Use of HIC webservices (https://hicws.vlaanderen.be)

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Manual on the use of HIC webservices

Version: 25/07/2023

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1   General

HIC (Hydrological Information Center) – a part of Flanders Hydraulics Research/Waterbouwkundig Laboratorium – maintains a measuring network on the Flemish navigable waterways. HIC also runs realtime flood forecasting models on the Flemish navigable waterways and is responsible for the tidal previsions in the Scheldt area.

With webservices on the WISKI database of HIC, our customers can request data from our database. We want to encourage the use of our data and therefore standard data are available at no cost. We kindly ask to use the correct acknowledgement as foreseen on https://hicws.vlaanderen.be.

However, our data are critical for certain operational processes and therefore our webservices are protected. In the event of an overload of the systems, non-registered customers (TYPE 1) may be blocked by HIC and only registered customers can still use the webservices.

We differentiate between three types of customers.

- TYPE 1: Customers who need sporadically a limited amount of data. Data are requested manually and not in a regular scheduled way (*example: checking measurements of the last month, checking metadata for certain stations,….)*.
    - o   Free use of our webservices
    - o   Authentication not obliged

- TYPE 2: Customers who need sporadically big amounts of data. Data are requested manually and not in a regular scheduled way (*example: retrieve a dataset with all available measurements for a certain parameter to start a research project)*.
    - o   Authenticated use required
    - o   The customer receives **personal** credits, with the Conditions of Use
    - o   HIC informs the customer on planned non-availability of the HIC webservices

- TYPE 3: Customers who need data for their daily operation or operational applications. Data are requested in an automatic process and/or scheduled in a tool/viewer/software software solution. *(example: integration of HIC webservices in a viewer to combine HIC data with other data, import of HIC data in a floodforecasting system,….)*
    - o   Authenticated use required
    - o   Your organization/company receives credentials – if needed separated between different applications. A User Agreement fit to your needs is put in place after consultation with HIC
    - o   HIC informs the customer on planned non-availability of the HIC webservices

Some general rules to use the HIC webservices are listed in Chapter 2.

Standard available data and examples for calls to our webservices can be found in chapters 3 and 4.

Chapter 5 gives the technical background on our webservices (especially for users TYPE 2 and TYPE 3).

Chapter 6 refers to some example scripts available at HIC that can help you to get started with the authenticated use of our webservices.

Further questions are welcome by email: hic@vlaanderen.be (Chapter 7).

2 Important rules

2.1 Disclaimer and quality of values

A disclaimer for the use of data, the correct acknowledgement of the data and information on quality flags can be found on https://hicws.vlaanderen.be/ (reference is compulsory in case of use of the data in external applications). The table below shows the explanation of the quality flags:

Table 1: Quality flags for data in the HIC-database

State of Value	Declaration
6-8	External validated data (6=good, 7=estimated, 8=suspect)
10-19	Good measurements
20-29	Good calculations
30-39	Estimate measurements
40-49	Estimate calculations
60-69	Suspect measurements
70-79	Suspect calculations
110-179	Unchecked
221-223	Unknown (import)
255 / -1	Missing

2.2 Pause between consecutive calls

For large data downloads the customer should apply a pause between two consecutive calls. The next call only can be started when the data of the previous call are retrieved completely.

2.3 Maximum number of 250000 values in one call

A single call will only return a maximum number of 250000 values, as precalculated based on the definition and density of the time series in the database. It is possible that you get the message error message of 'Too Many Results' (Figure 1) with less than 250000 values expected. In this case,. you will have to split up your request.

Figure 1: Example of error message when asking for Too Many Values in one call

```
▼<ExceptionReport>
  ▼<Exception exceptionCode="TooManyResults">
    ▼<ExceptionText>
        Maximum number of timeseries values surpassed. Please narrow your request. Limit is: 250000
      </ExceptionText>
    </Exception>
  </ExceptionReport>
```

3   Available time series from the HIC database

The HIC database contains time series of several stations with different parameters. A large part of these time series are used for internal processing of the data and are as such not useful for external use or research. HIC organizes time series that can be used by our customers in time series groups. These 'Public available time series groups' are organized by parameter and frequency. The table below lists the time series groups that are default available for all type of users

It is important to distinguish between two different types of time series, which have to be handled in different ways.

- **Cmd (Continuously Measured) time series** typically contain records with 1 timestamp and 1 value
- **Ensemble time series**, in the HIC-database used for forecasts and previsions, each records contain a Time Of Forecast (TOF; timestamp for the moment the forecast/prevision starts/was made), followed by all forecasted timestamps with their value.

When requested by a specific customer (TYPE 3) specific time series groups can be created. In the user agreement the time series group ids that can be queried by this customer will be listed.

Table 2: Public available time series groups in the HIC database (dd 3/3/2023)

Parameter en frequentie (Nederlands)	Parameter and frequency (English)	Timeseriesgroup_id	Time series type
Afvoer_dag	Discharge (daily)	156169	Cmd
Afvoer_hoge resolutie	Discharge (high resolution)	156170	Cmd
Afvoer_uur	Discharge (hourly)	156171	Cmd
Astronomische voorspellingen Continue reeksen Schelde en kust (LAT)	Astronomic predictions Scheldt and coastal area (high resolution) (LAT)	512458	Cmd
Astronomische voorspellingen Continue reeksen Schelde en kust (mTAW)	Astronomic predictions Scheldt and coastal area (high resolution) (mTAW)	354718	Cmd
Astronomische voorspellingen Hoog-en laagwaters Schelde en kust (LAT)	Astronomic predictions Scheldt and coastal area (high and low water) (LAT)	515316	Cmd
Astronomische voorspellingen Hoog-en laagwaters Schelde en kust (mTAW)	Astronomic predictions Scheldt and coastal area (high and low water) (mTAW)	350099	Cmd
Berekende afvoeren sleutellocaties waterwegen	Calculated discharges at important locations waterways	260592	Cmd
Berekende gebiedsneerslagen belangrijke meetlocaties HIC	Calculated area precipitation important HIC locations	156159	Cmd
Chlorofyl_hoge resolutie	Chlorophyl (hig resolution)	156172	Cmd
Conductiviteit_hoge resolutie	Conductivity (high resolution)	156173	Cmd
Neerslag_dag	Precipitation (daily)	156166	Cmd
Neerslag_hoge resolutie	Precipitation (high resolution)	156167	Cmd
Neerslag_jaar	Precipitation (yearly)	156191	Cmd
Neerslag_maand	Precipitation (monthly)	156190	Cmd
Neerslag_uur	Precipitation (hourly)	156168	Cmd
Saliniteit_hoge resolutie	Salinity (high resolution)	421208	Cmd
Sedimentconcentratie_hoge resolutie	Sediment concentration (high resolution)	156188	Cmd
Stroomrichting_hoge resolutie	Flow direction (high resolution)	156158	Cmd
Stroomsnelheid_hoge resolutie	Flow velocity (high resolution)	156199	Cmd
Turbiditeit_hoge resolutie	Turbidity (high resolution)	156202	Cmd
Verwachtingen Tijgebied Schelde (HWLW)	Tidal Previsions Scheldt tidal area (high/low water)	432821	Ensemble
Voorspellingen afvoer korte termijn (48u)	Forecast discharge short term (48hrs)	506057	Ensemble
Voorspellingen afvoer lange termijn (10 dagen)	Forecast discharge long term (10 days)	506059	Ensemble
Voorspellingen berekende gebiedsneerslagen belangrijke meetlocaties HIC korte termijn (48u)	Forecast calculated area precipitation important HIC locations short term (48hrs)	506060	Ensemble
Voorspellingen berekende gebiedsneerslagen belangrijke meetlocaties HIC lange termijn (10 dagen)	Forecast calculated area precipitation important HIC locations long term (10 days)	506061	Ensemble
Voorspellingen waterstand korte termijn (48u)	Forecast Water level short term (48hrs)	506056	Ensemble

Voorspellingen waterstand lange termijn (10 dagen)	Forecast Water level long term (10 days)	506058	Ensemble
Waterstand_dag	Water level (daily)	156162	Cmd
Waterstand_hoge resolutie	Water level (high resolution)	156163	Cmd
Waterstand_Hoog-en laagwaters tijgebied Schelde	High and low waters Scheldt tidal area	156165	Cmd
Waterstand_Hoogwaters tijgebied Schelde	High waters Scheldt tidal area	510205	Cmd
Waterstand_Laagwaters tijgebied Schelde	Low waters Scheldt tidal area	510207	Cmd
Waterstand_uur	Water level (hourly)	156164	Cmd
Watertemperatuur_hoge resolutie	Water temperature high resolution	156200	Cmd
Zuurstofgehalte_hoge resolutie	Oxygen concentration (high resolution)	156207	Cmd
Zuurstofverzadiging_hoge resolutie	Oxygen saturation (high resolution)	156208	Cmd
Zuurtegraad_hoge resolutie	pH (high resolution)	156197	Cmd

4   Example calls

4.1 Get list of time series

4.1.1   Time series in a group

Hourly waterlevels from HIC measurement network (Timeseriesgroup_id=156164) on navigable waterways:

https://hicws.vlaanderen.be/KiWIS/KiWIS?&type=queryServices&request=getTimeseriesList&datasource=4&format=json&timeseriesgroup_id=156164

Additional formats that can be asked for by varying the format URL-parameter[1]:

- &format=html
- &format=ascii
- &format=csv
- &format=kml
-

4.1.2   Time series in a group with metadata

Hourly waterlevels from HIC measurement network (Timeseriesgroup_id=156164) on navigable waterways including coördinates:

https://hicws.vlaanderen.be/KiWIS/KiWIS?&type=queryServices&request=getTimeseriesList&datasource=4&format=json&timeseriesgroup_id=156164&returnfields=ts_id,ts_name,station_no,station_name,stationparameter_name,station_latitude,station_longitude,station_carteasting,station_cartnorthing,ts_unitsymbol

-Station_carteasting and station_cartnorthing returns values in Lambert72 (meter)

-Station_latitude and station_longitude returns values in WGS84 (decimal degrees)

4.2 Get data for Cmd time series

The time range for which data are requested is a crucial parameter in the KiWIS calls and can be defined using the following 3 URL parameters:

- &from=
- &to=
- &period=

---

[1] For Ensemble timeseries: only format=json is possible (see 4.3)

The parameters can be combined in pairs (from/to;from/period;to/period). When the &to parameter is omitted, it is replaced with the current time.

For &from= and &to= the following date time formats can be used:

Table 1: Some possible date-time formats

Date time formats
yyyy-MM-dd'T'HH:mm:ss.SSSXXX
yyyy-MM-dd'T'HH:mm:ssXXX
yyyy-MM-dd HH:mm:ss.SSS
yyyy-MM-dd'T'HH:mm:ss
yyyy-MM-dd HH:mm:ss
yyyy-MM-dd
yyyy-MM
yyyy
yyyy-MM-ddXXX
yyyyXXX
yyyy-MMXXX
UNIX (in milliseconds)

For &period= the format is P#Y#M#DT#H#M#S, where P just indicates an arbitrary period with the # being integers; the entities are: Y=Year, M=Month, D=Day, T just indicates that smaller entities are included, H=Hour, M=Minute, S=Second; W=Week is also supported but mutually exclusive with D=Day setting; Examples: P3D, P1Y, P1DT12H, PT6H, P1Y6M3DT4H20M30S, P1W; all periods are applied by calendar.

4.2.1 Get data for a certain Cmd time series (ts_id)

Example for time range selection based on from/to, including quality flags:

hicws.vlaanderen.be/KiWIS/KiWIS?&type=queryServices&service=kisters&datasource=4&request=getTimeseriesValues&ts_id=67837010&metadata=true&from=2017-10-01T00:00:00+01:00&to=2017-10-02T23:00:+01:00&format=html&returnfields=Timestamp,Value,Quality Code

Example for time range selection based on period only (last 6 hours):

hicws.vlaanderen.be/KiWIS/KiWIS?&type=queryServices&service=kisters&datasource=4&request=getTimeseriesValues&ts_id=67837010&metadata=true&period=P6H&format=html&returnfields=Timestamp,Value,Quality Code

4.2.2 Get data for complete time series group (timeseriesgroup_id)

https://hicws.vlaanderen.be/KiWIS/KiWIS?datasource=4&service=kisters&type=queryServices&format=html&request=getTimeseriesValues&timeseriesgroup_id=156162&from=2019-01-01&to=2019-01-03&returnfields=Timestamp,Value,Quality%20Code

4.3 Get data for Ensemble time series

4.3.1   Differences between Cmd and Ensemble time series / What can go wrong?

Ensemble time series, in the HIC-database used for forecasts and previsions, should never be treated in the same way as Cmd time series. Special calls are to be used. When the same type of call as for Cmd time series is used, non-consistent results will be returned by HIC webservices.

When calling an ensemble time series in the same way as a Cmd time series, HIC webservices will return the timestamps and values for the forecast with the most recent TOF available, just mixing up forecasts with different TOF.

Figure 2: Example of 1 (one!) timeseries, containing 4 different TOF for 28/01/2021
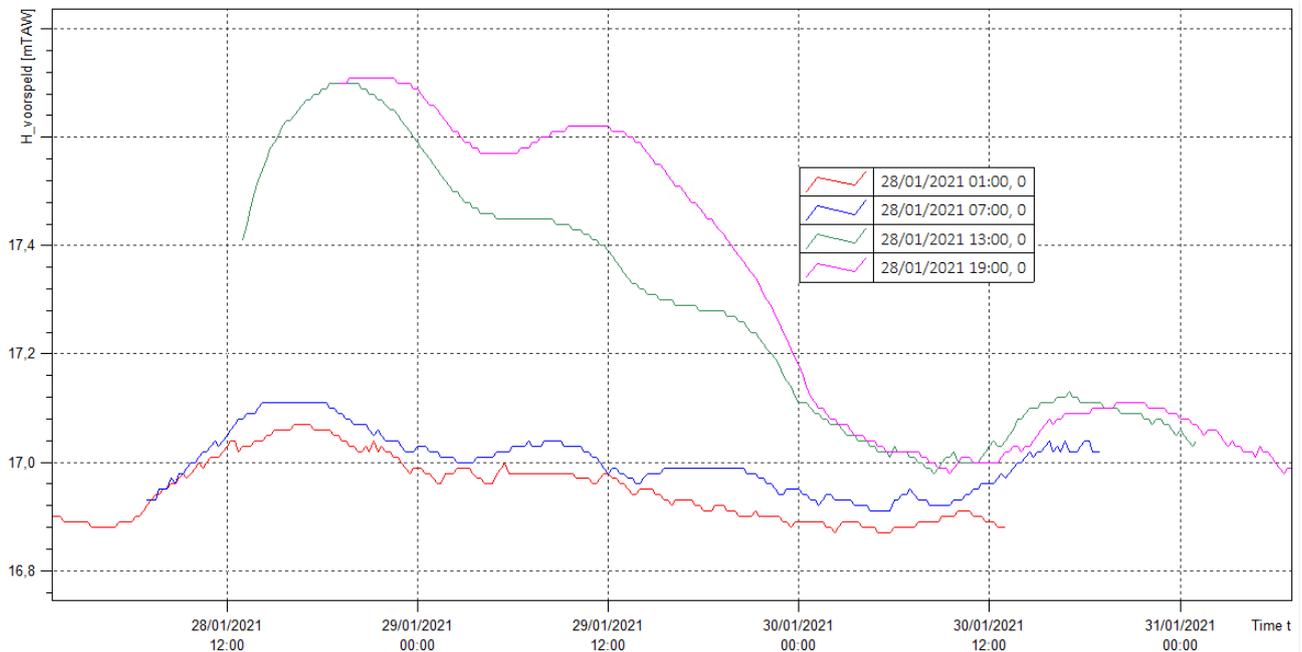
Figure 3: Figure showing (in black) the non-consistent result for 28/01/2021 that will be returned by HIC Webservices when treated as a Cmd time series.
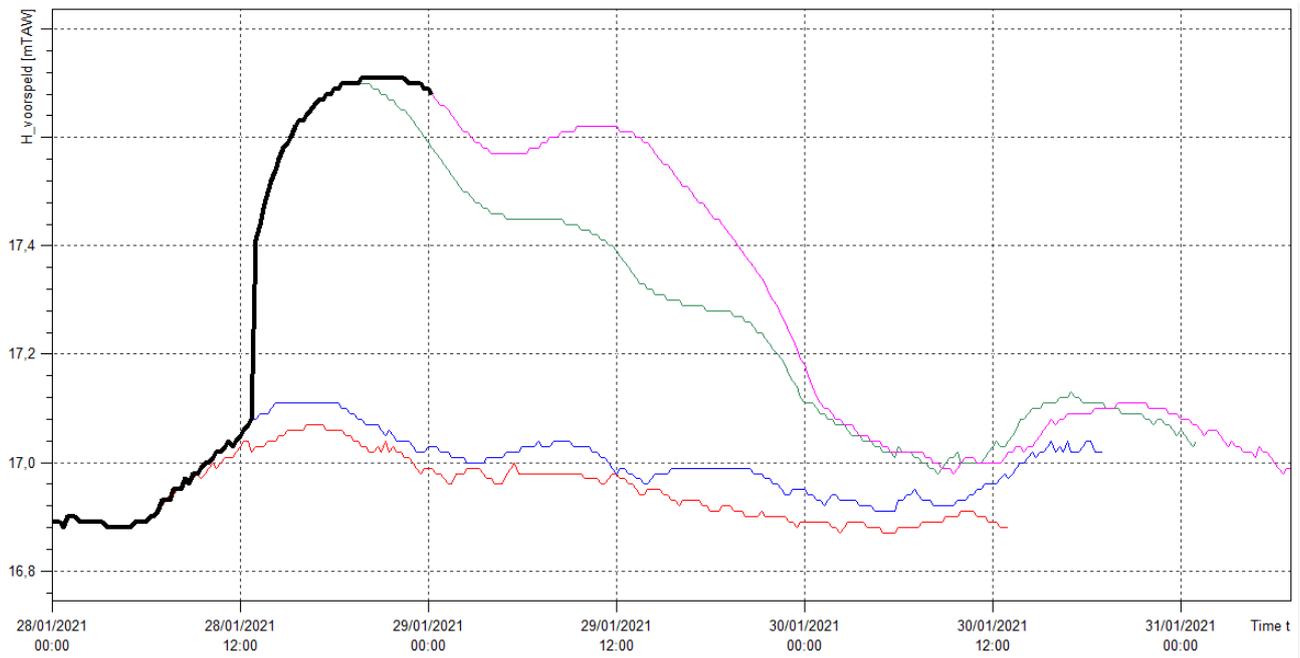
4.3.2 Get all forecasts/previsions for an Ensemble Time series with a TOF in a certain timerange

An overview of available ts_id's of Ensemble Time series in a group, can be found using example calls in paragraph 4.1

For Ensemble Time series the request should be getTimeseriesEnsembleValues. Only &format=json is currently possible.

https://hicws.vlaanderen.be/KiWIS/KiWIS?&type=queryServices&service=kisters&datasource=4&request=getTimeseriesEnsembleValues&ts_id=84021010&from=2020-10-01T00:00:00+01:00&to=2020-10-05T23:00:+01:00&format=json

No additional formats are currently possible !

The results returns for every available TOF in the specified range the TOF followed by all forecasted timestamps with their value for this TOF.

Using an add-on for json-format in your browser can make it more easy to see the result and data format.

Figure 4: Result of json-format with gettimeseriesEnsembleValues in a browser without extension

Figure 5: Result of json-format with gettimeseriesEnsembleValues in a browser with browserextension (here: JSON LITE in Firefox)

```
JSON   Onbewerkte gegevens   Headers
Opslaan  Kopiëren  Alles samenvouwen  Alles uitvouwen (langzaam)   JSON filteren
▼ 84021010:
  ▼ 0:
       ensembledate:              "2020-10-01T02:00:00.000+02:00"
       ensembledispatchinfo:      "MR1"
     ▼ timeseries:
          ts_id:                  "84021010"
        ▶ ts_path:                "Aarschot/dem02a-1066/Q_v…nsemble.Binary.KT-det.O"
          station_id:             "21965"
          station_no:             "dem02a-1066"
          station_name:           "Aarschot Afwaarts/Demer"
          parametertype_name:     "Q_voorspeld"
          ts_name:                "KT-det.O"
          ts_unitsymbol:          "m³/s"
          rows:                   241
          columns:                "Timestamp,0"
        ▼ data:
           ▼ 0:
                0:                "2020-10-01T02:00:00.000+02:00"
                1:                12.44
           ▼ 1:
                0:                "2020-10-01T02:15:00.000+02:00"
                1:                12.43
           ▼ 2:
                0:                "2020-10-01T02:30:00.000+02:00"
                1:                12.4
           ▼ 3:
                0:                "2020-10-01T02:45:00.000+02:00"
                1:                12.37
           ▼ 4:
                0:                "2020-10-01T03:00:00.000+02:00"
                1:                12.35
           ▼ 5:
                0:                "2020-10-01T03:15:00.000+02:00"
```

4.3.3   Get overview of TOF available for a certain ensemble time series

When you want to get an overview of available TOF for an ensemble time series. Do NOT forget the &getensembletimestampsonly=true in this example call, or you will get the non-consistent results for an ensemble time series as mentioned in 4.3.1.

https://hicws.vlaanderen.be/KiWIS/KiWIS?datasource=4&format=html&request=gettimeseriesvalues&service=kisters&ts_id=88527010&type=queryServices&period=P15D&getensembletimestampsonly=true

4.3.4   Get forecast/prevision for most recent TOF available in an Ensemble time series

When you are only interested in the forecasted timestamps with their value for the most recent TOF available, without knowing this TOF, the following call can be used. With the &request=getTimeseriesValues, all formats mentioned in 4.1.1 are possible.

https://hicws.vlaanderen.be/KiWIS/KiWIS?service=kisters&type=queryServices&datasource=4&request=getTimeseriesValues&format=html&ts_id=88527010

4.4   Additional information and possibilities in calls

4.4.1   Timezone

A call without specification of required time zone results in time stamps in Belgian local time. Adding "&timezone=GMT%2B1"(where %2B stands for '+'), returns data in GMT+1.

An example:

hicws.vlaanderen.be/KiWIS/KiWIS?&type=queryServices&service=kisters&datasource=4&request=getTime
seriesValues&ts_id=67837010&metadata=true&period=P6H&format=html&returnfields=Timestamp,Value,
Quality Code&timezone=GMT%2B1

4.4.2 Use of Filters for the request "getTimeseriesList"

The HIC webservices offer the possibility to use certain returnfields to filter the results of a getTimeseriesList request in combination with a wildcard (*). The table below lists those returnfields.

Name	combine with * as wildcard?
station_no	yes
station_id	no
station_name	yes
ts_id	no
ts_name	yes
parametertype_id	no
parametertype_name	yes
stationparameter_name	yes

A few examples:

- Time series in the group of hourly waterlevels on navigable waterways (Timeseriesgroup_id=156164) located on the Dender river (*i.e.* which have "Dender" in their station_name):
  https://hicws.vlaanderen.be/KiWIS/KiWIS?&type=queryServices&request=getTimeseriesList&datas
  ource=4&format=html&timeseriesgroup_id=156164&station_name=*Dender
- Time series in the group of high frequency waterlevels on navigable waterways (Timeseriesgroup_id=156163) which have a tidal waterlevel (W) as parameter:
  https://hicws.vlaanderen.be/KiWIS/KiWIS?&type=queryServices&request=getTimeseriesList&datas
  ource=4&format=html&timeseriesgroup_id=156163&parametertype_name=W

4.4.3 Tidal numbers

For some users working in the tidal Scheldt-area, the Tidal Number might be usefull. This system allows to combine the tidal high- or low- peaks of different measuring locations for a single tide through the Scheldt. This can be added to the results with an additional returnfield '' Tide%20Number''. This functionality is currently not available for Ensemble time series in the HIC-database.

Be aware that this will only work for time series that are defined as a tidal peak time series!

An example:

- https://hicws.vlaanderen.be/KiWIS/KiWIS?&type=queryServices&service=kisters&datasource=4&re
  quest=getTimeseriesValues&ts_id=53995010&metadata=true&period=P2D&format=html&returnfi
  elds=Timestamp,Value,Quality%20Code,Tide%20Number

4.4.4 Coordinates

The example call in paragraph 4.1.2 returns some coordinates for stations.

Station_carteasting and station_cartnorthing returns values in Lambert72 (meter)

Station_latitude and station_longitude returns values in WGS84 (decimal degrees)

4.4.5   River name

A possibility to retrieve the river for a station, is to extent the call in paragraph 4.1.2 with a custom station attribute as in the example below

https://hicws.vlaanderen.be/KiWIS/KiWIS?&type=queryServices&request=getTimeseriesList&datasource=4&format=html&timeseriesgroup_id=156164&returnfields=station_no,station_name,stationparameter_name,station_carteasting,station_cartnorthing,ts_unitsymbol,ca_sta&ca_sta_returnfields=river_name

5 Technical details for authenticated use (TYPE 2/TYPE 3)

5.1 General

The HIC web services are running on the underlying WISKI database of the German company Kisters AG. The web services are called KiWIS (Kisters Web Interoperability Solution).

Registered users (TYPE 2/TYPE 3) receive a user with corresponding client credentials from HIC for authenticated use of the webservices.

5.2 How it works

A registered user makes 2 consecutive calls.

In a first call an **access token is requested** from the authentication software (to be reached at: https://hicwsauth.vlaanderen.be/auth). For this the client credentials are required every time.

An access token is valid for 24 hours and must therefore be requested daily from the authentication software. In the case of multiple data queries within 24 hours there is no need for a request of a new access token.

The (valid) access token must be included in the **second call**, in which the final desired data is requested from the KiWIS. This is done via the link style https://hicws.vlaanderen.be/KiWIS/KiWIS(...).

The system keeps track of how many credits (data quantities) have already been used in the software by a certain access token. When the maximum set number of credits for the registered user is reached, no more information is obtained.

As a first step a registered customer needs to be created by HIC, together with user rights and credits. Next the customer receives the **client credentials**: a Base64 encrypted code with the required information for a registered customer to identify ('clientId:clientSecret' as Base64 encoded string).

5.3 Credits

5.3.1 Principles

Each client is granted a number of credits per day that he can use to make KiWIS requests with his configured user. The amount of credits that each call 'costs', depends on the system load a command generates. Plain metadata calls like retrieving stations or groups are usually 'cheap' and will cost one credit only. Data that is held in internal caches by KiWIS like the most current value of a time series also does not cost much. Examples for commands that are more expensive:

- Getting large lists of time series by filter (getTimeseriesList)
- Getting large time-based value layers (getTimeseriesValueLayer)
- Getting long time ranges of data from high density time series (getTimeseriesValues)

When using getTimeseriesValues, it is important to know that the credit amount is based on the theoretical amount of values within a time range, not the actual count. E.g. an equidistant 15 minute time series has 96

values per day or ~35.000 per year. Requesting one year of data will cost 4 credits, if credit calculation is configured to one credit per 10.000 values, whether the time series has data in that range or not.

To protect the HIC systems, requests that ask for more than 250.000 credits at once are never allowed.

5.3.2   Usage recommendations

To be able to make efficient use of the granted credits, there are some guidelines that should be followed. The main point here is to utilize the web server / browser caches for data that does not often change.

1. Do not ask for a new access token more than once in every 24 hours. This will cause an unnecessary load on our systems. Instead you can check whether the locally available token is still valid by comparing its expire date with the current date and time.
2. KiWIS sets long cache times for metadata requests. Therefore it will be more efficient to get one large metadata list (and maybe only use part of it) than to get metadata for each station or time series individually.
3. Last value layers are comparatively cheap because KiWIS holds them in memory. These should be retrieved for a whole group unless just a single or a few values are needed.
4. If data for "the last seven days" or similar is required, use the 'period' parameter, e.g. set period=P7D to get the data. This way the command will always have the same URL and can be cached. If the exact current time is used, every command will have a unique URL that never will be called again.
5. Use the default 'returnfields' unless specific other fields are required which reduces the complexity of URLS.

HIC can provide some code examples on a good use of the webservices (see chapter 6).

Technically much more URL-combinations than these in this manual are possible. However, not all these combinations give results that are meaningful, available in a good way in the HIC database. Therefore we recommend to use only calls given in this document, querying the time series groups as mentioned in chapter 3. Don't hesitate to contact HIC when you need some other things or calls.

5.4   Auth Service Unavailability

In case the auth service is offline, no tokens can be retrieved. However, KiWIS will still treat all existing tokens as valid and allow access. Access will be counted and monitored but not restricted (e.g. due to overusage) until the auth service is back online. If the auth service is offline for a longer time, older requests may be 'forgotten' on purpose and therefore be free of credits. In this case it is most likely that the blocking system will be temporarily disabled anyway.

As long as no tokens can be retrieved and the client does not still have a valid token, clients can use public requests without authentication. However they will only receive public data and not data for their configured user.

5.5   How to authenticate and use the API

5.5.1   Overview

The HIC webservices are based on a software solution of Kisters AG (Germany), called KiWIS.

KiWIS uses OAUTH2 respectively OpenID Connect as the authentication protocol. This is a standard procedure in the internet world, developed and used by major companies like Google and others. KiWIS brings an additional AUTH-Server implementing OpenID Connect and a token based authorization model. We will not describe OAuth2 in detail here but refer to the standard and the many tutorials on the internet. Concisely we can say that the use of the system is done in two steps:

1. Authenticate the client application to the KiWIS Auth Service with the provided credentials and obtain an access token. At HIC this is done on https://hicws.auth.vlaanderen.be/vlaanderen
2. Use the access token to obtain information from the KiWIS Data Service(s). At HIC this is done on https://hicws.vlaanderen.be/KiWIS
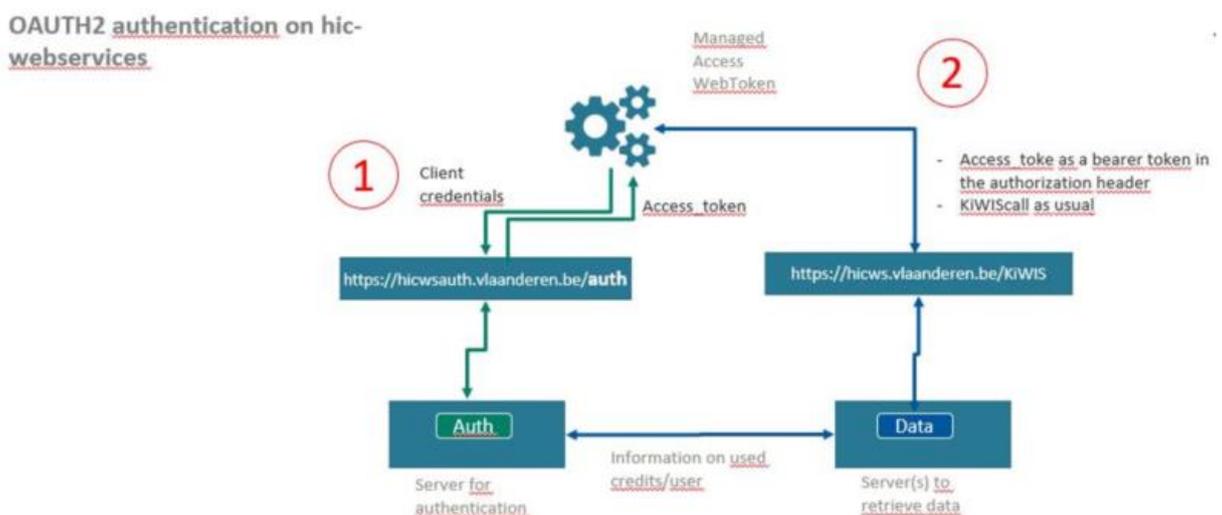
However, to make this simple procedure secure and operable there are some more details to know.

5.5.2   Details

Basically, OAuth defines so called grant types that allow a client to receive a token that identifies a user. KiWIS-Auth uses JSON Web Tokens (JWTs) as a token format. A JWT is a Base-64 encoded JSON document plus a header and a signature. It might optionally be encrypted. The JWT contains information about the user and the users roles. It therefore provides a completely stateless way of authenticating and authorizing a user: all information to identify the user and all the information to figure out what he is allowed to do is provided within the JWT. The signature (respectively the optional encryption) make sure that provided information cannot be modified, respectively read.

We discuss the Token format at the end of this section, but start with how to obtain a token in the first place.

5.5.3   Obtaining a token

Obtaining a token requires your client to be registered in the KiWIS Auth Service. Please contact the HIC administrators team in order to get your client registered. Once you have a registered client, you will be

provided with a set of credentials consisting of your client id and a corresponding client secret, that are used to authenticate your client to KiWIS in order to generate an access token. The credentials will already be formatted in the required form 'clientId:clientSecret' as Base64 encoded string.

One OAuth grant type is supported, namely the client credentials grant type. The client credentials grant is used solely to authenticate and identify a client (i.e. a trustworthy piece of software running somewhere). It does not allow for accessing KiWIS Data Services in terms of a user. This grant type is mainly used for batch processing jobs, monitoring, or analytical processes running against the data stored in KiWIS.

The HIC token endpoint can be reached via:

https://hicwsauth.vlaanderen.be/auth

In general all requests to generate a token require HTTP Basic Authentication with the received credentials.

5.5.4   Client Credentials Grant

This grant type is used when a client, i.e., a software process or tool, wants to access KiWIS on behalf of itself, i.e., not on behalf of a user. Monitoring, Import or Batch processes, as well as computational or analytical systems are examples of such clients. OAuth provides the client credentials grant for this case. The client credentials grant type requires you to perform a POST request against the token endpoint as follows:

```
curl -XPOST -H "Authorization: Basic $CLIENT_CREDENTIALS \
        -d "grant_type=client_credentials" https://hicwsauth.vlaanderen.be/auth
```

The request is authenticated using HTTP Basic Authentication. The string **$CLIENT_CREDENTIALS** is the Base64 encoded combination of 'clientId:clientSecret' as described previously, added to the authorization header with type Basic, i.e. for the credentials 'test:test':

Authorization: Basic dGVzdDp0ZXN0

The body of the request only contains the **application/x-www-form-urlencoded** string:

grant_type=client_credentials

The response is a JSON string similar to:

```
{
        "access_token":
"eyJhbGciOiJIUzI1NiJ9.eyJqdGkiOiI1NDdjNjliMS1lNzcyLTQ5ZWMtODc5My05OWY3ZmI5MTA0YWUiLCJpYXQiOjE0Nz
g3MDM1OTYsImlzcyI6Imh0dHA6Ly92bS13ZWJkZXYtMy5raXN0ZXJzLmRlOjgwODAvS2lXWJQb3J0YWwvYXV0aCIsIm
F1ZCI6ImUyMWEzZDcwLTI0NDUtNDRmNS1hOGJmLTNjMDk3OGRjNjU5ZCIsImV4cCI6MTQ3ODc4OTk5Nn0.hzeDZv7
6Tl9QWeNLutXX4cfmnJ2lUhu8zeNAG2umnG0",
        "token_type": "Bearer",
        "expires_in": 86400
}
```

The JSON attribute access_token should be used in subsequent KiWIS requests. The token type is always 'Bearer' and the expires_in value is the token lifetime in seconds.

Now, in order to perform a request against a KiWIS Data Service, the access token has to be provided as a bearer token in the Authorization header. As an example, we request data from KiWIS:

```
curl -H "Authorization: Bearer ey…G0"
```

```
        -XGET "
https://hicws.vlaanderen.be/KiWIS/KiWIS?datasource=4&request=getTimeseriesList&&timeseriesgroup_id=15616
4"
```

The important part is the Authorization header that is added to the request:

```
        Authorization: Bearer $ACCESS_TOKEN
```

The token can be validated and decoded by the KiWIS Data Service and therefore encapsulates all information to decide whether the request is accepted, which user (if any) is accessing the data, and what exactly might be returned.

6 Available tools and starting points for authenticated use

6.1 Scripted examples

We can provide some code examples to our customers to start using our webservices in an authenticated way. We can provide you with some examples in **R, Python, Matlab and curl/Powershell**. This latest example can be usefull for customers who do not have scripting-experience and are interested in getting always the same kind of data.

6.2 Authenticated use in web-browser (Chrome)

Because the OpenID Connect procedure is a standardized authentication procedure, it is available in HTTP Clients, too. A well-known HTTP client for manual HTTP interaction is the Chrome extension called "Postman".
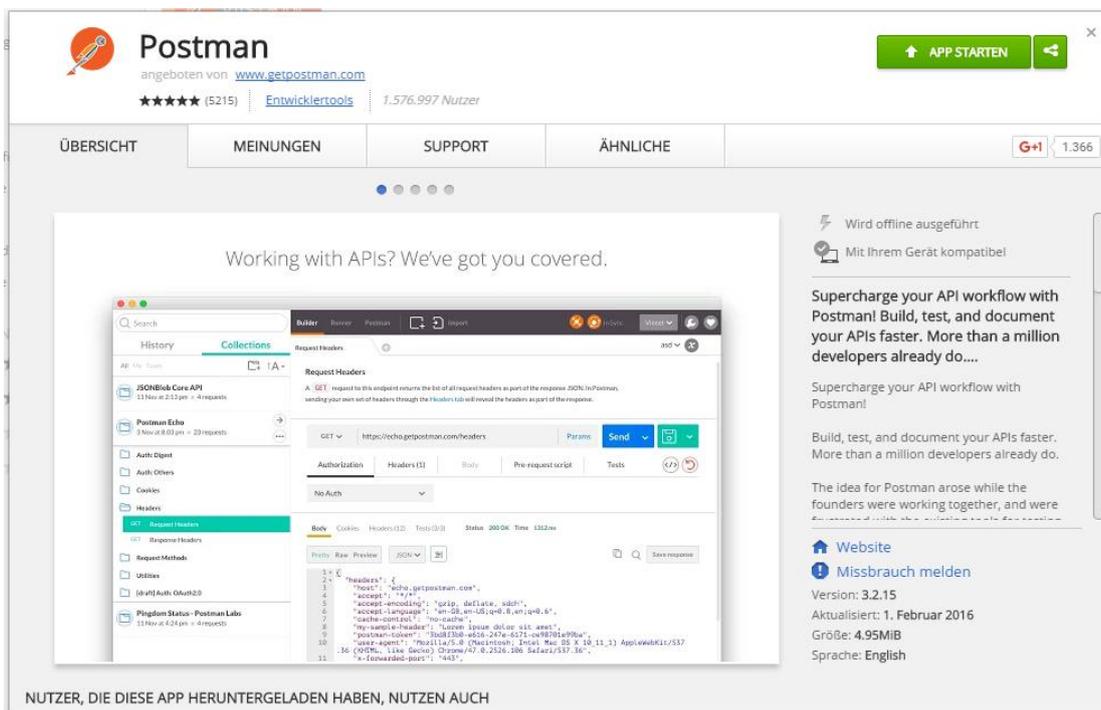
Once installed, it easily allows you to log in to the KiWIS Auth Service with a few clicks.
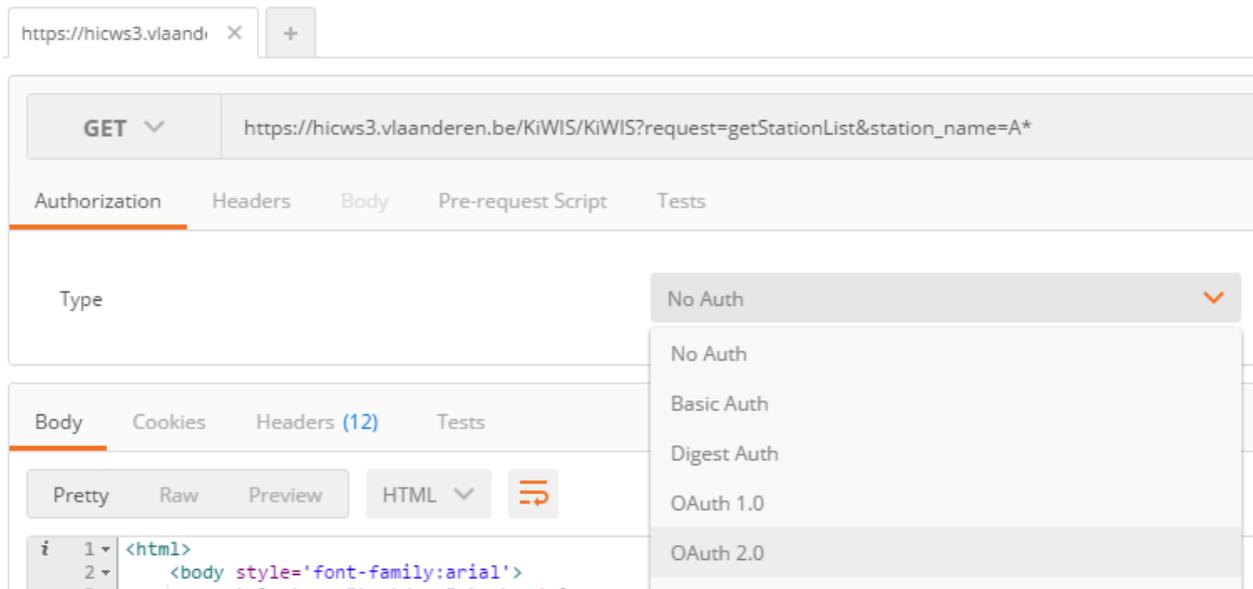
First, create a new request and enter any KiWIS URL. Then navigate to the Authorization tab and select OAuth 2.0.
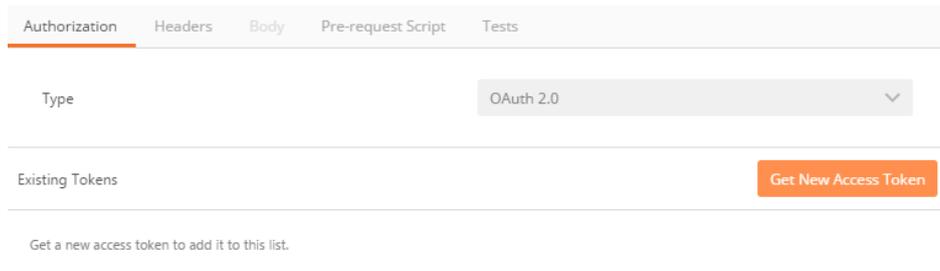
Then click "Get New Access Token" to configure the token retrieval.

Enter any token name and the token URL "https://hicwsauth.vlaanderen.be/auth". Since Client ID and secret are provided as encoded string already, any Base64 decoder can be used to decode them into the clientId:clientSecret string, e.g. "https://www.base64decode.org/". Then enter the two parts in the form as well. Set the scope to "none", select "Client Credentials" in the dropdown menu and deactivate "Request access token locally". A click on "Request Token" should now retrieve a token valid for 24 hours. The token will appear in the token list.
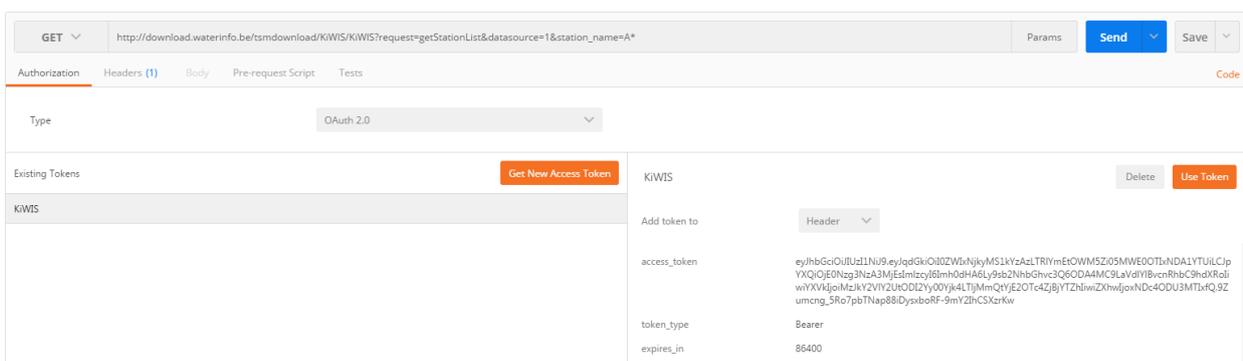
Select the token in the list, set "Add token to" to "Header" and click "Use Token". Now Postman will use the token to set the proper header for authenticated KiWIS requests when pressing the "Send" button. The token can be selected for new requests in new tabs too of course.

7 Further questions?

When you have more questions about the use of our webservices, you can send them to hic@vlaanderen.be

We try to give you a first answer within a period of 5 working days.