



Data broker

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This content applies to the latest CD version of Cumulocity.

Specifications contained herein are subject to change and these changes will be reported in subsequent versions.

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## DATA BROKER APPLICATION

### USING THE DATA BROKER

The data broker lets you share data selectively with other tenants. You can share:

- Devices (and more generically, managed objects)
- Events
- Alarms
- Measurements
- Operations

#### ✔ REQUIREMENTS

To be able to use this feature, your tenant must be subscribed to the application “feature-broker”.

Navigate to **Data connectors** in the **Data broker** menu if you would like to send data to another tenant. Navigate to **Data subscriptions**, if you would like to receive data from another tenant.

#### ❗ IMPORTANT

Devices that are forwarded using the data broker are charged like normal devices in the destination tenant.

### LIMITATIONS

Be aware of the following limitations of the data broker:

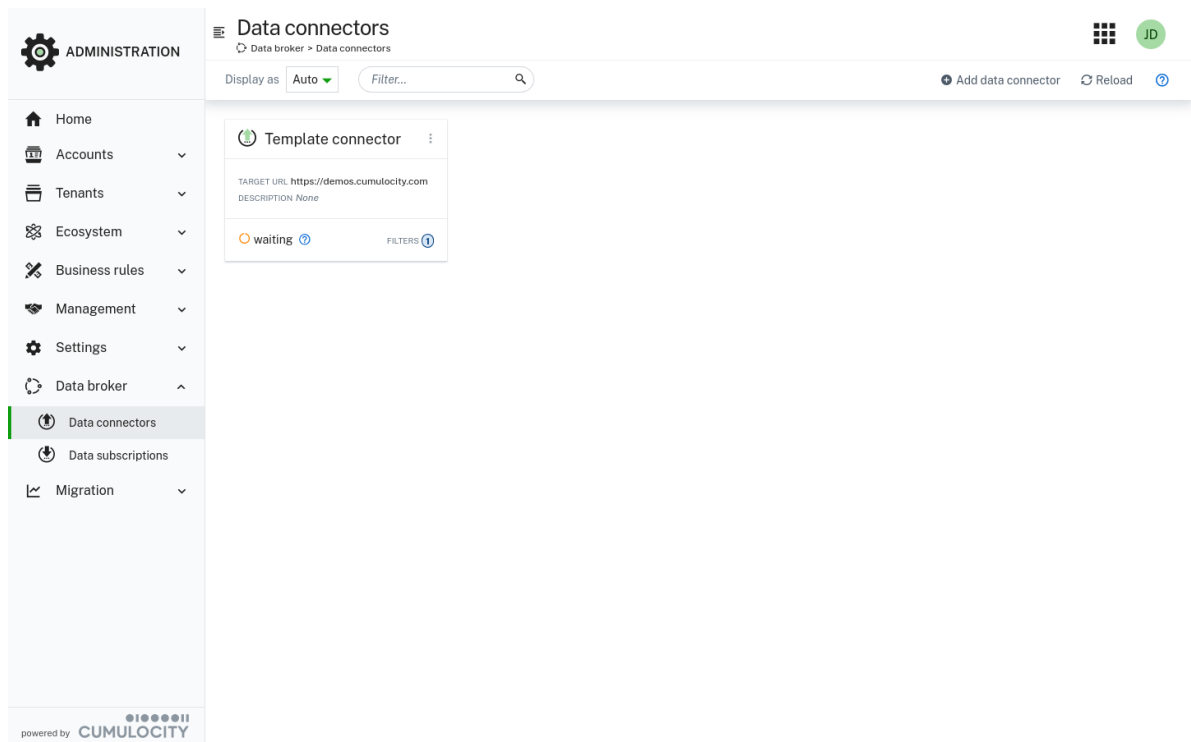
- Cloud Remote Access cannot be used on the destination tenant.
- The Management tenant cannot be used as data broker source tenant.
- Currently, the Fieldbus widget does not work on tenants that receive the fieldbus devices through data broker, as the corresponding data models are not synchronized.
- Data broker does not guarantee the same order of messages on destination tenants as it was on the source tenant.
- While we provide backwards compatibility, we cannot ensure that data broker can send data to Cumulocity tenants which run on earlier Cumulocity versions than the source.

### DATA CONNECTORS

A data connector describes the subset of the data that you would like to send to a destination tenant as well as the URL of that destination tenant.

#### TO VIEW DATA CONNECTORS

Click **Data connectors** in the navigator to see a list of all currently defined data connectors with their status.



For each data connector, the following information is provided:

- The data connector's name
- Its destination tenant
- Description if provided, "None" displayed otherwise
- The status of the connector
- The number of filters set for the data connector

Use the toggle to enable and disable data forwarding to the destination tenant. If data is being forwarded, the toggle reads "Active". If data is not being forwarded, the toggle reads "Suspended" or "Pending". "Suspended" means that you have disabled forwarding. "Pending" means that the destination tenant has disabled forwarding.

## INFO

If the source tenant has been suspended all its data broker connectors will be suspended as well.

## TO ADD A DATA CONNECTOR

1. Click **Add data connector** in the top menu bar.
2. In the **Settings** tab, provide the following information to create a new data connector:

Field	Description
Title	The name of the data connector.
Target URL for data connector	The URL of the tenant to which data will be forwarded. Once saved, you cannot edit this value anymore.
Description	A textual description of the configuration. Both the name and the description will be visible on the destination side after accepting the subscription.
Data filters	A set of filters that define what is copied to the destination. You must configure at least one filter.

3. Click **Add filter** to configure a new filter.

DATA FILTERS

All objects Filter: none; Copy: standard only

Group or device

No assets or devices found. Refine your search.

Selection change is disabled.

✓ Root Device

Some assets or devices might not be shown. Try narrowing search criteria.

All objects

Selecting the "All objects" option will synchronize all types of objects, including internal and technical ones (not exclusively groups and devices). This may cause issues on the target tenant.

API ☒ Alarms ☒ Events ☒ Measurements ☒ Managed objects ☒ Operations ☒

Fragments to filter

Fragments to copy ☐ Copy all fragments

Type filter

**+ Add filter**

4. Each data filter contains the following information:

Field	Description
Group or device	The group or device that is forwarded. If you select a group here all subgroups and subdevices of this group will be forwarded. <b>See the warning below on the usage of All objects.</b>
API	The type of data being forwarded (alarms, events, measurements, managed objects) or being received (operations).
Fragments to filter	The fragments that must be present in a device to be forwarded.

Field	Description
Fragments to copy	The fragments that are copied to the destination. If nothing is specified here, only standard properties of managed objects, alarms, events and measurements are forwarded (see below). Select <b>Copy all fragments</b> to forward the entire object.
Type filter	Forwarded data must have this value in its "type" property.

5. Click **Save** to save the configuration.

## ❗ IMPORTANT

The option **All Objects** is left in the UI to ensure backward compatibility with older versions. We intend to deprecate it and we strongly recommend to not use this option.

When selected, Cumulocity will synchronize all types of objects, system as well as user-defined, and might override, or create out of context, objects in the destination tenant. Such objects may contain references to other objects and also configuration information. It is the user's responsibility to check and ensure consistency of such information in the transferred objects in the target environment.

This concerns items such as SmartREST templates, device protocols, smart rule configurations and dashboards.

For example, when you create a smart rule on the source tenant and you synchronize all objects, then the data broker creates a smart rule managed object on the destination tenant. The rule itself is not copied, because a synchronized smart rule would perform the same action on the same device for the same configuration. That would create duplicate emails for the same recipients when an alarm occurs.

If the **Group or device** field is filled in, the entire descendant structure of the inventory is forwarded to the destination as soon as the connector stays active. If the **Group or device** field is empty or set to "all" the descendant structure of the inventory is not forwarded; in this case the filter works in "lazy" mode, meaning it forwards the device or asset along with its first event/measurement/alarm.

If operation API is checked in filters, operations created in the target tenant will be forwarded to the source tenant. This applies only to operations that meet the following conditions:

- The operation's device itself is a result of forwarding data.
- The operation matches other filter criteria.


Updates of the operation status coming from the source tenant will be forwarded to the destination tenant.

The heading of a data filter summarizes the configuration in one line. The standard properties that are copied by default are:

- **For created alarms:** type, text, time, severity, status
- **For updated alarms:** status, text, severity
- **For created events:** type, text, time
- **For created measurements:** type, text, time
- **For created and updated devices:** type, name, c8y\_IsBinary, c8y\_IsDeviceGroup, c8y\_IsDevice, c8y\_DeviceGroup, c8y\_DeviceSubgroup, c8y\_SmartRule, c8y\_DynamicGroup, c8y\_DeviceQueryString
- **For updated operations:** status

After saving the configuration, you will see a security code displayed below your configuration. The security code prevents unintended forwarding of data. You must communicate this security key separately to an administrative user of the destination tenant. You can click the copy icon next to the security code to copy the code to your clipboard.


## TO EDIT A DATA CONNECTOR

Click the connector title, or click the menu icon  at the right of a data connector entry and then click **Edit**.


In the **Settings** tab, edit the data connector configuration.

See [To add a data connector](#) for details on the settings.

### TO DUPLICATE A DATA CONNECTOR

Click the menu icon  at the right of a data connector entry and then click **Duplicate** to create another data connector with the same configuration.

### TO DELETE A DATA CONNECTOR

Click the menu icon  at the right of a data connector entry and then click **Delete** to stop data forwarding and delete the data connector.

### INFO

A data connector can also be deleted from the **Settings** tab of a connector configuration.

### TO VIEW ALARMS FOR A DATA CONNECTOR

Open a data connector and switch to the **Alarms** tab to display current alarms for the data connector.

For details on data broker alarms, see [Troubleshooting](#).

For details on alarms in general, see [Working with alarms](#).

## DATA SUBSCRIPTIONS

In the **Data subscriptions** page, you can manage existing data subscriptions or create new ones.

### TO VIEW SUBSCRIPTIONS


Click **Data subscriptions** to see a list of all currently defined data forwarded to your tenant.

For each subscription, the name, the target tenant and the status (enabled or disabled) is provided on a card.

Use the toggle to temporarily stop forwarding data into your tenant.

### TO SET UP DATA FORWARDING ON THE RECEIVING END


1. Click **Add data subscription** in the top menu bar to receive data.
2. In the new card, enter the security code that you received from the sending end of the data.
3. When the connection is established, click **Accept** to start forwarding data into your tenant. The subscription is active now.
4. You can use the toggle in the card to temporarily stop forwarding data into your tenant.

You can now navigate to the Device Management application or the Cockpit application. You will find a new “virtual group” with a specific icon  showing the forwarded devices. The group will have the same name as your subscription. Devices are “lazily” created on the destination side whenever they send data for the first time after setting up an active subscription.



The screenshot shows the 'Groups' page in the Data Broker interface. The left sidebar contains a navigation menu with items: Home, Devices, Overviews, Groups (highlighted), Device tabs, Nesting assets, OPCUA, Phones, Simulators, Template connector (highlighted), Device types, and Management. The main content area is titled 'Groups' and shows a table of 'Subassets' with 6 items. The table has columns 'Type', 'Name', and 'Model'. The 'Template connector' row is highlighted with an orange border. The bottom of the page shows 'powered by CUMULOCITY'.

## TO DELETE A DATA CONNECTOR

Click the menu icon  and then click **Delete** to stop data forwarding and delete the data connector.

## TROUBLESHOOTING

If the data broker is not able to connect to a destination tenant, a CRITICAL alarm is raised, showing the connector which is affected.

### Queue overflow

On the source tenant, data broker queues data that cannot be forwarded immediately to the destination tenant. The amount of data that can be queued is limited. If Cumulocity cannot queue any further data, the oldest queued data is dropped. In this case, a MAJOR alarm is raised in the tenant, showing the connector which is affected.

Similarly, an alarm is raised when the input queue is overflowed.

To reduce the number of alarms, alarms are not triggered more often than once per minute.

## MICROSERVICE-BASED DATA BROKER

### USING THE MICROSERVICE-BASED DATA BROKER

The microservice-based data broker is powered by the Cumulocity Messaging Service that enables reliable, scalable and high-performance movement of IoT data. The microservice-based data broker is similar to the existing data broker in its functionality, except that a microservice, the `databroker-agent-server`, must be enabled to make use of it.

#### ✔ REQUIREMENTS

The Cumulocity Messaging Service is an optional component of the Cumulocity platform that may need to be enabled before the microservice-based data broker can be used. The original data broker will continue to operate alongside the microservice-based data broker for the time being, and users can choose which data broker to use on a per-tenant basis.

For the shared public cloud instances of the Cumulocity platform, the Messaging Service is enabled by default on release 10.13 and above, and the microservice-based data broker can be enabled on request for individual tenants that already have access to the original data broker. For dedicated and self-hosted instances, the Messaging Service and microservice-based data broker are available for release 10.10 and above, but will need to be explicitly enabled.

Please [contact product support](#) to inquire about using the Messaging Service and microservice-based data broker capabilities in your Cumulocity environment. See the *Messaging Service Installation & operations guide* for further technical details of the configuration required, but note that these tasks can only be performed by a Cumulocity platform operator, not by a normal user.

In summary, to work with the microservice-based data broker, the following requirements must be met:

- The Cumulocity Messaging Service should be available on your Cumulocity platform.
- Your tenant must be subscribed to the application “feature-broker”.
- Your tenant must be subscribed to the microservice “databroker-agent-server”.

### TO ENABLE THE MICROSERVICE-BASED DATA BROKER

The microservice-based data broker must be enabled from the Management tenant. Contact your Operations team for further support.

#### DATA CONNECTORS

See [Data connectors](#) for details on how to manage data connectors.

#### DATA SUBSCRIPTIONS

See [Data subscriptions](#) for details on how to manage data subscriptions.

### MIGRATING EXISTING DATA CONNECTORS TO THE MICROSERVICE-BASED DATA BROKER

After enabling the microservice-based data broker, your existing data connectors should continue to work without any additional configuration.

## SERVICE QUOTAS FOR THE MICROSERVICE-BASED DATA BROKER

The microservice-based data broker stores messages persistently using the Cumulocity Messaging Service until they are successfully delivered to the destination tenant. To optimize resource usage, the Messaging Service imposes storage limits and a message time-to-live (TTL) on persistently stored messages.

See the [service quotas](#) documentation for details on the default limits. These limits are configurable on a per-tenant basis. If your use case requires a different configuration, or if you have any questions or concerns, please contact [product support](#).

### Message backlog quota

Persistent messages are stored in a “backlog” until they are delivered to the destination tenant. The maximum size of a backlog is determined by the “backlog quota” limit, which directly affects the number of messages that can be stored and therefore the resource consumption of the platform. If the quota limit is reached, no new messages can be added to the backlog until some older messages have been delivered, or deleted due to their TTL expiring. A separate backlog exists for each data broker connector.

If the backlog for a data broker connector has reached its quota limit, any API request to the Cumulocity platform that would be forwarded by that connector will receive HTTP response code 500. For example, a POST request to the `/measurement/measurements` API endpoint will return the 500 response code if there is a data broker connector that should forward the new measurement, but that cannot do so because its backlog is full. Note that for requests using the PERSISTENT or QUIESCENT [processing modes](#), the Cumulocity operational store will still be updated. This can lead to duplicated entries in the operational store if applications blindly retry failed requests.

### Message time-to-live

Any undelivered messages will be automatically deleted if they have been on the backlog for longer than the TTL limit. This policy helps to limit overall resource usage and reduces the need to process outdated data after a prolonged disconnection of a consumer or destination tenant.

No message will ever be deleted from the backlog unless it reaches its TTL limit. Messages will always be delivered to the destination tenant in the order they were received by the source tenant.

### Best practices to ensure reliable data broker operation {# best-practices-for-reliable-data-broker-operation}

Applications using the microservice-based data broker do not have any direct control over the operation of the microservice. These best practices will help to ensure that the microservice can reliably deliver messages to the destination tenant, and avoid requests failing due to reaching the backlog quota limit:

- A destination tenant that is unreachable, for example due to a network outage or changed credentials, is the most common reason for a data broker backlog to fill up. Therefore, monitor the destination tenant to ensure that it is reachable and receiving forwarded messages.
- Also monitor the alarms and `databroker-agent-server` microservice logs on the source tenant.
- If persistent or frequent disconnections are expected, consider requesting a larger backlog quota or TTL. Higher message rates might require a larger backlog to cope with reasonable levels of downtime of the destination tenant. Longer disconnections might require a larger TTL to prevent messages from being deleted before they can be delivered.
- Consider adjusting the filters on the data broker connector to send fewer messages to the destination tenant.

## TROUBLESHOOTING

### SUBSCRIPTION ALERT

The Management tenant cannot be used as a data broker source tenant and this alarm is raised when trying to subscribe a Management tenant to the data broker agent.

### DATA BROKER CONNECTION ERROR

The data broker agent is pre-configured to monitor each connector for the number of failed forwarding requests sent. If this number reaches a pre-configured threshold a CRITICAL alarm is raised in the tenant. If this happens the data will be stored until the connection is restored and it can be forwarded again. Failed requests can happen in the event the data broker subscriber tenant becomes unreachable.

## DATA BROKER SLOW PROCESSING ALERT

The data broker agent is pre-configured to monitor the rate at which events are being delivered to their destination. If events cannot be delivered fast enough, slow processing alarms will be raised. A slow processing alarm includes a connector ID to help identify which destination tenant is affected.

### Queue backlog

This alarm is raised when latency for message delivery crosses a specified threshold. This usually happens if there is a backlog of undelivered events to the destination tenant due to various factors.

### Average request bytes sent per second

The data broker monitors the data rate at which events are being forwarded. If this rate is lower than a pre-configured threshold, a slow processing alert will be raised. This can occur due to a slow network.