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FACTSET TRADING API DEVELOPER GUIDE APRIL 2022

Portware, A FactSet Trading Solution

Park Avenue South,
New York, NY 10016
Phone: 212.425.5233
Fax: 212.571.4634

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FACTSET TRADING API – VERSION 1.0

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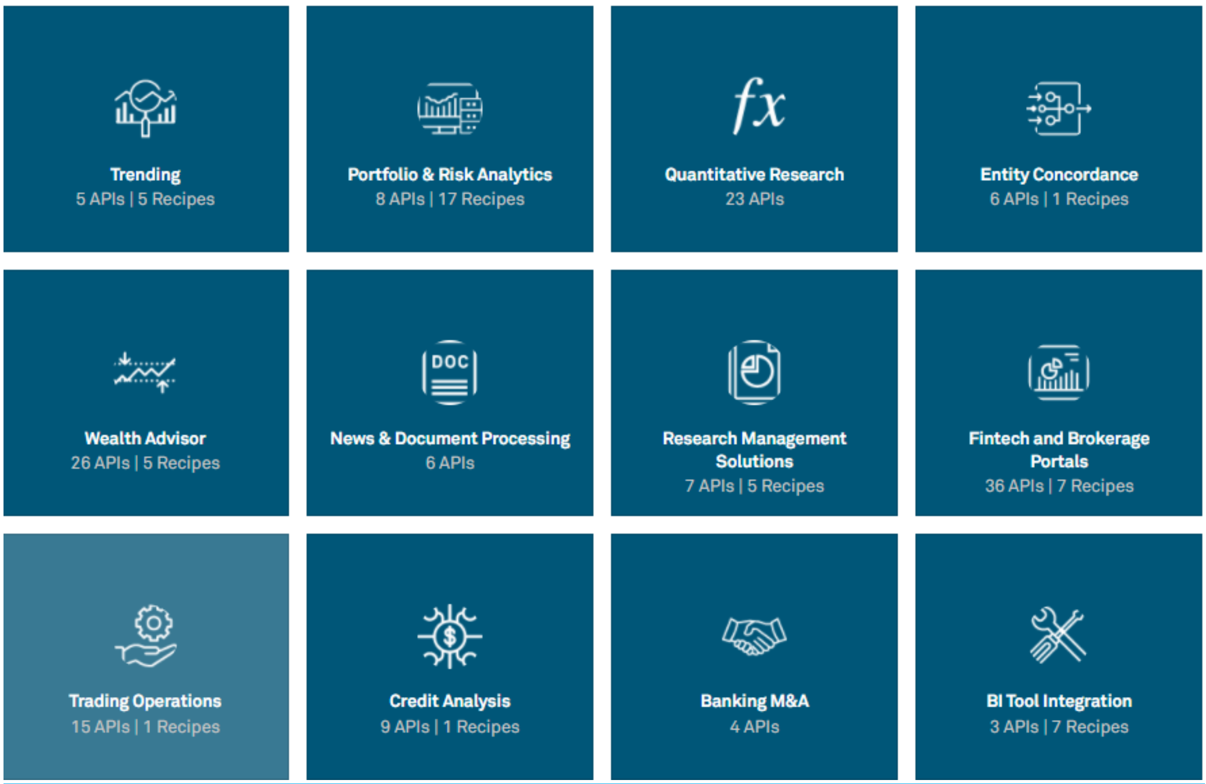
The FactSet API Program

Companies use APIs to address multiple business workflows and enable seamless interoperation with third-party developers, business partners, and their own internal departments. The FactSet API Program is a well-established collection of APIs that offers programmatic access to our diverse FactSet products and data feeds available within the **FactSet API** program. The FactSet API Program is designed to support digital transformation journeys through flexible access to data in a secure and consistent manner. The scope of the FactSet API Program is illustrated in the following diagram.



The FactSet API program offers access to the following set of tools that can assist with several user workflows.

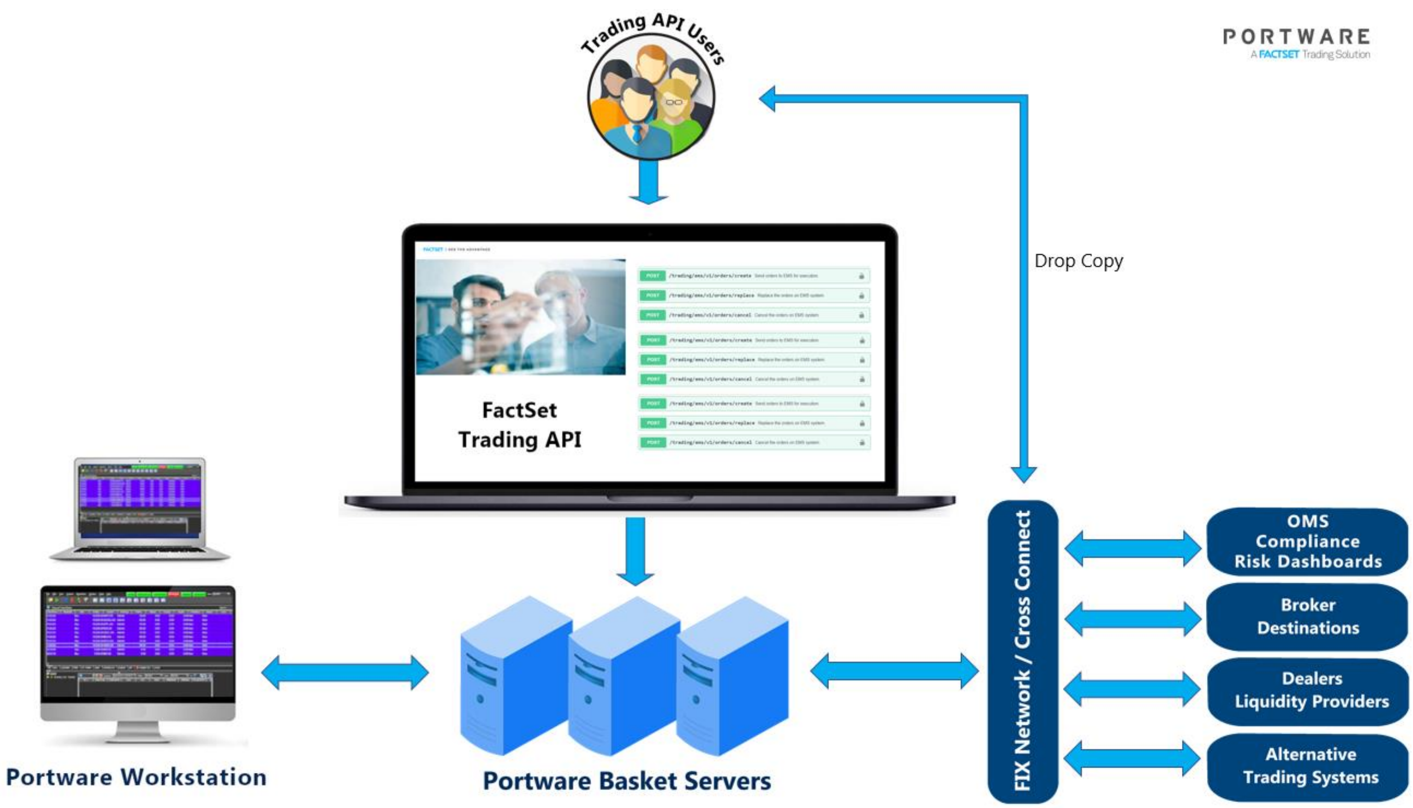
- Developer toolkit includes SDK libraries for C#, Java, and Python
- Adherence to industry REST standards
- API Documentation on FactSet developer portal (https://developer.factset.com/)
- Uniform feel across all FactSet Enterprise scale APIs

The FactSet Trading API

The FactSet API Program contains the FactSet Trading API (Trading API), a RESTful API used to enter orders into Portware, a multi-asset trading platform for automated or discretionary workflows. The FactSet Trading API facilitates a programmatic experience that couples ease of integration with a client's proprietary order generation technologies and offers programmatic access to stage and amend orders within Portware. The API also allows programmatic access to existing Portware capabilities for an optimized programmatic trading experience, for example, the Smart Trading Assistant.

An order originated using the Trading API is subject to the field definition and schema mapping rules as defined in this document. The API request can have multiple orders, and Portware will receive each order as a single order entry. Further grouping, netting and/or aggregation is applied based on user's predefined configuration.

Portware advanced routing capabilities will equivocally extend across any OMS staged order or API originated order. All inbound orders are processed on the Portware Basket Server and either validated against the predefined mapping rule(s) or rejected with an error response code accordingly.



Using the Trading API

The FactSet Trading API is hosted at https://developer.factset.com/api-catalog/ems-api. FactSet leverages an API Key System using Basic HTTP Authentication Scheme as well as the OAUTH 2.0 client credential flow for secure access. For more information about the FactSet authentication protocol, see https://developer.factset.com/authentication.

HTTP request and response header names are case insensitive as per HTTP Standard. Do not rely on case sensitive matching of headers in your code.

Trading API Definitions

To use the Trading API:

- **Portware Version 6.16.0+ is required.** API users are recommended to maintain the most current version of Portware and the Trading API as any enhancements or bug fixes will propagate to end user workstations in accordance with Portware software release cycles.
- Confirm the Portware Basket Server is up and running.

Client application sends an API **POST** request to **create, replace, and cancel orders** within Portware, offering a programmatic alternative to the FIX Protocol.

- Mandatory fields are required in POST requests. If no mandatory fields are passed, the order will be rejected.
- The Trading API supports throttling up to 1000 orders per request and/or 25 requests within a five second window.
- All orders staged into Portware from an API are stamped with a unique FIX ID Tag 8500 = “API” within the response code message

The following sections contain the Trading API definitions.

- Create Orders
- Replace Orders
- Cancel Orders

Create Orders

POST/trading/ems/v1/orders/create

Description

This endpoint creates orders in Portware for execution.

Request Headers

Header name	Description
Authorization	Standard HTTP header. Value needs to use 'Basic <base64 encoded value>' format.
Content-Type	Standard HTTP header. Value needs to specify application/JSON (i.e., caller needs to specify that the body is in JSON format).

Request Body

Parameter name	Data type	Required	Description	Format
data	Array	Yes	Parent object of the request body	Each request is represented by an object containing order inputs. See below for schema and example values.

Field definitions supported within the data request message:

Parameter name	Data type	Required	Description	Format
investorId	String	No	Id of the trader or the SenderSubID	For example – Firm ID
orders	Object	Yes	Order details	Order details include orderId, orderType, side etc.

Field definitions supported within the order request message:

Parameter name	Data type	Required	Description	Format
orderId	String	No	Unique Id for the order within a single trading day	For example – OR0000001
instrument	Object	Yes	Ticker symbol of the order	.
side	String	Yes	Side of the order	For example - Buy or Sell
orderType	String	Yes	Type of order	Accepted Values - market, limit, stop, stop_limit, market_on_close, limit_or_better
orderQuantity	Number	No	Number of shares ordered	For example – 5,000, 10,000 etc.

Parameter name	Data type	Required	Description	Format
price	Number	No	Price per share	For example – USD 200 etc.
stopPrice	Number	No	Stop price of the security	Stop price becomes mandatory when orderType is stop or stop_limit.
strikePrice	Number	No	Strike price of the option security.	
currency	String	No	Currency used for price of order	For example – USD, EUR etc.
isCovered	Boolean	No	Used for options- Covered or uncovered	true = Covered false = Uncovered
maxShow	Number	No	Max number of shares within an order to display (sent via an IOI typically)	
maxFloor	Number	No	Max number of shares within an order displayed on the exchange floor	
prevClosePrice	Number	No	Previous closing price of security	
settlementType	String	No	Order settlement period	0 = Regular 1 = Cash 2 = Next Day 3 = T+2 4 = T+3 5 = T+4 6 = Future 7 = When Issued 8 = Sellers Option 9 = T+ 5
settlementDate	String	No	Date of trade settlement	Format - YYYYMMDD
handlingInstructions	String	Yes	Order handling instructions	Acceptable Values: auto_ord_pvt, auto_ord_pub, best_execution
executionInstructions	String	No	Order execution instructions	Acceptable Values: not_held, work, go_along, over_the_day, held, participate_dont_initiate, strict_scale, try_to_scale, stay_on_bidside, stay_on_offerside, no_cross, ok_to_cross, call_first, percent_of_volume,

Parameter name	Data type	Required	Description	Format
				do_not_increase, do_not_reduce, all_or_none, reinstate_on_system_failure, institutions_only, reinstate_on_trading_halt, cancel_on_trading_halt, last_peg, mid_price_peg, non_negotiable, opening_peg, market_peg, cancel_on_system_failure, primary_peg, suspend, fixed_peg_to_local_best_bid, customer_display_instruction, netting, peg_to_vwap, trade_along, try_to_stop, cancel_if_not_best, trailing_stop_peg, strict_limit, ignore_price_validity_checks, peg_to_limit_price, work_to_target_strategy, intermarket_sweep, external_routing_allowed, external_routing_not_allowed, imbalance_only, single_execution_requested_for_block_trade, best_execution
locateRequired	Boolean	No	Indicates whether the broker is to locate the stock for the short sell order	true = Indicates the broker is responsible for locating the stock false = Indicates the broker is not required to locate
effectiveTime	String	No	Expressed in UTC	Format should be YYYYMMDD-HH:MM:SS
account	String	No	Unique account mnemonic	Test account
timeInForce	String	No	IF TIF= GTD, then expireDate or expireTime is required	Acceptable Values: DAY, GTC, OPG, IOC, FOK, GTX, GTD, ATC
userDefinedFields	String	No	Custom user defined fields	Example: "123": "Y"

Field definitions supported within the instrument request message:

Parameter name	Data type	Required	Description	Format
symbol	String	Yes	Symbol/Ticker of the security	For Example – FDS, FB etc.
securityType	String	No	Type of security	For example – equity, bond etc.
cfiCode	String	No		
securityExchange	String	No	Trading exchange of the security	For example – NYSE etc.

Parameter name	Data type	Required	Description	Format
issuer	String	No	Issuer of the security	For example – FDS, FB etc.
securityDescription	String	No	Description of the security	
maturityMonthYear	String	No	Maturity month/year of the security	
maturityDay	String	No	Maturity day of the security	

Response Headers

Header name	Description
X-DataDirect-Request-Key	FactSet's request key header.
X-FactSet-Api-Request-Key	Key to uniquely identify a Trading API request. Only available after successful authentication.
X-FactSet-Api-RateLimit-Limit	Number of allowed requests for the time window.
X-FactSet-Api-RateLimit-Remaining	Number of requests left for the time window.
X-FactSet-Api-RateLimit-Reset	Number of seconds remaining till rate limit resets.

Returns

HTTP status code	Description
200	Expected response, returns the list of orders
400	Invalid POST body parameters
401	Missing or invalid authentication.
403	User is forbidden access with current credentials.
415	Missing/Invalid Content-Type header. Header needs to be set to application/JSON.
429	Rate limit reached. Cancel older requests using Cancel Calculation endpoint or wait for older requests to finish / expire.
500	Server error. Log the X-DataDirect-Request-Key header to assist in troubleshooting.
503	Request timed out, Retry the request shortly after.

Example

```
Request:
POST http://api.factset.com/trading/ems/v1/orders/create

Request Headers:
content-type: application/json
```

```
Authorization: Basic RkRTX0RFTU9fVVMt*****************************
Accept-Encoding:  gzip
```

Request Body:


```
{
  "data": {
    "orders": [
      {
        "instrument": {
          "symbol": "FDS"
        },
        "side": "buy",
        "orderType": "market",
        "orderQuantity": 1000,
        "price": 45,
        "currency": "USD",
        "handlingInstructions": "auto_ord_pub"
      },
      {
        "instrument": {
          "symbol": "FDS"
        },
        "side": "sell",
        "orderType": "limit",
        "orderQuantity": 1000,
        "price": 450,
        "currency": "USD",
        "handlingInstructions": "auto_ord_pub"
      },
      {
        "instrument": {
          "symbol": "FDS"
        },
        "side": "buy",
        "orderType": "market_on_close",
        "orderQuantity": 1000,
        "price": 450,
        "currency": "USD",
        "handlingInstructions": "auto_ord_pub"
      }
    ]
  }
}
```

Response Code:

HTTP 200 Accepted

Response Body:


```
{
  "data": {
    "accepted": {
      "720003": {
        "symbol": "FDS",
        "side": "buy",
        "orderType": "market",
        "orderQuantity": 1000
      },
      "720004": {
        "symbol": "FDS",
        "side": "sell",
        "orderType": "limit",
        "orderQuantity": 1000
      },
      "720005": {
        "symbol": "FDS",
        "side": "buy",
        "orderType": "market_on_close",
        "orderQuantity": 1000
      }
    },
    "rejected": {}
  }
}
```


Response Headers:

```
 access-control-allow-credentials: true
 access-control-allow-origin: https://api.factset.com
 access-control-expose-headers:       X-FactSet-Api-Request-Key,Vary,Transfer-Encoding,Content-
      Encoding
 api-supported-versions: 1
 connection: keep-alive
 content-encoding: br
 content-type: application/json
 date: Fri, 08 Apr 2022 18:11:35 GMT
 keep-alive: timeout=30
 transfer-encoding: chunked
 vary: Accept-Encoding, Origin
 via: 1.1 factsetio-router (0.46 bfa05cb),rdirstagea07:9026
 x-datadirect-request-key: 62507AD62A3A1150
```

```
x-factset-api-request-key: 62507AD62E8E3F85
x-factset-api-version: 1
```

Replace Order

POST/trading/ems/v1/orders/replace

Description

This endpoint modifies and replaces API created orders in Portware.

Request Headers

Header name	Description
Authorization	Standard HTTP header. Value needs to use ‘Basic <base64 encoded value>’ format.
Content-Type	Standard HTTP header. Value needs to specify application/JSON (i.e., caller needs to specify that the body is in JSON format).

Request Body

Parameter name	Data type	Required	Description	Format
data	Array	Yes	Parent object of the request body	Each request is represented by an object containing order inputs. See below for schema and example values.

Field definitions supported within the data request message:

Parameter name	Data type	Required	Description	Format
investorId	String	No	Id of the trader or the SenderSubID	For example – Firm ID
orders	Array	Yes	List of orders	Includes originalOrderId, order
order	Object	Yes	Order details	Order details include orderId, orderType, side etc

Field definitions supported within the order request message:

Parameter name	Data type	Required	Description	Format
originalOrderId	String	Yes	Unique Order Id of the original API order created	For example – OR0000001

Parameter name	Data type	Required	Description	Format
instrument	Object	Yes	Ticker symbol of the order	
side	String	Yes	Side of the order	For example - Buy or Sell
orderType	String	Yes	Type of order	Accepted Values - market, limit, stop, stop_limit, market_on_close, limit_or_better
orderQuantity	Number	No	Number of shares ordered	For example – 5000, 10,000 etc.
price	Number	No	Price per share	For example – USD 200 etc.
stopPrice	Number	No	Stop price of the security	Stop price becomes mandatory when orderType is stop or stop_limit.
strikePrice	Number	No	Strike price of the option security.	
currency	String	No	Currency used for price of order	For example – USD, EUR etc.
isCovered	Boolean	No	Used for options- Covered or uncovered	true = Covered false = Uncovered
maxShow	Number	No	Max number of shares within an order to display (sent via an IOI typically)	
maxFloor	Number	No	Max number of shares within an order displayed on the exchange floor	
prevClosePrice	Number	No	Previous closing price of security	
settlementType	String	No	Order settlement period	0 = Regular 1 = Cash 2 = Next Day 3 = T+2 4 = T+3 5 = T+4 6 = Future 7 = When Issued 8 = Sellers Option 9 = T+ 5

Parameter name	Data type	Required	Description	Format
settlementDate	String	No	Date of trade settlement	Format - YYYYMMDD
handlingInstructions	String	Yes	Order handling instructions	Acceptable Values: auto_ord_pvt, auto_ord_pub, best_execution
executionInstructions	String	No	Order execution instructions	Acceptable Values: not_held, work, go_along, over_the_day, held, participate_dont_initiate, strict_scale, try_to_scale, stay_on_bidside, stay_on_offerside, no_cross, ok_to_cross, call_first, percent_of_volume, do_not_increase, do_not_reduce, all_or_none, reinstate_on_system_failure, institutions_only, reinstate_on_trading_halt, cancel_on_trading_halt, last_peg, mid_price_peg, non_negotiable, opening_peg, market_peg, cancel_on_system_failure, primary_peg, suspend, fixed_peg_to_local_best_bid, customer_display_instruction, netting, peg_to_vwap, trade_along, try_to_stop, cancel_if_not_best, trailing_stop_peg, strict_limit, ignore_price_validity_checks, peg_to_limit_price, work_to_target_strategy, intermarket_sweep, external_routing_allowed, external_routing_not_allowed, imbalance_only, single_execution_requested_for_block_trade, best_execution
locateRequired	Boolean	No	Indicates whether the broker is to locate the stock for the short sell order	true = Indicates the broker is responsible for locating the stock false = Indicates the broker is not required to locate
effectiveTime	String	No	Expressed in UTC	Format should be YYYYMMDD-HH:MM:SS
account	String	No	Unique account mnemonic	Test account
timeInForce	String	No	IF TIF= GTD, then expireDate or expireTime is required	Acceptable Values: DAY, GTC, OPG, IOC, FOK, GTX, GTD, ATC
userDefinedFields	String	No	Custom user defined fields	Example: "123": "Y"

Field definitions supported within the instrument request message:

Parameter name	Data type	Required	Description	Format
symbol	String	Yes	Symbol/Ticker of the security	For Example – FDS, FB etc.
securityType	String	No	Type of security	For example – equity, bond etc.
cfiCode	String	No		
securityExchange	String	No	Trading exchange of the security	For example – NYSE etc.
issuer	String	No	Issuer of the security	For example – FDS, FB etc.
securityDescription	String	No	Description of the security	
maturityMonthYear	String	No		
maturityDay	String	No	Maturity day of the security	

Response Headers

Header name	Description
X-DataDirect-Request-Key	FactSet's request key header.
X-FactSet-Api-Request-Key	Key to uniquely identify a Trading API request. Only available after successful authentication.
X-FactSet-Api-RateLimit-Limit	Number of allowed requests for the time window.
X-FactSet-Api-RateLimit-Remaining	Number of requests left for the time window.
X-FactSet-Api-RateLimit-Reset	Number of seconds remaining till rate limit resets.

Returns

HTTP status code	Description
200	Expected response, returns the list of orders
400	Invalid POST body parameters
401	Missing or invalid authentication
403	User is forbidden access with current credentials
415	Missing/Invalid Content-Type header. Header needs to be set to application/JSON
429	Rate limit reached. Cancel older requests using Cancel Calculation endpoint or wait for older requests to finish / expire

500	Server error. Log the X-DataDirect-Request-Key header to assist in troubleshooting
503	Request timed out, Retry the request shortly after.

Example

```
Request:
POST http://api.factset.com/trading/ems/v1/orders/replace

Request Headers:
content-type: application/json
Authorization: Basic RkRTX0RFTU9fVVMt******************************
Accept-Encoding:  gzip

Request Body:
{
      "data": {
            "investorId": "SenderSubID",
            "orders": [
                  {
                        "originalOrderId": "720005",
                        "order": {
                              "instrument": {
                                    "symbol": "FDS"
                              },
                              "side": "buy",
                              "orderType": "market",
                              "orderQuantity": 2000,
                              "handlingInstructions": "auto_ord_pub"
                        }
                  }
            ]
      }
}

Response Code:
HTTP 200 Accepted

Response Body:
{
  "data": {
    "accepted": {
      "720005": {
        "symbol": "FDS",
        "side": "buy",
        "orderType": "market",
```

```
        "orderQuantity": 2000,
        "orderId": "720007"
      }
    },
    "rejected": {}
  }
}

Response Headers:
 access-control-allow-credentials: true
 access-control-allow-origin: https://api.factset.com
 access-control-expose-headers:X-FactSet-Api-Request-Key,Vary,Transfer-Encoding,Content-
      Encoding
 api-supported-versions: 1
 connection: keep-alive
 content-encoding: br
 content-type: application/json
 date: Fri, 08 Apr 2022 19:48:10 GMT
 keep-alive: timeout=30
 transfer-encoding: chunked
 vary: Accept-Encoding, Origin
 via: 1.1 factsetio-router (0.46 bfa05cb),rdirstagea08:9024
 x-datadirect-request-key: 6250917A24E1FA78
 x-factset-api-request-key: 6250917A41B4DA76
 x-factset-api-version: 1
```

Cancel Order

POST/trading/ems/v1/orders/cancel

Description

This endpoint triggers cancels for a list of orders in Portware.

Request Headers

Header name	Description
Authorization	Standard HTTP header. Value needs to use ‘Basic <base64 encoded value>’ format.

Request Body

Parameter name	Data type	Required	Description	Format

data	Array	Yes	Parent object of the request body	Each request is represented by an object containing order inputs. See below for schema and example values.

Field definitions supported within the data request message:

Parameter name	Data type	Required	Description	Format
investorId	String	No	Id of the trader or the SenderSubID	For example – Firm ID
orders	Object	Yes	Order details	Order details include orderId, orderType, side etc.

Field definitions supported within the orders request message:

Parameter name	Data type	Required	Description	Format
originalOrderId	String	Yes	Unique Order Id of the original API order created	For example – OR0000003

Response Headers

Header name	Description
Content-Encoding	Standard HTTP header. Header value based on Accept-Encoding Request header.
Content-Type	Standard HTTP header.
Transfer-Encoding	Standard HTTP header. Header value will be set to Chunked if Accept-Encoding header is specified.
X-DataDirect-Request-Key	FactSet's request key header.
X-FactSet-Api-Request-Key	Key to uniquely identify a Trading API request. Only available after successful authentication.
X-FactSet-Api-RateLimit-Limit	Number of allowed requests for the time window.
X-FactSet-Api-RateLimit-Remaining	Number of requests left for the time window.
X-FactSet-Api-RateLimit-Reset	Number of seconds remaining till rate limit resets.

Returns

HTTP status code	Description
200	Expected response once the calculation is completed. The response body contains status information of the entire request and each individual calculation.

400	Invalid identifier parameter provided.
401	Missing or invalid authentication.
403	User is forbidden access with current credentials.
415	Missing/Invalid Content-Type header. Header needs to be set to application/json
429	Rate limit reached. Cancel older requests using Cancel optimization endpoint or wait for older requests to finish/expire.
500	Server error. Log the X-DataDirect-Request-Key header to assist in troubleshooting.
503	Request timed out. Retry the request shortly after.

Example

```
Request:
POST  http://api.factset.com/trading/ems/v1/orders/cancel

Request Headers:
content-type: application/json
Authorization: Basic RkRTX0RFTU9fVVMt******************************
Accept-Encoding:  gzip

Request Body:
{
  "data": {
    "investorId": "SenderSubID",
    "orders": [
      {
        "originalOrderId": "720004"
      }
    ]
  }
}

Response Code:
HTTP 200 Accepted

Response Body:
{
  "data": {
    "accepted": {
      "720004": {
```

```
        "info": "Cancel request for order 720004 received. Cancel
pending.",
        "orderId": "720006"
      }
    },
    "rejected": {}
  }
}
```


Response Headers:

```
 access-control-allow-credentials: true
 access-control-allow-origin: https://api.factset.com
 access-control-expose-headers: X-FactSet-Api-Request-
 Key,Vary,Transfer-Encoding,Content-Encoding
 api-supported-versions: 1
 connection: keep-alive
 content-encoding: br
 content-type: application/json
 date: Fri, 08 Apr 2022 19:15:29 GMT
 keep-alive: timeout=30
 transfer-encoding: chunked
 vary: Accept-Encoding, Origin
 via: 1.1 factsetio-router (0.46 bfa05cb),rdirstagea07:9020
 x-datadirect-request-key: 625089D220F5B03F
 x-factset-api-request-key: 625089D27569E775
 x-factset-api-version: 1
```

Note: Only orders entered originally from the Trading API are eligible for this action. If the order was staged in Portware from an OMS those orders will need to be addressed within the Portware application and are not eligible for replace or cancels using the Trading API. The following response message will reflect this behavior.


```
{
  "data": {
    "accepted": {},
    "rejected": {
      "678666218": {
        "error": "Ticket does not exist"
      }
    }
  }
}
```


Troubleshooting

The following steps are recommended to troubleshoot errors from any of the different APIs.

- Record the X-DataDirect-Request-Key response header to troubleshoot your specific request/response.
- Record the response body when the response is an error response. All HTTP status codes equal to and greater than 400 are considered error responses.

Contacting FactSet Support

Email the Portware and FactSet EMS support team at support@portware.com.

LOCATION	TELEPHONE
Americas	+1 (212) 571 4660 +1 (212) 425 5233
EMEA	+44 (0) 203 002 6410
APAC	+852 3693 1333
Australia	+61 1 800 430 863
Singapore	+65 800 852 6849

Appendix A: FIX Mapping Table

API Schema	Data Type	Affiliated FIX Tag
account	String	FIX Tag 1
currency	String	FIX Tag 15
effectiveTime	String	FIX Tag 168
executionInstructions	String	FIX Tag 18
handlingInstructions	String	FIX Tag 21
instrument	Object	FIX Tag 55
investorId	String	FIX Tag 115
isCovered	Boolean	FIX Tag 203
locateRequired	Boolean	FIX Tag 114
maxFloor	Number	FIX Tag 111
maxShow	Number	FIX Tag 210
orderId	String	FIX Tag 11
orderQuantity	Number	FIX Tag 38
orderType	String	FIX Tag 40
prevClosePrice	Number	FIX Tag 140
price	Number	FIX Tag 44
settlementDate	String	FIX Tag 64
settlementType	String	FIX Tag 63
side	String	FIX Tag 54
stopPrice	Number	FIX Tag 99
strikePrice	Number	FIX Tag 202
timeInForce	String	FIX Tag 59

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