Single Trade Volume Restriction Manager

- **Introduced in:** v2.1.0
- **Contract name:** SingleTradeVolumeRestrictionManager.sol
- **Compatible ST Protocol version range**: TBD
- **Type:** Transfer Manager Module

How it works

The STVRM allows the issuer to put a transfer restriction that applies a limit to how many tokens can be transferred in a single transaction. This limit can be set in either a percentage of the total supply or a fixed number of tokens. Some senders might be exempt from this module's transfer restrictions, while other wallets might have a different limit then the general one applied across all accounts.

Key functionalities (as defined in the Smart Contract)

Initialization

This module is initialized by passing 3 parameters:
- `bool _isTransferLimitInPercentage`: whether the transfer limit will be expressed in percentages or not (fixed token amounts)
- `uint256 _globalTransferLimitInPercentageOrToken`: the default transfer limit (0 to 100) or any amount if previous parameter was set to fixed token amount.
- `bool _allowPrimaryIssuance`: whether this module's restrictions should apply to issuance as well as secondary trades. (set to true to ignore restrictions on issuance)

```
function configure(bool _isTransferLimitInPercentage, uint256
_globalTransferLimitInPercentageOrToken, bool _allowPrimaryIssuance)
```

Transfer Verification

- If the _from account (sender) is in the "exempt" list, transfer restrictions are skipped for that account. (Line 59)
- If the module was set `allowPrimaryIssuance = true` and the sender is addres 0x (tokens are being minted), transfer restrictions are skipped for that account. (Line 61)
- If the module is configured to check for limits expressed in percentage, it will check that the amount being checked divided by the totalSupply is <= to the specified percentage. (Line 69)
- If the module is configured to check for limits expressed in fixed tokens, it will check that the amount being checked is <= to the specified fixed amount. (Line 75)
- If both cases above, if the issuer had set a special percentage or fixed limit for the sender account, that particular limit will be used to check instead of the general limit specified in the contract. (Lines 66 and 72)

Considering transfer restrictions on primary issuance

This module can be set to be considered or not on transfers occurring on issuance. If `allowPrimaryIssuance` is set to true, the result of this module's verifyTransfer function will be ignores. Thus, that means that transfers will not be restricted by this module when minting tokens.

Issuer or a designated ADMIN (through the PermissionsTM) can set this to true or false.

```
function setAllowPrimaryIssuance(bool _allowPrimaryIssuance) public
withPerm(ADMIN)
```

Switching back and forth between percentage or fixed amount limits

The module supports setting the transfer limit either in percentage or a fixed amount of tokens. I.E: If configured to percentage and limit is 30(%), when Alice tries to send Bob 1000 tokens, it will be calculated how much that represents of the total supply, and if it's higher than the 30% limit, transfer will fail.
I.E: If configured to fixed amount and the limit is 5000(tokens), when Alice tries to send Bob X tokens it will compare that number to the limit and fail it if it goes

beyond that number.

Percentage or Fixed amount can be switched at any point in time, but only one of them applies.

```
function changeTransferLimitToPercentage(uint256
_newGlobalTransferLimitInPercentage) public withPerm(ADMIN)
```
Switches percentage mode on while allowing to set a new limit.

```
function changeTransferLimitToTokens(uint _newGlobalTransferLimit)
public withPerm(ADMIN)
```
Switched fixed limit mode on while allowing to set a new limit.

Issuer or a designated ADMIN (through the PermissionsTM) can use these functions.

Change limits on the fly

Both percentage and fixed limits can be changed on the fly at any point in time.

```
function changeGlobalLimitInPercentage(uint256
_newGlobalTransferLimitInPercentage) public withPerm(ADMIN)
```
Sets a new percentage limit. (Only callable if the percentage mode is the currently active mode).

```
function changeGlobalLimitInTokens(uint256
_newGlobalTransferLimitInTokens) public withPerm(ADMIN)
```
Sets a new fixed limit. (Only callable if the fixed mode is the currently active mode).

Issuer or a designated ADMIN (through the PermissionsTM) can use these functions.

Setting exempt wallets

Some wallets might be exempt of these transfer restrictions. If a exempt wallet is sending tokens elsewhere, the transfer restrictions put forth by this module will be ignored.

Issuer or a designated ADMIN (through the PermissionsTM) can:

- Add an exempt wallet by calling: `function addExemptWallet(address _wallet) public withPerm(ADMIN)`
- Remove a wallet from the exempt list by calling: `function removeExemptWallet(address _wallet) public withPerm(ADMIN)`
- Add multiple wallets to the exempt list in a single transaction by calling: `function addExemptWalletMulti(address[] _wallets) public withPerm(ADMIN)` - **Might be subject to gas limits**
- Remove multiple wallets from the exempt list in a single transaction by calling: `function removeExemptWalletMulti(address[] _wallets) public withPerm(ADMIN)` - **Might be subject to gas limits**

Setting special limits for specific wallets

Some wallets might be subject to different single trade restrictions, setting them apart from the general list. In practice, this means that while every single wallet could be limited to only transferring 1000 tokens per transaction (or x%), Alice, if included in this list could have a 10.000 limit defined just for her, and Bob a 500 limit defined just for him, and so on.

Issuer or a designated ADMIN (through the PermissionsTM) can:

When dealing with percentages:
- Add a wallet with a special limit by calling: `function setTransferLimitInPercentage(address _wallet, uint _transferLimitInPercentage) public withPerm(ADMIN)`
- Remove a wallet so it doesn't have this special limit anymore by calling: `function removeTransferLimitInPercentage(address _wallet) public withPerm(ADMIN)`
- Add multiple wallets with special limits in a single transaction by calling: `function setTransferLimitInPercentageMulti(address[] _wallets, uint[] _transferLimitsInPercentage) public withPerm(ADMIN)`
- Remove multiple wallets with special limits in a single transaction by calling: `function removeTransferLimitInPercentageMulti(address[] _wallets) public withPerm(ADMIN)`

<u>When dealing with fixed amounts:</u>

- Add a wallet with a special limit by calling: `function setTransferLimitInTokens(address _wallet, uint _transferLimit) public withPerm(ADMIN)`
- Remove a wallet so it doesn't have this special limit anymore by calling: `function removeTransferLimitInTokens(address _wallet) public withPerm(ADMIN)`
- Add multiple wallets with special limits in a single transaction by calling: `function setTransferLimitInTokensMulti(address[] _wallets, uint[] _transferLimits) public withPerm(ADMIN)`
- Remove multiple wallets with special limits in a single transaction by calling: `function removeTransferLimitInTokensMulti(address[] _wallets) public withPerm(ADMIN)`

Special considerations / notes

None

Troubleshooting / FAQs

None

Know Issues / bugs

None