

Index Guide for 4X Short Index linked to Micron Technology Inc.

ISIN CH0429831891

This Index Guide describes the composition and calculation of the *Factor Index* specified below. The *Index Calculation Agent* makes the *Index Guide* available on the *Information Page*. The *Index Guide* constitutes the basis for calculating and publishing the *Factor Index*.

Index Name:	4X Short Index linked to Micron Technology Inc. (the " Factor Index ")
Reference Instrument	Micron Technology Inc.
Index Calculation Agent:	Bank Vontobel AG, Gotthardstrasse 43, 8002 Zürich, Switzerland
Information Page:	https://indices.vontobel.com
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The Factor Indices are not recognized financial indices but are customized indices conceived by Bank Vontobel AG in its capacity as Index Calculation Agent, their sole function being to act as underlying for this type of security (Factor Certificates).

The Index Calculation Agent will perform the calculation and composition of the Factor Index with the utmost care. However, the Index Calculation Agent does not guarantee that the calculation of the indices or of any other parameters required for the composition and calculation, as in accordance with this Index Guide, will be free from error.

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The original version of the Index Guide is in German; foreign-language versions constitute non-binding translations.

The composition and calculation of the *Factor Index* specified above is described in the following. The *Index Calculation Agent* will make an index guide available on the *Information Page* for each *Factor Index*, containing this description together with the stipulations in the Final Terms. The index guide constitutes the basis for calculating and publishing the *Factor Index*.

A) INDEX DESCRIPTION

The *Factor Index* reflects price movements in the *Reference Instrument* with a leverage factor of 4. A decrease in the price of the *Reference Instrument* since the most recent calculation of an Index Closing Value results in a positive change in the *Factor Index* as compared to the previous price of the *Factor Index* and vice versa. The *Factor Index* therefore replicates a "short" strategy.

The *Factor Index* consists of a leverage component and a financing component.

Leverage component

The leverage component tracks an investment in the *Reference Instrument*, whereby movements in the price of the *Reference Instrument* are multiplied by the *Leverage* (Factor). This leverage effect occurs with either positive or negative movements in the price of the *Reference Instrument*, having a disproportionate effect on the value of the *Factor Index*. For example (leaving aside the financing component):

1. An increase in the price of the *Reference Instrument* (as compared to the most recent *Valuation Price* of the *Reference Instrument*) by 2% results in an decrease in the in the *Factor Index* by $4 \times 2\%$;
2. A decrease in the price of the *Reference Instrument* (as compared to the most recent *Valuation Price* of the *Reference Instrument*) by 2% results in a increase in the *Factor Index* by $4 \times 2\%$;

Financing component

The financing component emulates the capital costs that would arise from acquiring the *Reference Instrument*, selling it and investing the proceeds at the risk-free rate. Additionally, a fee charged by the *Index Calculation Agent* for the calculation and administration of the *Factor Index* is added (*Index Fee*) which reduces the value of the index.

If the acquisition costs and the *Index Fee* exceed the interest income based on the relevant *Interest Rate* on a particular day, the value of the *Factor Index* is reduced on such day.

B) INDEX DEFINITIONS

The definitions below shall apply for the purposes of this index description:

"**Adjustment Date**" means the first *Index Calculation Day* of each calendar month.

"**Extraordinary Adjustment Event**" means any of the following events as they relate to the *Reference Instrument*:

- (a) capital increase by way of the issue of new shares in return for contributions in cash or in kind with the grant of a subscription right, capital increase from retained earnings, issue of securities with option or conversion rights into shares, distribution of special dividends, share split, subdivision, consolidation or reclassification of the shares;
- (b) spin-off of a division of the company in such a manner that a new independent company is created or the division is absorbed by a third company;
- (c) probable or definitive cessation of stock exchange trading in the shares as a result of a merger by absorption or new company formation or takeover of the company of the underlying by another company;
- (d) any other event which the *Index Calculation Agent* may at its reasonable discretion deem to have a comparable or similar impact on the calculation of the *Factor Index* in the event no adjustment were to be made;

In case of securities representing shares (ADRs/GDRs) as the Reference Instrument, the following provisions (e) to (h) shall additionally apply :

- (e) modification of the terms and conditions of the securities representing shares by their issuers;
- (f) cessation of the stock exchange quotation of the securities representing shares or of the shares underlying them;
- (g) insolvency of the issuer of the securities representing shares;
- (h) end of the term of the securities representing shares as a result of termination by the issuer of the securities representing shares.

In case of securities representing shares (ADRs/GDRs) and other dividend-bearing securities (e.g. profit participation rights, participation certificates) as the *Reference Instrument* the provisions specified under (a) to (c) shall apply mutatis mutandis with respect to the *Reference Instrument* and the issuing company.

"Valuation Price" of the *Reference Instrument* for an *Index Calculation Day* means – subject to an *Extraordinary Adjustment* to the calculation of the index in accordance with section D) – the closing price of the *Reference Instrument*, as determined and published for that day by the *Reference Exchange*.

If an *Index Calculation Day* falls on a day which is not a *Trading Day*, the *Valuation Price* of the immediately preceding *Index Calculation Day* shall continue to apply. If no *Valuation Price* for the *Reference Instrument* is determined or published on a *Trading Day*, the *Index Calculation Agent* shall determine the *Valuation Price* of the *Reference Instrument* for that day on the basis of the most recent prices set for the *Reference Instrument* at its due discretion.

"Dividend" shall mean the dividend of the company, exclusive of which the *Reference Instrument* is traded on the *Reference Exchange* on the *Ex-dividend Day*.

"Dividend Tax Factor" means 1.0 on the *Index Start Date*. The *Index Calculation Agent* may change the *Dividend Tax Factor* at its due discretion on any *Index Calculation Day* with prospective effect if the relevant tax law applicable to the *Index Calculation Agent* changes, resulting in a change in the amount of the – after tax – *Dividend* virtually accruing to it.

"Ex-Dividend Date" means the *Trading Day* on which the *Reference Instrument* trades "ex-dividend" on the *Reference Exchange*.

"Financing Spread" reflects the current annual costs for acquiring the *Reference Instrument* as at the *Index Calculation Day* via a securities lending and repurchase ("repo") transaction.

The *Financing Spread* on the *Index Start Date* corresponds to the *Initial Financing Spread*. The *Index Calculation Agent* then adjusts the **"Current Financing Spread"** in its due discretion on each *Adjustment Date* to reflect current market conditions and publishes it in accordance with section E) of this index description. The adjusted *Financing Spread* shall apply immediately as from the relevant *Adjustment Date*.

"Initial Financing Spread" means 0.50% per annum.

"Trading Day" means every day on which the *Reference Instrument* is traded on the *Reference Exchange*.

"Leverage" means -4. It describes the impact that a change in the price of the *Reference Instrument* has on the relevant *Factor Index*.

The negative sign for the *Leverage* indicates that the *Short Factor Index* participates inversely in the performance of the *Reference Instrument*.

"Index Calculation Agent" means Bank Vontobel AG, Gotthardstrasse 43, 8002 Zurich, Switzerland.

"Index Calculation Day" means every day from Monday to Friday.

"Index Fee" means 1.00% per annum. The *Index Fee* is charged each calendar day, beginning as of the *Index Start Date*. It is calculated on the basis of a 360-day year and the most recently calculated *Index Closing Value*.

"Index Closing Value" is calculated for each *Index Calculation Day* by the *Index Calculation Agent* in accordance with section C) 1) of this index description on the basis of the *Valuation Price* of the *Reference Instrument* for this *Index Calculation Day* and published in accordance with section E) of this index description.

"Index Start Date" means 9 January 2019.

"Index Start Value" means 1,000 index points and represents the *Index Closing Value* on *Index Calculation Day* T=0 for the purposes of calculating the index in accordance with C).

"Index Currency" means USD.

"Information Page" means <https://indices.vontobel.com>.

"Reference Instrument Price" corresponds at any time during the trading period on the *Reference Exchange* to the price of the *Reference Instrument* on the *Reference Exchange*, as determined by the *Index Calculation Agent*.

"Reference Exchange" means Nasdaq Global Select Market.

"Reference Instrument" means Micron Technology Inc..

Type:	Registered Share
Currency:	USD
ISIN:	US5951121038
Bloomberg Symbol:	MU UW Equity

"Barrier" means 21%. It indicates the maximum permitted positive change in price of the *Reference Instrument* compared with its most recent *Valuation Price* before an *Intraday Index Adjustment* takes place.

"Derivatives Exchange" means Chicago Board Options Exchange.

"Interest Rate" means USD LIBOR O/N (overnight).

LIBOR stands for London InterBank Offered Rate. LIBOR is an average interest rate based on information submitted by the contributing banks. The panel banks indicate the interest rates at which they are able to refinance their own

interbank activities in the relevant currency for the relevant term on an unsecured basis. To calculate the reference interest rate, the highest and lowest quartiles of these interest rates are eliminated, and the remaining interest rates are averaged. LIBOR is calculated for 7 different terms and 5 different currencies. The LIBOR interest rates (ICE Libor) are administered by ICE Benchmark Administration Limited (IBA) and determined each business day at 11 a.m. (London time). LIBOR O/N (overnight) stands for terms of 1 day.

If the Interest Rate is neither set nor published on an Index Calculation Day, the Interest Rate applied on the immediately preceding Index Calculation Day is used to calculate the Index in accordance with section C).

If the Interest Rate has neither been set nor published for ten consecutive Index Calculation Days, the Index Calculation Agent has the right and obligation to stipulate in its reasonable discretion an alternative relevant Interest Rate which has functions comparable to the previous Interest Rate.

C) INDEX CALCULATION

The *Factor Index* shall be calculated for the first time on the *Index Start Date*. The initial level of the *Index* on the *Index Start Date* corresponds to the *Index Start Value*. The respective current index level is calculated by the *Index Calculation Agent* on a continuous basis during the trading period of the *Reference Instrument* on the *Reference Exchange* on each *Index Calculation Day*, rounded to two decimal places and published in accordance with section E).

One index point corresponds to one unit of the *Index Currency*.

C) 1) Index Formula

The *Factor Index* is calculated for each time t during an *Index Calculation Day T* in accordance with the following formula:

$$IDX_t = IDX_{T-1} \cdot \underbrace{\left(1 + L \cdot \left(\frac{R_t + divf \cdot div}{R_{T-1}} - 1 \right) \right)}_{\text{leverage component}} - \underbrace{\left[(1 - L) \cdot IR_{T-1} + L \cdot FS_T - IG \right]}_{\text{financing component}} \cdot \frac{d}{360}$$

where:

<i>T</i> :	current Index Calculation Day
<i>IDX_t</i> :	Index Value at time t on Index Calculation Day T
<i>IDX_{T-1}</i> :	Index Closing Value on Index Calculation Day T-1 which immediately precedes the current Index Calculation Day
<i>L</i> :	Leverage (Factor): -4
<i>R_t</i> :	Reference Instrument Price at time t
<i>RT-1</i> :	Valuation Price on Index Calculation Day T-1
<i>divf</i> :	Dividend Tax Factor
<i>div</i> :	Dividend on Index Calculation Day T. This amount is 0, except on the Ex-Dividend Date.
<i>IR_{T-1}</i> :	Interest Rate on Index Calculation Day T-1
<i>FST</i> :	Financing Spread on Index Calculation Day T
<i>IG</i> :	Index Fee
<i>d</i> :	Number of calendar days between Index Calculation Days T-1 and T

C) 2) Intraday Index Adjustment

If at time s on *Index Calculation Day T* the *Reference Instrument Price* (on an *Ex-Dividend Date*, plus *Dividend* multiplied by the *Dividend Tax Factor*: $R_s + divf \times div$) exceeds the most recent *Valuation Price* of the *Reference Instrument* by more than 21% (*Barrier*), an "**Intraday Index Adjustment**" takes place, simulating a new day:

$$\begin{aligned} s &= T, \text{ i.e. } IDX_{T-1}(\text{new}) = IDX_s \\ R_{T-1}(\text{new}) &= R_{T-1}(\text{old}) \times 1.21 - divf \times div \\ d &= 0 \end{aligned}$$

A new *Valuation Price* valid after time s ($R_{T-1}(\text{new})$) is calculated by multiplying the previous *Valuation Price* ($R_{T-1}(\text{old})$) by 1.21. If Index Calculation Day T is an *Ex-Dividend Date*, the net dividend shall be deducted.

If the *Index Calculation Day T* is an *Ex-dividend Day* the newly simulated *Index Calculation Day* shall no longer be treated as *Ex-Dividend Date*, i.e. *Dividend* and *Dividend Tax Factor* shall not be considered in the index calculation in section C) 1) on such simulated *Index Calculation Day*.

The financing component remains unchanged. No additional costs are incurred for the newly simulated day.

D) EXTRAORDINARY ADJUSTMENT OF THE INDEX CALCULATION

In the event of an *Extraordinary Adjustment Event* occurring in relation to the *Reference Instrument*, the *Index Calculation Agent* will adjust the index calculation on the *Reference Date* (as defined below). The *Index Calculation Agent* will – to the extent possible – endeavour to calculate the *leverage component* as if no *Extraordinary Adjustment Event* had occurred.

The *Index Calculation Agent* will generally adjust the index calculation by correcting in its due discretion the relevant *Valuation Price* for the *Reference Instrument* on *Index Calculation Day T-1* on the *Reference Date*, in order to factor into the index calculation the adjustments made on the *Derivatives Exchange* for futures and options linked to the *Reference Instrument* traded there.

The *Index Calculation Agent* may adjust the Index Calculation in some other manner if it deems this necessary in its due discretion in order to account for differences between this Factor Index and the futures and options traded on the *Derivatives Exchange*. Such adjustments may in particular relate to the *Reference Instrument* being replaced by a basket of shares, securities representing shares or other dividend-bearing securities or in the event of a merger by an appropriate number of shares, securities representing shares or other dividend-bearing securities issued by the absorbing or newly formed company and where necessary stipulating a different *Reference Exchange*, *Derivatives Exchange* and *Reference Instrument Price*.

The list of *Extraordinary Adjustment Events* listed in section B) is not exhaustive. The deciding factor is whether the *Derivatives Exchange* deems an adjustment of the contract size, an underlying or the involvement of relevant *Reference Exchange* determining the price of the *Reference Instrument* to be necessary. If neither futures nor options linked to the *Reference Instrument* are traded on the *Derivatives Exchange*, the adjustment shall be made in a manner in which the *Derivatives Exchange* would do so if corresponding futures or options were traded there. In cases of doubt about the application of the adjustment rules of the *Derivatives Exchange*, the *Index Calculation Agent* shall decide such questions in its reasonable discretion. The rules and regulations of the *Derivatives Exchange* shall apply in addition to the provisions set out above.

In the event that the company issuing the *Reference Instrument* underlying the Factor Index is liquidated or if insolvency, winding-up or similar proceedings are instituted against the assets of the company or if the possibility that such proceedings will be initiated becomes known, the price of the *Reference Instrument* will continue to be factored into the index calculation for as long as the price of the *Reference Instrument* continues to be determined on the *Reference Exchange*. However, if pricing in such a case is temporarily or permanently suspended, the leverage component shall remain unchanged and the index level will be determined solely on the basis of the other components of the index formula.

"**Reference Date**" within the meaning of this index description means the first *Index Calculation Day*, on which the relevant futures or options are traded on the *Derivatives Exchange* after taking the adjustment into account, or would be so traded if corresponding futures or options were traded on the *Derivatives Exchange*.

Adjustments relating to the Factor Index and all other measures taken under this section will be published by the Index Calculation Agent in accordance with section E).

E) NOTICES

All notices pertaining to the *Factor Index* will be published on the *Information Page*. Such notices shall be deemed to have been given on the date on which they are first published.

Notices are made for informational purposes only and do not represent a precondition for legal effectiveness.