quote Events to be Excluded During Bar Calculations

Trade Events		Quote Events	
Bit Mask Position	Flags	Bit Mask Position	Flags
14	tOutOfSequence	3	qClosing
20	tAveragePrice	4	qNewsDissemination
22	tPriceVariation	5	qNewsPending
23	tRule155	6	qTradingRangeIndication
24	tOfficialClose	7	qOrderImbalance
25	tPriorReferencePrice	13	qResume
26	tOfficialOpen		



Included data

- Include only NBBO quotes
- Include both NBBO and exchange trades
- Include Trade Cancel events only for the CancelSize field (no price or flag filter applied)

You should only include events with one or more flags listed in Table 3. If the event has any of the exclude flags enabled, it is not included. If the event does not contain any flags from the include list, it is not included in bar calculations.

Table 3: Flags for Trade and Quote Events to be Included During Bar Calculations

Trade Events		Quote Events	
Bit Mask Position	Flags	Bit Mask Position	Flags
0	tRegular	0	qRegular
1	tCash	1	qSlow
2	tNextDay	2	qGap
5	tIntermarketSweep	11	qOpeningQuote
6	tOpeningPrints	21	qFastTrading
7	tClosingPrints		
10	tFormT		
13	tExtendedHours		
21	tCross		
29	tTradeThroughExempt		
31	tOddLot		

Price validation

Additionally, you should filter out test quote events using the following approach:

- 1) For symbols with price history (last 10 trading days):

$$\text{MinPrice} = 0.05 * \text{AveragePrice}$$

$$\text{MaxPrice} = 10 * \text{AveragePrice}$$
- 2) For new symbols (no price history):

$$\text{MinPrice} = 0.03$$



`MaxPrice = 19998`

If a Quote price is lower than MinPrice or higher than MaxPrice - the event is excluded.

Note: We do not recommend applying price filtering for Trade events.