

INDEX GUIDELINE

REFERENCE INDEX FOR S&P 500 FUTURES
AT EUROPEAN CLOSING TIME

Version 1.1

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INTRODUCTION

This document (the “**GUIDELINE**”) is to be used as a guideline with regard to the composition, calculation and maintenance of the Reference Index for S&P 500 Futures at European Closing Time (the “**INDEX**”). Any amendments to the rules made to the GUIDELINE are approved by the OVERSIGHT COMMITTEE specified in Section 3.5. The INDEX is calculated, administered and published by Solactive AG (“**SOLACTIVE**”) assuming the role as administrator (the “**INDEX ADMINISTRATOR**”) under the Regulation (EU) 2016/1011 (the “**BENCHMARK REGULATION**” or “**BMR**”). The name “Solactive” is trademarked.

The text uses defined terms which are formatted with “SMALL CAPS”. Such Terms shall have the meaning assigned to them as specified in Section 6 (Definitions).

The GUIDELINE and the policies and methodology documents referenced herein contain the underlying principles and rules regarding the structure and operation of the INDEX. SOLACTIVE does not offer any explicit or tacit guarantee or assurance, neither pertaining to the results from the use of the INDEX nor the level of the INDEX at any certain point in time nor in any other respect. SOLACTIVE strives to the best of its ability to ensure the correctness of the calculation. There is no obligation for SOLACTIVE – irrespective of possible obligations to issuers – to advise third parties, including investors and/or financial intermediaries, of any errors in the INDEX. The publication of the INDEX by SOLACTIVE does not constitute a recommendation for capital investment and does not contain any assurance or opinion of SOLACTIVE regarding a possible investment in a financial instrument based on this INDEX.



1. INDEX SPECIFICATIONS

1.1. SCOPE OF THE INDEX

The INDEX aims to track the E-Mini S&P 500 Index during Closing Time of the London Stock Exchange. The INDEX therefore subtracts the BTIC from the 5-minute TWAP on the E-Mini S&P 500 at 16:30 pm UK Time.

1.2. IDENTIFIERS AND PUBLICATION

The INDEX is published under the following identifiers:

Name	ISIN	Currency	Type	RIC	BBG ticker
Reference Index for S&P 500 Futures at European Closing Time	DE000SLOB2N1	USD	PR*	.SPXEU430	SPXEU430 Index

*PR means that the INDEX is calculated as Price Return.

The INDEX is published on the website of the INDEX ADMINISTRATOR (www.solactive.com) and is, in addition, available via the price marketing services of Boerse Stuttgart GmbH and may be distributed to all of its affiliated vendors. Each vendor decides on an individual basis as to whether it will distribute or display the INDEX via its information systems.

Any publication in relation to the INDEX (e.g. notices, amendments to the GUIDELINE) will be available at the website of the INDEX ADMINISTRATOR: <https://www.solactive.com/news/announcements/>.

1.3. INITIAL LEVEL OF THE INDEX

The initial level of the INDEX on the 02/01/2019, the START DATE, is 2501.625. Historical values from the 19/02/2021, the LIVE DATE, will be recorded in accordance with Article 8 of the BMR. Levels of the INDEX published for a period prior to the LIVE DATE have been backtested.

1.4. PRICES AND CALCULATION FREQUENCY

The level of the INDEX is calculated and distributed on each INDEX BUSINESS DAY based on the TRADING PRICES on the EXCHANGES on which the INDEX COMPONENTS are listed. Should there be no current TRADING PRICE for an INDEX COMPONENT, the INDEX cannot be calculated and distributed. The INDEX is calculated once an INDEX BUSINESS DAY at 5:35 pm, CET. In the event that data cannot be provided to the pricing services of Boerse Stuttgart GmbH, the INDEX cannot be distributed and is only available via the website of the INDEX ADMINISTRATOR.



1.5. LICENSING

Licenses to use the INDEX as the underlying value for financial instruments, investment funds and financial contracts is only issued to Goldman Sachs International by SOLACTIVE.



2. CALCULATION OF THE INDEX

2.1. INDEX COMPONENTS

The INDEX is composed of the following two underlyings (each of them an UNDERLYING COMPONENT, together the INDEX COMPONENTS)

Component	Name	RIC	BBG Ticker	Exchange
1	E-Mini S&P 500 Future	O#ES:	ESA Index	CME
2	BTIC on E-Mini S&P 500 Stock Price Index	O#SET:	STEAM Index	CME

2.2. INDEX FORMULA

The level of the INDEX is calculated according to the following formula:

$$IL_t = TWAP_t^{E-Mini S\&P 500} - BTIC_t^{E-Mini S\&P 500}$$

Where:

IL_t	the level of the INDEX as of INDEX BUSINESS DAY t.
$TWAP_t^{E-Mini S\&P 500}$	the TWAP of the ACTIVE CONTRACT as of INDEX BUSINESS DAY t.
$BTIC_t^{E-Mini S\&P 500}$	the BTIC of the ACTIVE CONTRACT as of INDEX BUSINESS DAY t.

The ACTIVE CONTRACT as of INDEX BUSINESS DAY t is defined as:

If INDEX BUSINESS DAY t is prior to the expiry of the front month contract of the E-Mini S&P 500 Future, the ACTIVE CONTRACT is the front month contract of the E-Mini S&P 500 Future.

If INDEX BUSINESS DAY t falls on expiry of the front month contract of the E-Mini S&P 500 Future, the ACTIVE CONTRACT is the next month contract.

2.3. TWAP CALCULATION

Each regular LAST PRICE TICK in a TIME WINDOW k, which arrives between the TWAP START TIME and TWAP END TIME will be used in the calculation of the respective TWAP as of INDEX BUSINESS DAY t. A regular LAST PRICE TICK is a tick, which is associated with an executed REGULAR TRADE.



Let N denote the number of LAST PRICE TICK, then the TWAP as of INDEX BUSINESS DAY t is calculated according to following formula:

$$TWAP_t = \frac{\sum_{k=1}^N LPT_k}{N}$$

Where:

LPT_k denotes the LAST PRICE TICK in TIME WINDOW (k)

If there is no LAST PRICE TICK in TIME WINDOW k , the TIME WINDOW k will be neglected, and the average of the remaining LAST PRICE TICKS will be used for TWAP calculation. Thus, N will be decremented by 1 unit (recursively in case of more missing data).

"LAST PRICE TICK", shall mean the last trading price in any given TWAP WINDOW.

"TWAP START TIME", shall mean 16:30 pm UK time.

"TWAP END TIME", shall mean 16:35 pm UK time.

"TWAP GRID", shall mean in respect of an integer " k ", the time of day which is k multiplied by 15 seconds starting at TWAP START TIME.

"TWAP WINDOW (k)", shall mean each interval from (including) the TIME GRID $k-1$ to (excluding) the TIME GRID k , where " k " is each integer from 1 to 20.

2.4. ACCURACY

The level of the INDEX will be rounded to 3 decimal places.

2.5. RECALCULATION

SOLACTIVE makes the greatest possible efforts to accurately calculate and maintain its indices. However, errors in the determination process may occur from time to time for variety reasons (internal or external) and therefore, cannot be completely ruled out. SOLACTIVE endeavors to correct all errors that have been identified within a reasonable period of time. The understanding of "a reasonable period of time" as well as the general measures to be taken are generally depending on the underlying and is specified in the Solactive Correction Policy, which is incorporated by reference and available on the SOLACTIVE website: <https://www.solactive.com/documents/correction-policy/>.



2.6. MARKET DISRUPTION

In case one INDEX COMPONENT is affected by a TRADING HALT or MARKET CLOSURE anytime during the TWAP Window such a day will be treated as a MARKET DISRUPTION DAY and the level of the INDEX will not be published by SOLACTIVE.



3. MISCELLANEOUS

3.1. DISCRETION

Any discretion which may need to be exercised in relation to the determination of the INDEX (for example the determination of the INDEX UNIVERSE (if applicable), the selection of the INDEX COMPONENTS (if applicable) or any other relevant decisions in relation to the INDEX) shall be made in accordance with strict rules regarding the exercise of discretion or expert judgement.

3.2. METHODOLOGY REVIEW

The methodology of the INDEX is subject to regular review, at least annually. In case a need of a change of the methodology has been identified within such review (e.g. if the underlying market or economic reality has changed since the launch of the INDEX, i.e. if the present methodology is based on obsolete assumptions and factors and no longer reflects the reality as accurately, reliably and appropriately as before), such change will be made in accordance with the Solactive Methodology Policy, which is incorporated by reference and available on the SOLACTIVE website: <https://www.solactive.com/documents/methodology-policy/>.

Such change in the methodology will be announced on the SOLACTIVE website under the Section "[Announcement](https://www.solactive.com/news/announcements/)", which is available at <https://www.solactive.com/news/announcements/>. The date of the last amendment of this INDEX is contained in this GUIDELINE.

3.3. CHANGES IN CALCULATION METHOD

The application by the INDEX ADMINISTRATOR of the method described in this document is final and binding. The INDEX ADMINISTRATOR shall apply the method described above for the composition and calculation of the INDEX. However, it cannot be excluded that the market environment, supervisory, legal and financial or tax reasons may require changes to be made to this method. The INDEX ADMINISTRATOR may also make changes to the terms and conditions of the INDEX and the method applied to calculate the INDEX that it deems to be necessary and desirable in order to prevent obvious or demonstrable error or to remedy, correct or supplement incorrect terms and conditions. The INDEX ADMINISTRATOR is not obliged to provide information on any such modifications or changes. Despite the modifications and changes, the INDEX ADMINISTRATOR will take the appropriate steps to ensure a calculation method is applied that is consistent with the method described above.

3.4. TERMINATION

SOLACTIVE makes the greatest possible efforts to ensure the resilience and continued integrity of its indices over time. Where necessary, SOLACTIVE follows a clearly defined and transparent procedure to adapt Index



methodologies to changing underlying markets (see Section 5.2 "Methodology Review") in order to maintain continued reliability and comparability of the indices. Nevertheless, if no other options are available the orderly cessation of the INDEX may be indicated. This is usually the case when the underlying market or economic reality, which an index is set to measure or to reflect, changes substantially and in a way not foreseeable at the time of inception of the index, the index rules, and particularly the selection criteria, can no longer be applied coherently or the index is no longer used as the underlying value for financial instruments, investment funds and financial contracts.

SOLACTIVE has established and maintains clear guidelines on how to identify situations in which the cessation of an index is unavoidable, how stakeholders are to be informed and consulted and the procedures to be followed for a termination or the transition to an alternative index. Details are specified in the Solactive Termination Policy, which is incorporated by reference and available on the SOLACTIVE website: <https://www.solactive.com/documents/termination-policy/>.

3.5. OVERSIGHT

An oversight committee composed of staff from SOLACTIVE and its subsidiaries (the "**OVERSIGHT COMMITTEE**") is responsible for decisions regarding any amendments to the rules of the INDEX. Any such amendment, which may result in an amendment of the GUIDELINE, must be submitted to the OVERSIGHT COMMITTEE for prior approval and will be made in compliance with the [Methodology](https://www.solactive.com/documents/methodology-policy/) Policy, which is available on the SOLACTIVE website: <https://www.solactive.com/documents/methodology-policy/>.



4. DEFINITIONS

“**ACTIVE CONTRACT**” shall have the meaning as defined in section 2.2.

“**BENCHMARK REGULATION**” shall have the meaning as defined in Section “Introduction”.

“**BMR**” shall have the meaning as defined in Section “Introduction”.

“**BTIC**” or Basis Trade at Index Close shall be the Closing Price in respect of the BTIC on E-Mini S&P 500 Stock Price Index.

“**CLOSE OF BUSINESS**” is the calculation time of the closing level of the INDEX as outlined in Section 1.4.

The “**CLOSING PRICE**” in respect of an INDEX COMPONENT and a TRADING DAY is a security's final regular-hours TRADING PRICE published by the EXCHANGE and determined in accordance with the EXCHANGE regulations. If the EXCHANGE has no or has not published a CLOSING PRICE in accordance with the EXCHANGE rules for an INDEX COMPONENT, the last TRADING PRICE will be used.

“**EXCHANGE**” is with respect to the INDEX and every INDEX COMPONENT, the respective exchange where the INDEX COMPONENT has its listing as determined in accordance with the rules in Section 2.

“**GUIDELINE**” shall have the meaning as defined in Section “Introduction”.

“**INDEX**” shall have the meaning as defined in Section “Introduction”.

“**INDEX ADMINISTRATOR**” shall have the meaning as defined in Section “Introduction”.

“**INDEX BUSINESS DAY**” shall mean every weekday, on which New York Stock Exchange (XNYS) is open for general business.

“**INDEX COMPONENTS**” is the universe of underlying components, as defined in Section 2.1.

“**INDEX CURRENCY**” is the currency specified in the column “Currency” in the table in Section 1.2.

“**INDEX UNIVERSE**” is defined as the INDEX COMPONENTS, as outlined in Section 2.1.

“**LAST PRICE TICK**” shall have the meaning as defined in section 2.3.

“**LIVE DATE**” shall have the meaning as defined in Section 1.3.

“**MARKET CLOSURE**”, affects not only a single INDEX component but the whole market or segments of the market. MARKET CLOSURES can be further divided into planned and unplanned MARKET CLOSURES. The former refers mainly to days on which the relevant exchange is not open for trading as scheduled, while the latter may occur unplanned due to a variety of reasons, inter alia, including: a systems failure, a natural or man-made disaster, an armed conflict, an act of terrorism, a riot or labour disruption or any similar intervening circumstances.

With respect to the maintenance and calculation of its indices, SOLACTIVE sets out different treatments for unplanned MARKET CLOSURES without taking their reasons into account. Any planned MARKET CLOSURES do not fall within the scope of this policy; their respective treatment, if any, is defined at the level of the individual Indices in their relevant INDEX guidelines.



“MARKET DISRUPTION DAY” shall have the meaning as defined in Section 2.6.

“OVERSIGHT COMMITTEE” shall have the meaning as defined in Section 3.5.

“REGULAR TRADE” is any Trade not associated with a cancelled Trade and has a volume greater than zero.

“SOLACTIVE” shall have the meaning as defined in Section “Introduction”.

“START DATE” shall have the meaning as defined in Section 1.3.

“TRADING DAY” is with respect to an INDEX COMPONENT included in the INDEX at the REBALANCE DAY and every INDEX COMPONENT included in the INDEX at the INDEX BUSINESS DAY immediately following the REBALANCE DAY (for clarification: this provision is intended to capture the TRADING DAYS for the securities to be included in the INDEX as new INDEX COMPONENTS with close of trading on the relevant EXCHANGE on the REBALANCE DAY) a day on which the relevant EXCHANGE is open for trading (or a day that would have been such a day if a market disruption had not occurred), excluding days on which trading may be ceased prior to the scheduled EXCHANGE closing time and days on which the EXCHANGE is open for a scheduled shortened period. The INDEX ADMINISTRATOR is ultimately responsible as to whether a certain day is a TRADING DAY.

“TRADING HALT” is any situation in which the trading of an individual INDEX component is intentionally halted or the INDEX component is suspended from trading for a period of time. Such a TRADING HALT may occur for a variety of reasons, depending on the jurisdiction, the stock exchange and the relevant security. It may be ordered by a supervisory authority based on its statutory powers (e.g. the SEC orders a trading suspension according to Section 12(k) of the Securities Exchange Act 1934) or the management of an exchange (e.g. in accordance with Section 25 of the German Stock Exchange Act (Börsengesetz), or in accordance with their individual stock exchange rules).

The **“TRADING PRICE”** in respect of an INDEX COMPONENT and a TRADING DAY is the most recent published price at which the INDEX COMPONENT was traded on the respective EXCHANGE.

“TWAP START TIME” shall have the meaning as defined in section 2.3.

“TWAP END TIME” shall have the meaning as defined in section 2.3.

“TWAP GRID” shall have the meaning as defined in section 2.3.

“TWAP WINDOW” shall have the meaning as defined in section 2.3.

“UNDERLYING COMPONENT” are the components listed in Section 2.1, together known as the “INDEX COMPONENTS”.

CONTACT

Solactive AG
German Index Engineering

Platz der Einheit 1
60327 Frankfurt am Main
Germany

Tel.: +49 (0) 69 719 160 00

Fax: +49 (0) 69 719 160 25

Email: info@solactive.com

Website: www.solactive.com

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