User Guide – M7 API
Load Management

Applicable as of 19 July 2022

Table of Contents:

1 User summary

Alongside continuous investments to increase the technical capabilities of M7, a new load management framework will be implemented to better accompany the growth of API-based and algorithmic trading on our Intraday continuous markets, ensuring increased transparency and reactivity to business needs.

To this end, new functionalities will be introduced in M7 6.12 to actively monitor the load of orders submitted through APIs by each member, and to alert and prevent any excess that could put trading members and markets at risk. These functionalities will only apply to API orders and not ComTrader orders.

2 M7 Load Management functionalities

2.1 Background

To accompany the growth of algo trading on intraday continuous markets supported by M7, new Load Management ("Load Mgmt.") functionalities are introduced in M7 v6.12 to actively monitor the orders load submitted by each member and alert & prevent excesses that could put at risk trading members and markets.

2.2 Main principles

2.2.1 What is the orders load?

One **OMT** (Order Management Transaction) corresponds to any creation, modification, activation, hibernation or deletion of an order triggered by a user on M7 (whether it is via ComTrader or via API).

The **orders load** (i.e. **OMT count**) considered in the M7 Load Mgmt. functionalities only counts the **OMTs submitted[1] via an M7 API application** over an **observation period**. When submitted via ComTrader none of the above order actions is considered as part of the OMT count calculated for the Load Mgmt. functionalities.

See ***DFS230; Section 3.1 - Load*** for more details.

Noteworthy, the OMT count submitted by a member can be influenced by the order submission/management approach:

- The modification of an existing order (with or without change implying a priority modification) only leads to 1 OMT whereas the deletion of an existing order and a subsequent submission of a new order count as 2 OMTs.
- A user-triggered deletion of an order counts as 1 OMT, whereas a system triggered deletion (contract expiry, Good till date) does not count as an OMT.
- "Hibernate all", "Delete all" and "Activate all" messages are counted as 1 OMT, even if they impact multiples orders.

2.2.2 What are the Load Management functionalities and how do they work?

In a nutshell, the Load Mgmt. functionalities will allow:

Functions	In practice[2]…
To set OMT count thresholds per member (at the M7 member level)	SEMOpx will configure thresholds (and other parameters) to the OMT count that can be submitted via API applications by any given Member (per ECC code) over 2 different rolling periods of time, called « Observation Windows » or « OW » (Long and Short): • the **Short** OW (e.g. a few seconds) • the **Long** OW (e.g. 24 hours) There are 2 types of thresholds for each OW: • A **lower** threshold « **L1** »: a number x of OMTs

[1] Whether the OMT submission is accepted or rejected by the system
[2] See Load Management parameters table for all details

	• An **upper** threshold « **L2** »: a number y of OMTs (y ≥ x)
To track the OMT count for each member and for each observation window	The OMT count for each observation window is available to all members via API query messages. The answer provided by the system includes all OMTs submitted over the last observation windows, whether they have been accepted or rejected by the system.
To send first an API warning notification when the OMT count reaches the threshold L1 of any observation window	If L1 equals x, then it is the x^{th} OMT that will trigger the notification. This notification is visible to all API users of a member, also via ComTrader "messages" panel.
If needed, to then start rejecting any further OMT submitted • either if the L1 excess is longer than the "Tolerance Period" • or if the L2 is reached.	The Tolerance Period is a period that allows a Member to keep submitting OMTs above L1 (but not L2) without having OMTs rejected. If L2 equals y, then it is the y^{th} OMT that will be rejected. The last OMT accepted is the $(y-1)^{th}$.
To accept again OMT submitted once the load goes back below L1, and after a cooldown period.	The cooldown period starts once the OMT count goes back strictly below L1.
To activate a protective suspension (i.e. disconnection of an API user of a member) in case the number of API messages submitted by this API user reaches a threshold, despite the OMTs submitted being already rejected.	The Protective Suspension Threshold ("PST") aims at further protecting the system and represents a maximal number of OMT messages submitted (accepted or rejected) per second at API user level before getting disconnected and suspended until reactivation by Market Operators.

2.2.3 How can a Member know its current orders load?

The Load Mgmt. functionalities allow any Member's API user to request its current member's OMT count, both on the short and long OW via API's **Order Throttling Status Inquiry**.
Please note that the information provided in the response, such as the load for instance, might be slightly delayed due to processing time between the moment the Inquiry is sent and the moment the response is received.

See ***DFS230; Section 4.1 - Order Throttling Status Inquiry*** for more details.

2.2.4 What may happen if a Member reaches the thresholds?

Events such as Warnings (Member level), OMT rejection (Member level / also referred to as Throttling), and in extreme cases, Protective Suspension (API user level) might be triggered.

Such events are visible by all users of a Member.

See further below ***section 2.3 - Scenarios*** for more details.

2.2.5 What may happen to the Member's active orders in case of OMT rejection?

A user can configure at member or user level how API active orders should behave in case of OMT rejection. This configuration is available at each Login.

See further below ***section 2.4 – Configuration*** for more details.

2.2.6 Can a Member keep placing orders via ComTrader even in case of OMT rejection?

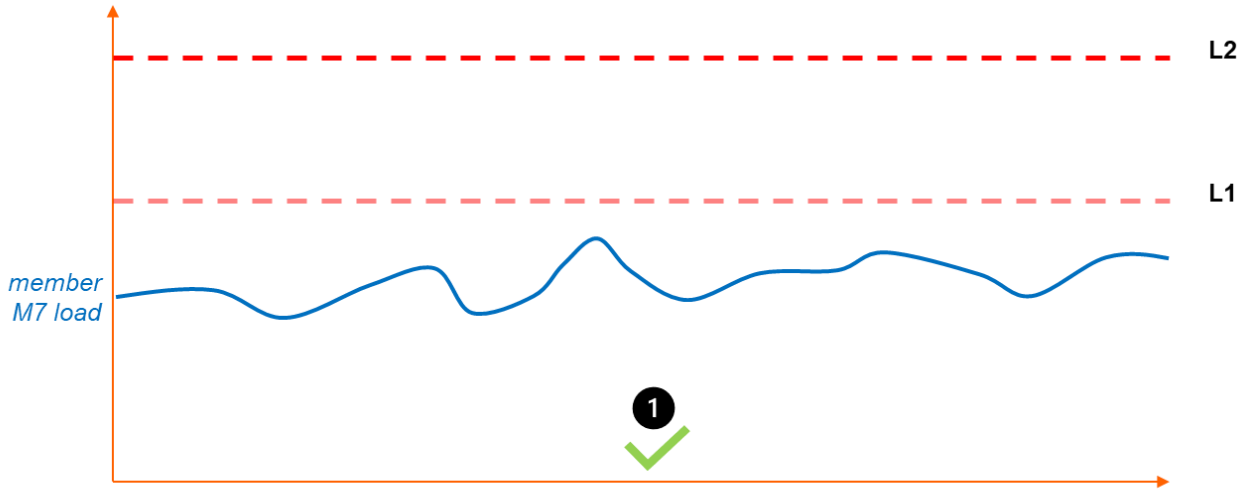
ComTrader is not concerned by the M7 API Load Management in order to always be accessible:

- Creation, modification and deletion of an order triggered by a user on ComTrader will always remain available to Members.
- OMT submitted through ComTrader are not included in the Load Mgmt. OMT count.

2.3 Scenarios

*NOTE: unless explicitly specified, the scenarios described below may apply to either the **Short** or **Long** rule.*

2.3.1 Scenario 1: Below L1



1 • All good
• All OMTs accepted

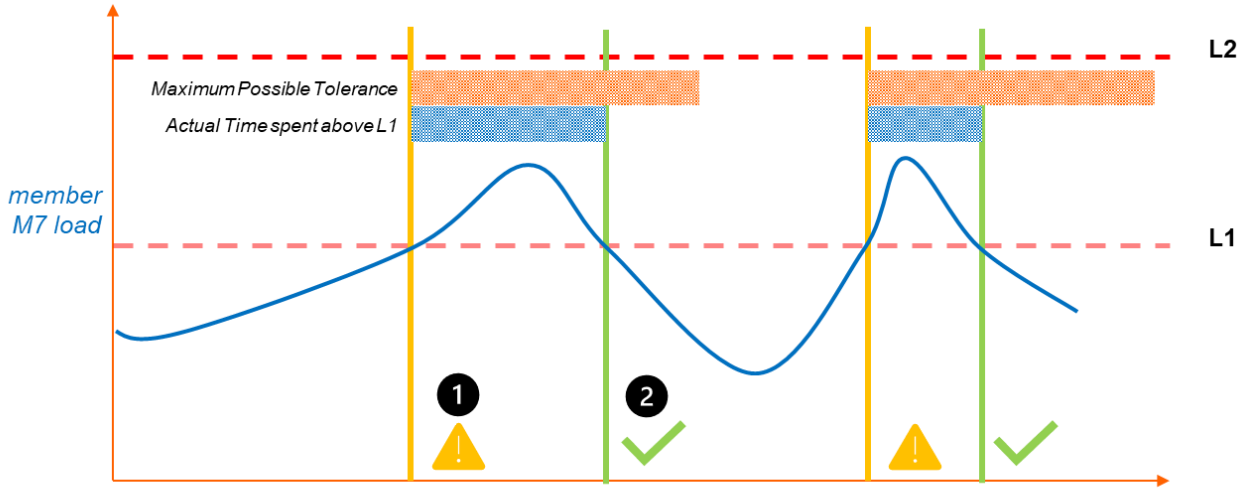
Assumptions:	
L1	7000
L2	10 000
TP	30s
CP	10s

Member M7 load : *rolling count of « total » OMTs (accepted + rejected) per OW*

In this scenario:

- The load collectively generated by Member's API users remains constantly strictly below the L1 specified for this particular Member,
- The load not having reached L1, no event is generated.

2.3.2 Scenario 2: Above L1 and back below before Tolerance Period expiry



1 • Warning triggered
• Message sent to Member (all Users)
• Start of Tolerance countdown

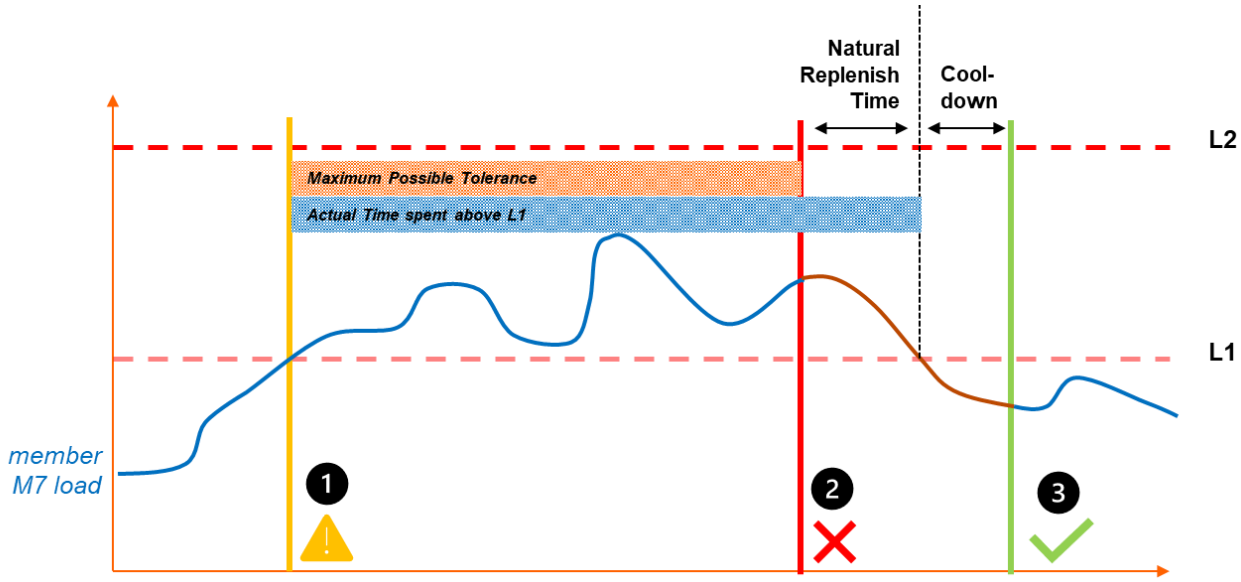
2 • Warning lifted
• Message sent to Member (all Users)
• Tolerance reset when Rolling Count of OMTs goes below L1

Assumptions:	
L1	7000
L2	10 000
TP	30s
CP	10s

In this scenario:

- The load collectively generated by Member's API users reaches the L1 specified for this particular Member,
- The load having reached L1, an event "WARNING" is generated (when OMT count equals L1 value),
- The load having reached L1, the Tolerance Period countdown starts,
- The load collectively generated by Member's API users does not reach L2 and goes back strictly below L1 before the end of the Tolerance Period (i.e. Tolerance Period not expired),
- The load having gone back strictly below L1, an event "NO RESTRICTION" is generated (when OMT count equals L1 value minus 1),
- The load having gone back strictly below L1, the Tolerance Period is reset up to its maximum.

2.3.3 Scenario 3: Above L1 continuously till Tolerance Period expiry reached



1. Warning triggered
   - Message sent to Member (all Users)
   - Start of Tolerance countdown
2. OMT rejected
   - Message sent to Member (all Users)
3. OMT accepted
   - Message sent to Member (all Users)

Assumptions:	
L1	7000
L2	10 000
TP	30s
CP	10s

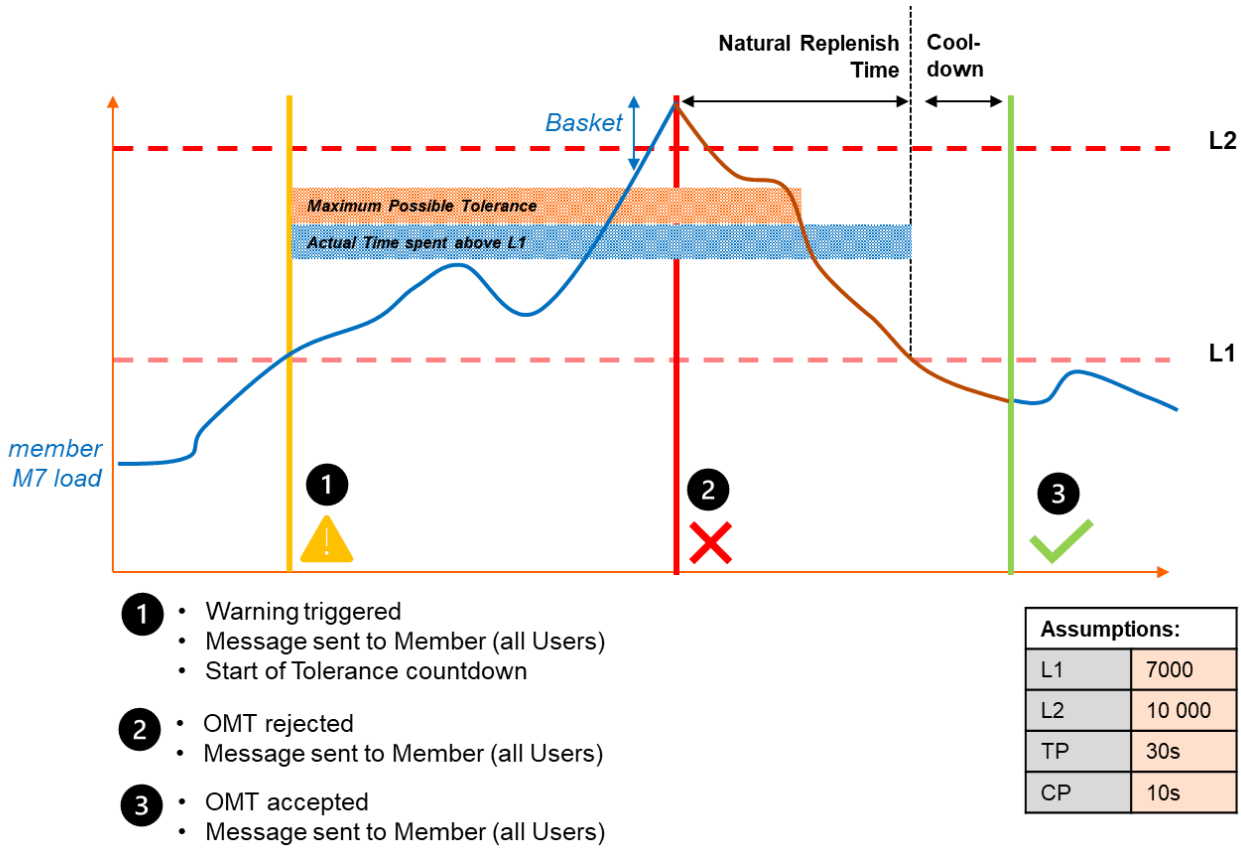
Natural Replenish Time: *variable period between the moment the throttling applies and the moment the Rolling count of OMTs goes back below L1. It depends on the past trading activity.*

In this scenario:

- The load collectively generated by Member's API users reaches the L1 specified for this particular Member,
- The load having reached L1, an event "WARNING" is generated (when OMT count equals L1 value),
- The load having reached L1, the Tolerance Period countdown starts,
- The load collectively generated by Member's API users does not reach L2 and remains above (or equal to) L1 until the end of the Tolerance Period is reached (i.e. Tolerance Period expired),
- The load having remained equal to or above L1 (but strictly below L2) when the Tolerance Period expires, an event "RESTRICTED" is generated,
- Member's API users cannot get OMT accepted until:
  - the End of Natural Replenish Time (i.e. the time needed from the start of the Restriction until the load generated by the API users of a Member gets strictly below L1) is reached (i.e. load < L1) and then,
  - the End of Cooldown period is reached,

  Until then, any attempt by Member's API users to submit or modify orders will be rejected (i.e. not sent to M7 Core), will result in an Error Response and will be added to the OMT count.
- Member's (or BG's or user's) active orders may remain active or be hibernated, based on configuration defined by Member's users,
- Member's CT users can always get OMT accepted as usual,
- The end of Cooldown period being reached, an event "NO RESTRICTION" is generated,
- Member's API users can get OMT accepted back again.

2.3.4 Scenario 4: Above L2



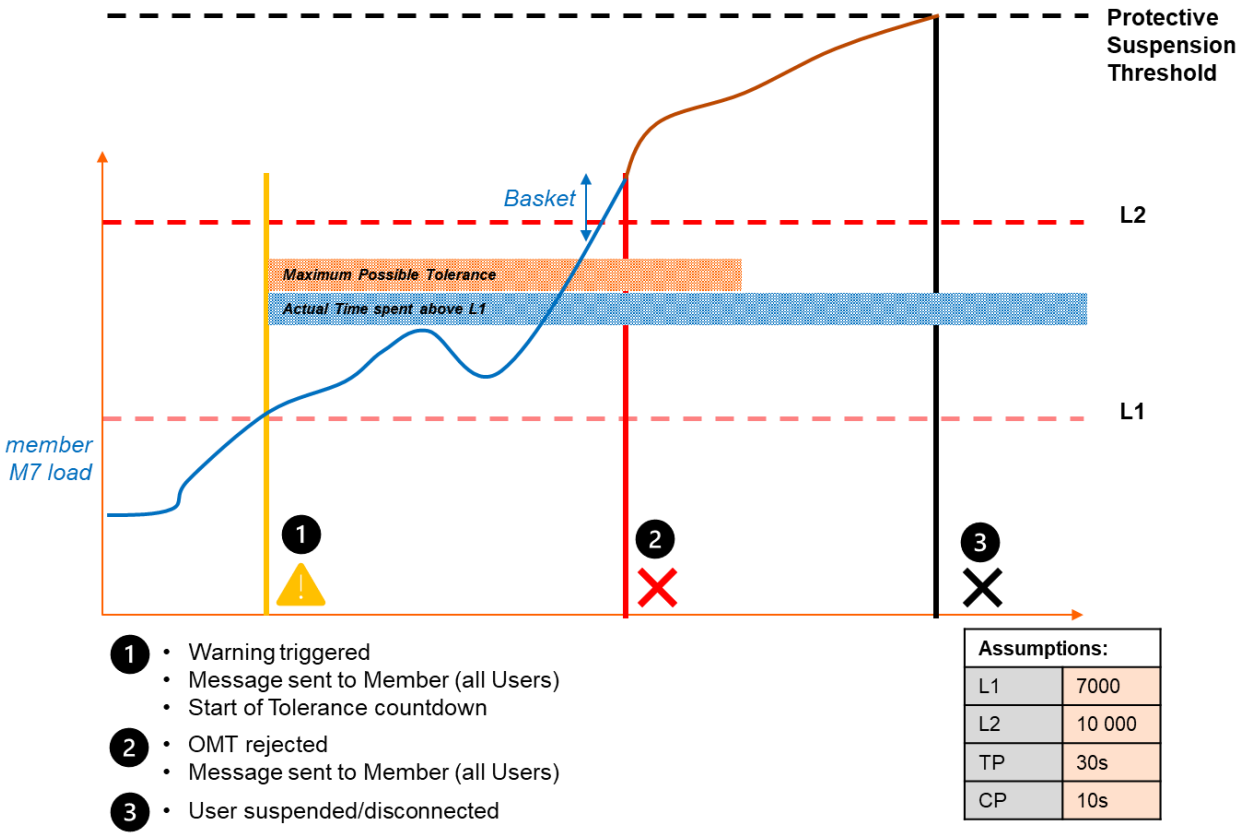
Assumptions:	
L1	7000
L2	10 000
TP	30s
CP	10s

In this scenario:

- The load collectively generated by Member's API users reaches the L1 specified for this particular Member,
- The load having reached L1, an event "WARNING" is generated (when OMT count equals L1 value),
- The load having reached L1, the Tolerance countdown starts,
- The load collectively generated by Member's API users reaches L2 before the end of the Tolerance Period (i.e. Tolerance Period not expired),
- The load having reached L2 (even without reaching the expiry of the Tolerance Period), an event "RESTRICTED" is generated (when OMT count equals L2 value),
- Member's API users cannot submit or modify orders until:
    - End of Natural Replenish Time (i.e. the time needed from the start of the Restriction until the load generated by the non-CT users of a Member gets below L1) is reached (i.e. load < L1) and then,
    - End of Cooldown period is reached,

  Until then, any attempt by Member's API users to submit or modify orders will be rejected (i.e. not sent to M7 Core), will result in an Error Response and will be added to the OMT count.
  IMPORTANT: in this particular case, please note that the whole basket bringing the load above L2 is fully accepted. This is a specific case where Load can be higher than L2. This is valid whatever the basket execution restriction is (including LFOK).
- Member's (or BG's or user's) active orders may remain active or be hibernated, based on configuration defined by Member's users,
- Member's CT users can always get OMT accepted as usual,
- The end of Cooldown period being reached, an event "NO RESTRICTION" is generated,
- Member's API users can get OMT accepted back again.

2.3.5 Scenario 5: Above L2 and above Protective Suspension Threshold



N.B.: the chart above is illustrating that only members with OMT already rejected might hit the Protective Suspension Limit if they continue submitting OMTs. However please note that the metrics for the Protective Suspension is the number of Order entry / Order modify Messages submitted per second at a user level, not the count of OMT per OW at member level.

In this scenario:

- The load collectively generated by Member's API users reaches the L1 specified for this particular Member,
- The load having reached L1, an event "WARNING" is generated (when OMT count equals L1 value),
- The load having reached L1, the Tolerance Period countdown starts,
- The load collectively generated by Member's API users reaches L2 before the end of the Tolerance Period (i.e. Tolerance Period not expired),
- The load having reached L2 before the Tolerance Period expires, an event "RESTRICTED" is generated (when OMT count equals L2 value),
- Member's API users cannot submit or modify orders until:
    - End of Natural Replenish Time (i.e. the time needed from the start of the Restriction until the load generated by the non-CT users of a Member gets below L1) is reached (i.e. load < L1) and then,
    - End of Cooldown period is reached,

  Until then, any attempt by Member's API users to submit or modify orders will be rejected (i.e. not sent to M7 Core), will result in an Error Response and will be added to the OMT count.
  NOTE: in this particular case, please note that the whole basket bringing the load above L2 is fully accepted. This is a specific case where Load can be higher than L2. This is valid whatever the basket execution restriction is (including LFOK).
- Member's (or BG's or user's) active orders may remain active or be hibernated, based on configuration defined by Member's users,

- In spite of having OMT rejected at Member level, at least one of Members' API users keep attempting to submit or modify orders until PST is reached,
- The load having reached the PST, the offending API user is disconnected and suspended until reactivation by Market Operators.

2.4 Configuration by Members

Members' API users can configure at 2 levels (User, Member) the behaviour of API active orders in case of OMT rejection. This is optional and can be performed by the API user when login in (LoginReq message) - see ***DFS180; Section 6.1.1 – LoginReq*** for more details.

At Member level
The user can decide that, if the Member gets his OMTs rejected:

- Option 1: STAY ACTIVE - The active orders of the Member will remain active
- Option 2: HIBERNATE - The active API orders of the Member will get hibernated

If Option 2 is configured, then user level section will be ignored.

At user Level
The user can decide that, if the Member gets his OMTs rejected AND that the Member level is configured with Option 1: STAY ACTIVE:

- Option 1: STAY ACTIVE - The active orders of the Member's API user will remain active
- Option 2: HIBERNATE BG - The active API orders of the Member's API user's Balancing Group will get hibernated
- Option 3: HIBERNATE - The active API orders of the Member's API user will get hibernated

2.5 API application implementation guidelines

Please refer to the "M7 API Introductory Training Session" slides in the M7 API package.
The "Throttling" section describes how API applications managing orders must integrate the following toolkit:

a) **A new Throttling Status Request/Response**

b) **New Message Reports content,** alerting all users of a given member about a throttling status change: transition to WARNING or to RESTRICTED, or to NO_RESTRICTION. All messages are referenced in the DFS200 Messages document of the API package.

c) **Responses to Order Management requests**: it is possible to send a valid Order Management Request and to get an Error Response directly in the private response queue without any Acknowledgment Response. This happens when an order is rejected because a member is RESTRICTED.

d) **Login Request new options**: it is possible to define when logging in the desired behaviour regarding the impacted member API orders when being restricted:

   - **Possible actions**: nothing, or hibernate API orders
   - **Action scope**: at user level, BG level (all BGs assigned to the throttled/logged in API user), all API orders of the throttled member
   - On top of the API package please refer to DFS180 for more details.

2.6 Applicable Load Management parameters

The final SEMOpx Load Mgmt. parameters will be set as below for the go-live

M7 parameters		Value
Long (member level)	**L_OP** (Observation Period)	**24 h**
	L_TP (Tolerance period)	**0 sec**
	L_CP (Cooldown period)	**0 sec**
	L_L1	**5 000 OMT**
	L_L2	**5 000 OMT**
Short (member level)	**S_OP** (Observation Period)	**10 sec**
	S_TP (Tolerance period)	**0 sec**
	S_CP (Cooldown period)	**0 sec**
	S_L1	**100 OMT**
	S_L2	**100 OMT**
Protective suspension (user level)	**PS** (messages/sec)	**10 000 msg**

2.7 Specificities for M7 members active on several exchanges

For M7 members only active on SEMOpx markets, the Load Management parameters uploaded in M7 will be as per the SEMOpx Load Management parameters described on section 2.6.

For M7 members active on SEMOpx markets and another Exchange markets via the same M7 member setup, the Load Management parameters uploaded in M7 will be calculated with the following logic:

1. SEMOpx Load Management parameters are herein defined in the SEMOpx Load Management user guide
2. Other Exchanges (like EPEX SPOT) Load Management parameters are defined in their respective user guides
3. L_OP, L_TP, L_CP, S_OP, S_TP, S_CP and PS uploaded values in M7 will be, for each parameter, the **maximum of values** offered by all exchanges
4. L_L1, L_L2, S_L1 and S_L2 uploaded values in M7 will be, for each parameter, the **sum of values** offered by all exchanges

3 Glossary

API user	API user and API user password: an user identifier is a string of characters that enables the contracting party API application to log in the M7 system via its API (once a secured technical connection has been established with the API server thanks to an API certificate) and then to interact with the M7 system via its API.
Cooldown Period	Period which starts when restricted once the OMT count goes back below L1. Once the Cooldown Period is over then OMT are accepted again.
Disconnected	The technical AMQP connection used by an API application to interact with the M7 API with a specific API user gets closed. As a result, a new connection to the M7 API must be created to try to log back in. Please note that a suspended user can establish a new connection but will see his Login attempts rejected.
L1	First Limit of the Load Mgt. feature: if the member load reaches or goes beyond L1 (OMT count >= L1), the member will receive an alert through the M7 API. If he does not decrease its load before a fixed Tolerance Period, the further exceeding OMT are rejected.
L2	Second Limit of the Load Mgmt. feature (L2>L1): if the member load reaches or goes beyond L2 (OMT count >= L2), further exceeding OMT are rejected.
M7 Member	M7 Members represent the highest level of the hierarchy, whilst the other entities are assigned below each Member. They represent the “company” level of a user setup.
Observation Period	Rolling period during which the OMT count calculates the number of OMT submitted by the Member.
OMT	Order Management Transaction: User-triggered Order action (e.g Order submission, Order modification, Order deletion, etc)
OTR	Order to Trade Ratio – please refer to the M7 API FAQ in the API Package for more details.
Protective Suspension	Functionality aiming at protecting the system once a maximal number of submitted OMT messages (accepted or rejected) per second is reached at member level. Once triggered, the API user gets disconnected. Note: L1 and L2 are based on an OMT count when protective suspension is based on a number of order management message per second.
Replenish time	The time needed from the start of the Restriction until the load generated by the API users of a Member gets strictly below L1.
Short/Long Periods	The Load Mgt. feature will apply on two distinct timeframes: the « Short period » monitors the OMT load on seconds rolling periods whereas the « Long Period » monitors the OMT load on hours rolling periods.
Suspended	A suspended user: • is immediately disconnected from M7 (end of the API AMQP connection) • is not able to connect or log back in All orders owned by a suspended user are immediately deleted by M7. Market Operations must be contacted to get a user unsuspended / active again.
Tolerance Period	Period over which a Member is allowed to submit orders above L1 (but not L2) without having OMTs rejected.