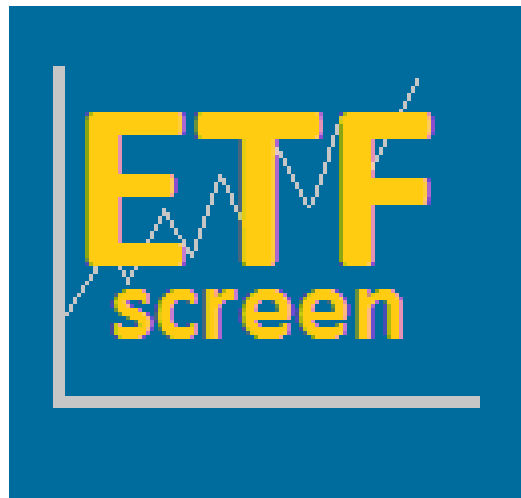# User's Guide

for

Screening and Backtesting

February, 2015

This User's Guide is intended to step the user through the process of setting up a screen, saving that screen as a favorite, and retrieving that screen for future use. We will then take that screen and run backtests against it to see how it might have performed in the past if one had periodically invested in the selected positions.

Let's start with an overview of the entry screen and the four steps needed to create a screen.

Screen Definition			
Start with which funds? Could be All Funds, a Predefined Group, or a Personal Portfolio.	All Funds ▾		**Step 1: Select Funds**
Allow or Disallow Inverse and/or Leveraged funds	Include: Short and Long Funds ▾ / Leveraged or Not ▾		
Filter based on name	Name Contains ▾ [_____]		

	Field	Logic	Value
Filter on field values *** Hints: *** Enclose field names in square brackets. Like: [EMA-5] > [EMA-200] Can do simple math. Like: [Price] > [SMA-200] * 1.05 For field definitions, click here.	[Price] ▾	> ▾	[SMA-200] ▾
	▾	▾	▾
	▾	▾	▾
	▾	▾	▾
	▾	▾	▾
	▾	▾	▾
	▾	▾	▾
	▾	▾	▾

Step 2: Set Filters

Sort Results by	[RSf] ▾ desc ▾
	Single field. No calculations allowed.

Step 3: Set Sort Order

User Defined Variables:
Formulas entered here can be referenced above for filtering and/or sorting records. In addition to the standard numeric operators +,-,*,/,(, and), formulas entered here can take advantage of these MySQL operators and functions.

UV1 = [_____] ▾   name = _ UV1

UV2 = [_____] ▾   name = _ UV2

UV3 = [_____] ▾   name = _ UV3

Market Timing Rule (Optional) An MTR like SPY [Price]>[SMA-200] requires the rule to be TRUE before any trades take place.	Symbol: [_____] Rule: [_____]

For Current Screen Picks	◉ Current as of Monday, 03:30 pm ET ◯ Close as of Friday, Nov 22 **Click Here For Current Screen Picks**

Step 4: Click

Backtest this Screen	Positions: 5 ▾ (number of funds held)
	Hold Thru Rank: opt. (more info)
	Holding Pd: 1 month ▾ (holding period)
	Benchmark: SPY ▾ (compare results to)
	Beginning Date: [_____] (5 yrs if blank)
	Run Backtest

Note: ETFScreen.com LLC reserves the right to use screens entered here for any purpose.

Step 1: Select Funds

The default here is to include all ETFs, and if that is what you want to do, you can leave this section as it is and move on. However, there are a few options in this section you might want to notice. We'll get back to the top of the section shortly, but even if we select "All Funds", there are some options in the second and third blocks we might want to consider.

The second block down lets us filter for Inverse (aka Short) funds and Leveraged funds. If you are just starting out, you might be well advised to avoid short and leveraged funds. Instead you might want to select "Long Funds Only" and "Un-Leveraged Funds Only" in these two entries. On the other hand, if you are preparing for a market correction you may be looking for a short fund, and if you are an aggressive trader you may be looking for leveraged funds only. If any of these scenarios fits, this section of the form is where you would make such a selection.

The third box down allows us to filter our funds based on name. This is an imperfect filter since all funds are not named in a consistent manner and all names are not perfectly consistent in our database. However, even with that limitation it is a good way to get a quick look at "energy" funds or "china" funds. It also works well for searching for all "Vanguard" funds or all "Schwab" funds. Just remember this is imperfect and may not return all funds that you would expect to match.

Using these two sections of the form is not the only way to define a starting group of funds, and we'll move back up to the first section now to see the options there. Clicking the "All Funds" dropdown shows a list like this. You will find a "Symbol List" option followed by several predefined groups of funds, and below that, off this screen shot, are any user portfolios that may have been previously defined.

The symbol groups and portfolios are self explanatory, as they pull in a group of symbols as a beginning point. For creating an ad hoc list on the fly you can click the "Symbol List" option. This opens another entry field where you can enter up to 100 symbols of your choice. This seems to be the more common starting point for most experienced users. They know the funds they are interested in and want to screen from that list. Below you see what this entry box looks like, and note the symbols can be separated by either commas or spaces (or both).
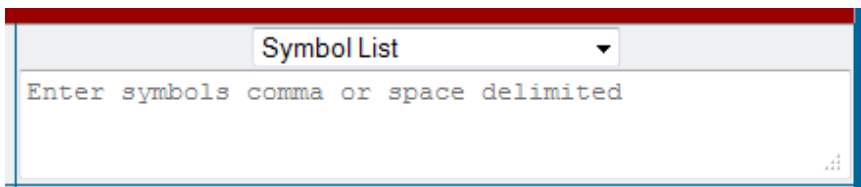
Note that regardless of how you select your symbols in the first section you can use the questions about leverage and short funds to further narrow the list. For the purposes of this demonstration let's enter the symbols from the Market View section of the home page.

Step 2: Set Filters

Setting filters is the most error prone part of defining a screen, but is really simple if you utilize the drop-down menu system to select the fields. Speaking of the drop-down menu system, that is probably a good place to start for this section. Take a look at this image. To activate the drop-down you can

click anywhere in the highlighted box. Most of the options on the main menu lead to more options in a secondary menu, and some have options from there. If you want to select a 3-month return value to filter on, the easiest way is to activate the drop-down menu, select "Total Return" from the primary menu and "3-Months" from the secondary. With that, the system will insert [Rtn-3mo] into the box shown highlighted above. Another option is to type this into the text box, but this is more error prone.

Note: All fields must be inside square brackets like [Rtn-3mo]. If you leave off the brackets the system will try to interpret this field as Rtn – 3mo, (variable Rtn minus something called 3mo), and it will have no idea what either "Rtn" or "3mo" is, resulting in an error being returned.

An **important point** to understand is that you cannot create your own versions of these fields; therefore, you must select from the options provided in the drop-down menu. This is another reason it is more error prone to type a field directly into the text box. Using our "Total Return" example above, you may want a 5-month return and try typing in [Rtn-5mo] in the text box, but this will not work because a 5-month total return is not valid in our system. To reiterate, you must select from the options given in the menu, even if you choose to type it in directly.

Just as we selected a field in the highlighted box above, we can click the logic box and select from >, <. =, and other options. Most all of these are self-explanatory, but a few deserve special mention. In case you are not familiar with it, **!=** is the abbreviation for **not equal to**. This is new to some users who are more familiar with the <> option for "not equal".

Also, we have two **crossover options**, **xo** and **xu**. In case it is non-obvious, xo stands for cross-over and xu for cross-under. These options select funds where the left field value crosses over/under the right field value, only on that day.

In addition to field names, you can also enter numbers or mathematical expressions into these text boxes. If you want funds where price is less than $100 per share, enter [Price] < 100. If you are looking for funds where price is greater than the 50-day SMA, but not too much greater, you can enter [Price] > {SMA-50] on one line and [Price] < [SMA-50] * 1.25 on another. This brackets price to being greater than the SMA but not more than 25% greater.

Going back to the last screen shot, notice the link in the left hand column that is underlined in this image. That link is to a description of all available data fields. You are highly encouraged to review this page to avoid misunderstandings of the data.

Our screening system currently supports eight filter rules, and each compete rule must be true for a symbol to pass the screen. Given that the text boxes on either side can accept a field, a value, or a mathematical expresson, there is ample flexibility to achieve most filter needs.

For our demonstration, let's enter a filter for 6-month total return is greater than zero, or [Rtn-6mo] > 0.

Step 3: Set Sort Order

Setting the sort order is much more straight forward than entering filter rules. As you can see in this

Sort Results by	[RSf] ▼	desc ▼
	Single field. No calculations allowed.	

image there are only two entries, a field entry and a directional entry. The default is to sort by Rsf, but any other single field can be selected as well. The default directional entry is to sort in descending order, but that can easily be changed to ascending order where desired.   Note that the sort field must be a single field and not a combination of fields. To sort by a combination of fields, such as an average of two return fields, requires the use of a User Variable which we will address later.

For the moment we will keep it simple and enter a sort rule based on 3-month total return. So use the drop-down menu to select [Rtn-3mo], and we'll keep the "desc" order.
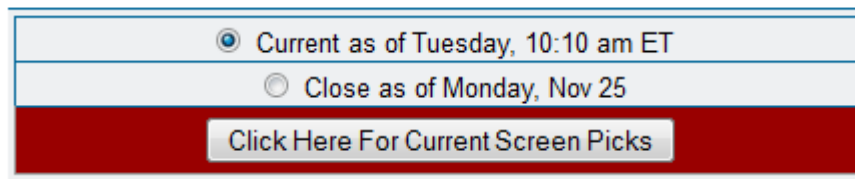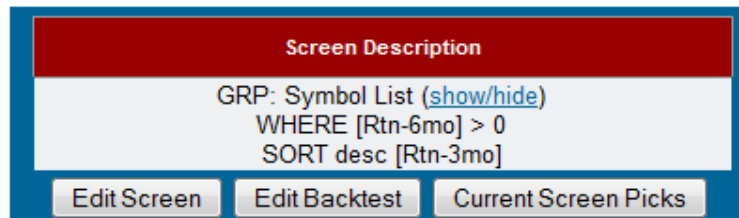
Step 4: Click the "Current Screen Picks" button

This is the easy part. You may have the option to pick between current and prior close data, but generally you just click the button.

So what do you get, and how do you interpret it?

If you followed along in this demonstration you should have a screen with this definition. We created a symbol list of the symbols in the Market View section of the home page, we set a filter to require [Rtn-6mo] > 0, and we sorted the results in descending order by [Rtn-3mo].

The resulting screen of data is shown below. In addition to the symbols and data fields you will see a number of options, but first lets discuss the all important data. The name and symbol are always given in these data views. Beyond that, it depends on the fields you specified in your screen definition. Following the symbol is always the sort field, beyond that would be User Variable definitions if they existed, and beyond that would be other fields the user stipulated in the screen definition (limited in number by the page width). You will notice only the symbols that pass the filters will be shown up to a maximum of 100 rows of data. In this case we started with eleven symbols and ended up with only eight on our output report because three did not pass our [Rtn-6mo] > 0 filter rule.

As for options on the screen they are mostly self-explanatory. You can check all or select symbols and then compare performance or easily view a correlation matrix of those symbols. There is an easily accessible Edit Screen button for quick adjustments. Next is a calendar for viewing this screen at some date in the past (a Premium Access feature), and finally there is an option to change the red/green color coding in the table.

User Variable definitions:

Earlier we skipped the section on defining user variables because they were not critical to creating a simple screen. They do, however, offer significant usefulness in numerous scenarios. Let's start with reviewing that section of the screen. You will see there are spaces for up to three UV definitions. In

the left hand entry field you enter a valid mathematical formula, and in the right hand column you enter a name for your User Variable. In this case we borrowed a UV from one of the published screens and named it "myRS". Note UV names are always preceeded by an underscore and when referenced in filters or in the sort rule should be in square brackets like [_myRS]. The underscore clarifies the field as a UV and prevents confusion with other fields.

Once a UV is defined, the name will be in the drop-down menu under the "User Variables" section for

easy access when creating filters and for use in defining the sort field. Remember we said earlier that the sort field had to be a single field, but by using a UV like the one defined above the actual sort field can be quite complex. One more thing to point out about UV's is that one can be dependent on another. That is, you can define UV1 and then use that value in the definition of UV2.

Market Timing Rule

The market timing section is totally optional and rarely used for most screening purposes. There are

Market Timing Rule	Symbol: SPY
(Optional) An MTR like SPY [Price]>[SMA-200] requires the rule to be TRUE before any trades take place.	Rule: [Price] > [SMA-200]

only two fields in this section, one for a symbol and one for a rule that is evaluated as true or false for a given date. In the example shown above we are using the symbol SPY since it is a good broad based indicator of the overall market, and our rule asks the question, "Is price greater than the 200-day SMA?" As long as the price is greater, we will be invested during a backtest. Whenever price drops below the 200-day SMA we will exit positions and move to cash. This rule has no impact on the "Currrent Screen Picks" view except for the placement of a text box at the top of the output table giving the current interpretation of the market timing rule.

Available Mathematical Functions

The screener is interpreted utilizing the MySQL database which makes available many functions native to that software. These are a few of the more useful ones, and the complete list can be found at this link: http://dev.mysql.com/doc/refman/5.0/en/mathematical-functions.html

ABS(X) - Returns the absolute value of X.

EXP(X) - Returns the value of e (the base of natural logarithms) raised to the power of X.

LN(X) - Returns the natural logarithm of X; that is, the base-e logarithm of X.

POW(X,Y) - Returns the value of X raised to the power of Y.

ROUND(X), ROUND(X,D) - Rounds the argument X to D decimal places.

Premium Functions

Our Premium Access subscribers have access to several functions beyond the basics that provide the user with a new level of flexibility and power. If you are not a Premium Access user and try to access one of these functions, you will receive an error message.

pRANK(expression) - Percentile rank of a field or expression. Returns a value x, where 0<x<=100.
  By default, higher values of the expression result in higher values for pRANK, much like our RSf ranking confers higher ranks to better performing funds. This ranking can be reversed in order by using the optional INVERTED keyword, as in pRANK(expression, INVERTED).
  Example: pRANK([Rtn-3mo])
   or: pRANK([Rtn-1mo]+([Rtn-3mo]*3)+([Rtn-6mo]*.25))
  The percentile rank of a volatility measure is a great tool to filter out relatively risky positions. Also, it can be used to force return and volatility into similar units so return can be risk-adjusted.

PREVAL(expression, offset) - Returns the value of "expresssion", "offset" days prior.
  Example: PREVAL([SMA-200], 5) returns the value of [SMA-200], 5 days previous. This can then be compared to the current [SMA-200] value to determine if the moving average is rising or falling. A filter for this could look like PREVAL([SMA-200],5) < [SMA-200].

RANK(expression) - Returns a 1 to n ranking based on the value of a field or expression.
  As opposed to pRANK which includes all symbols in our universe, RANK only ranks those symbols included in your screen. Specifically, the symbol list, portfolio, or other group specified in the first section of the screener input form. Note that ranks increase as the value of the field or expression increases unless the optional INVERTED keyword is specified (see pRANK above).
  Example: RANK([Rtn-3mo])
   or: RANK([StDv-1mo], INVERTED)

VALUE(expression, symbol)   - Returns the value of "expression" for the specified "symbol".
  Example: VALUE([Rtn-1mo], QQQ) returns the 1-month return for QQQ. This could then be referenced in a filter like [Rtn-1mo] > VALUE([Rtn-1mo], QQQ) to select funds where the 1-month return is greater than that of the QQQ.

Backtesting

The bottom section of the entry screen is regarding backtesting, and there are several options here to pick from, but two are important. First is the number of positions to hold in our test, and the second is how long to hold them. In the image below you will see several additional questions. "Hold Thru

Rank" and "Beginning Date" are only available for Premium Access users, therefore we will ignore them for the time being. "Benchmark" selects a fund to use for comparison purposes, and we can generally leave that set to SPY. So that gets us back to how many positions and how long to hold. The default number of positions is 5, but if we are limited in our number of funds we might want to reduce that. In our example where we are selecting from 11 funds, we might only want to select 1 or 2. Holding period depends on your trading style and what you are trying to achieve in you screen. From our experience we would say most users target 2-weeks to 1-month for a holding period. As throughout this site, we utilize standardized calendar equivalents so 2-weeks equates to 10 trading days and 1-month to 21 trading days.

How does the backtester work? Generally, it selects x number of positions based on your screen rules, and holds those for n days for a return r. It then repeats this process for the next n days, and then the next, and then the next, from the beginning date to the model ending date. This gives us what we term a cycle of trades. That is one cycle through the calendar with simulated trades every n days. We then calculate the statistics for that cycle. Most trading systems stop there, give you the results, and that is that. Let's assume we were trading monthly, or 12 times per year. The results for that cycle only used prices from 12 of the 252 trading days per year. These other systems give you results without looking at the bulk of the available data. We go a step further. We go back to our start day, skip to the next day, and run the whole series again for another cycle. Then we do that again and again until we have used all available data. If you request a monthly hold our system runs 21 cycles, and if you request a 5 day holding period we run 5 cycles through the data before summarizing the results. This reduces the noise and reduces the chance of you seeing an outlier result.

By default, we only present the average results for all the cycles tested. Shown here is a sample output table of such results. Since this was a monthly (aka 21-day) model, these results are the average of 21 independent series of trades.

There will also be a performance chart with each backtest that shows return and drawdown. Since presenting averages in this form would minimize apparent

	CAGR	Standard Deviation	Ulcer Index	Exposure
Model	43.5	39.1	7.8	85.0%
SPY	18.6	18.2	4.9	100.0%
Other	Holdings: 2 Update Cycle:21 days From 2008-11-20 to 2013-11-22.			

volatility, the chart presented is always from the cycle with the median return. That is, if 5 cycles are run then the chart will be from cycle 3 when sorted by CAGR. Occasionally this chart will be noticably different from average statistics, and users wonder why. This generally reflects a skew in the cycle results, yielding significant differences in average and median values.
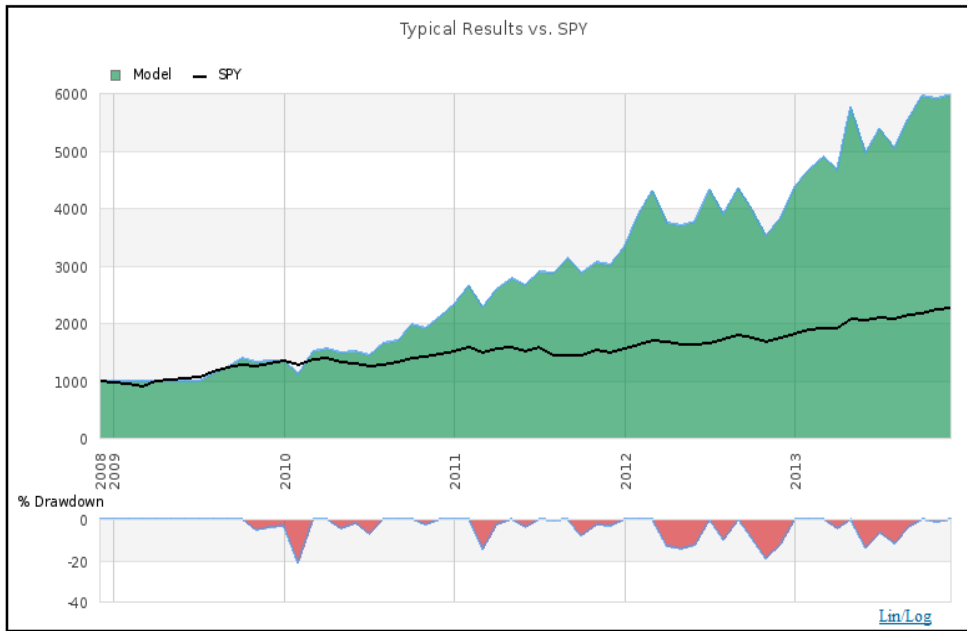
Note the Lin/Log option at the bottom of the chart. Many users prefer to look at log charts although linear is the default.

The following page views illustrate the cycle level data that is collected, and better illustrate how it relates to the average data that is presented by default. These views are readily available to our Premium Access users for every model and support their need to view all data from the individual trade, to the cycle summary, to the model average. These pages are accessed by clicking the "View Results by Cycle" button on the model statistics box as illustrated here.

	CAGR	Standard Deviation	Ulcer Index	Exposure
Model	101.8	31.6	3.2	82.6%
SPY	19.5	20.8	5.7	100.0%
Other	Holdings: 2 Update Cycle:5 days From 2008-11-20 to 2013-11-22.			

View Results By Cycle

Blog post on this Screener   Hints for Good Backtests

For these pages we have selected the published screen named "active", published by the user tpoto2. These results may not be realistic going forward but are interesting to look at.

This would be a good time to mention that backtest results have certain limitations and must be taken with caution. The CFTC states it this way:
CFTC RULE 4.41 – HYPOTHETICAL OR SIMULATED PERFORMANCE RESULTS HAVE CERTAIN LIMITATIONS. UNLIKE AN ACTUAL PERFORMANCE RECORD, SIMULATED RESULTS DO NOT REPRESENT ACTUAL TRADING. ALSO, SINCE THE TRADES HAVE NOT BEEN EXECUTED, THE RESULTS MAY HAVE UNDER-OR-OVER COMPENSATED FOR THE IMPACT, IF ANY, OF CERTAIN MARKET FACTORS, SUCH AS LACK OF LIQUIDITY. SIMULATED TRADING PROGRAMS IN GENERAL ARE ALSO SUBJECT TO THE FACT THAT THEY ARE DESIGNED WITH THE BENEFIT OF HINDSIGHT. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFIT OR LOSSES SIMILAR TO THOSE SHOWN.

Screen Results by Cycle

	Screen Avg.	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5-M
		(more)	(more)	(more)	(more)	(more)
Rebalance Dates						
First		2008 11-25	2008 11-26	2008 11-20	2008 11-21	2008 11-24
Last		2013 11-20	2013 11-21	2013 11-22	2013 11-18	2013 11-19
Model Results						
CAGR	101.8	91.9	121.6	99.7	97.4	98.3
SD	31.6	27.1	31.0	32.0	34.5	33.6
UI	3.2	2.7	2.5	3.4	4.1	3.2
Exp	82.6	83.9	81.2	81.8	83.3	82.7
SPY Benchmark						
CAGR	19.5	18.7	17.8	21.7	20.5	18.9
SD	20.8	19.4	19.7	22.7	20.3	22.1
UI	5.7	5.7	5.6	5.7	5.5	5.7

-M indicates median cycle

The table above shows the summary results for the model and the 5 independent cycles that were run. While the model averaged 101% cagr, the 5 cycles ranged from 91 to 120%. In the top table row you will see that cycle 5 carries a "-M" suffix indicating it is the median cycle. At the bottom of the table are similar statistics for the SPY. You may note that there is significant variability even in the SPY results from cycle to cycle. Clicking either the cycle number or the "more" link will lead to a page devoted to a single cycle, showing trade data and a performance chart based on that cycle.

ETF Screener – Results for Cycle 5

Back to Screen Page

	CAGR	Standard Deviation	Ulcer Index	Exposure
All Starts	101.8	31.6	3.2	82.6%
This Cycle	98.3	33.6	3.2	82.7%
SPY	18.9	22.1	5.7	100.0%
Other	Holdings: 2 Rebalance:5 days From 2008-11-24 to 2013-11-22.			

Screen Description

GRP: Symbol List (show/hide)
DEFINE _UV1 = [Rtn-2mo] * 0.37 + [Rtn-1mo] * 1.36 + [Rtn-5d] * 0.13 + [Rtn-1d] * 0.21
WHERE [Price] < [SMA-200] *1.2575
WHERE [Price] < [SMA-50]*1.251
WHERE [Price] > [SMA-20] * 0.995
WHERE [RRS-126] > -16.5
WHERE [RRS-21] > -35
WHERE [RRS-63] > -12.7
WHERE [RSI-14] < 78
WHERE [Rtn-10d] > 0.02
SORT desc [_UV1]
MTR: SPY : [RSI-14] < 76

Trades by Period

Date	Model	SPY	Symbols
2013-11-19	2.3	1	FAS(4.4) XLP(0.3)
2013-11-12	0.2	1.2	ROM(-1.1) PTH(1.5)
2013-11-05	2.7	0.4	XIV(2.7) TECL(2.7)
2013-10-29	-0.3	-0.5	GREK(-3) XIV(2.4)
2013-10-22	2.1	1	MVV(0.5) TECL(3.7)
2013-10-15	5.4	3.4	GREK(7.9) SLX(2.8)
2013-10-08	2	2.6	GREK(4)
2013-10-01	-0.8	-2.3	GREK(4.5) QLD(-6.1)
2013-09-24	2.1	-0.1	GREK(2) QLD(2.2)
2013-09-17	2.2	-0.4	PNQI(2.5) GREK(1.9)
2013-09-10	0.3	1.3	SLX(-0.2) PNQI(0.9)
2013-09-03	2.5	2.7	PNQI(5.1)
2013-08-26	-0.4	-1	PNQI(-0.5) EEV(-0.3)
2013-08-19	0.6	0.7	EEV(1.3)
2013-08-12	-3.1	-2.6	PNQI(-2.7) QLD(-3.4)
2013-08-05	-0.1	-0.9	PNQI(0.9) QLD(-1)

Favorite Screens

Flagging a screen as a favorite is our method of saving a screen for future review. Whenever you view a screen that is not a favorite you will have a box like this in the upper right-hand portion of the page. Click this link, and you will be prompted to name your favorite screen. Favorite screen names are for your purposes only and thus are unlike published screens which are shared among our community of users.

Flag Screen as a Favorite

Favorite screens are accessible from the My Pages link on the navigation bar and from the Favorite Screens link in the side panel of most screener related pages.

You can flag the Current Screen Picks view or any backtest as a favorite, but all favorites related to the same screen will carry the same name since they are basically the same screen. Marking one or more as a favorite just makes it easy to remember which got your attention or which you were following.

Published Screens

Publishing a screen is simply sharing it with our community of users. If you have developed a screen you think others would be interested in, and are willing to share, then please publish it. You are highly encouraged to leave comments about the screen as well, to describe your intentions or what you were attempting to achieve by the screen.

We often receive questions about how to change a published screen. Short answer is – you don't. Publishing a screen is like publishing a book. You can always publish version two of the book if there is new data, but version one is still out there.

Security Types

In January, 2015, we added coverage of CEF's and REIT's to our base ETF coverage, with plans to add additional security types in the near future. The site is laid out with sections devoted to each of the various security types, but the portfolio and screener sections are common across the site. This was by design so a user could easily view all of their portfolios and screens from whichever site section they were currently viewing. Also, personal portfolios and symbol lists for screens can be a mixture of any symbols covered by the site. That said, the pre-defined categories offered as choices on the screener page are unique to the section of the site being viewed. For example, the ETF section offers pre-defined categories dealing with ETFs, and the REIT section offers market segments targeted at REITs.

Summary

We hope this User's Guide is helpful, and we hope you find our website even more helpful. I'm sure we have left something out or made an issue more complicated than it should be, and there will be a version two of this document probably sooner than we would like. If you see such an issue, please let use know. Send your comments to support@etfscreen.com.