

Solution description - Water

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**READY**

The modern and efficient solution for reading smart water meters



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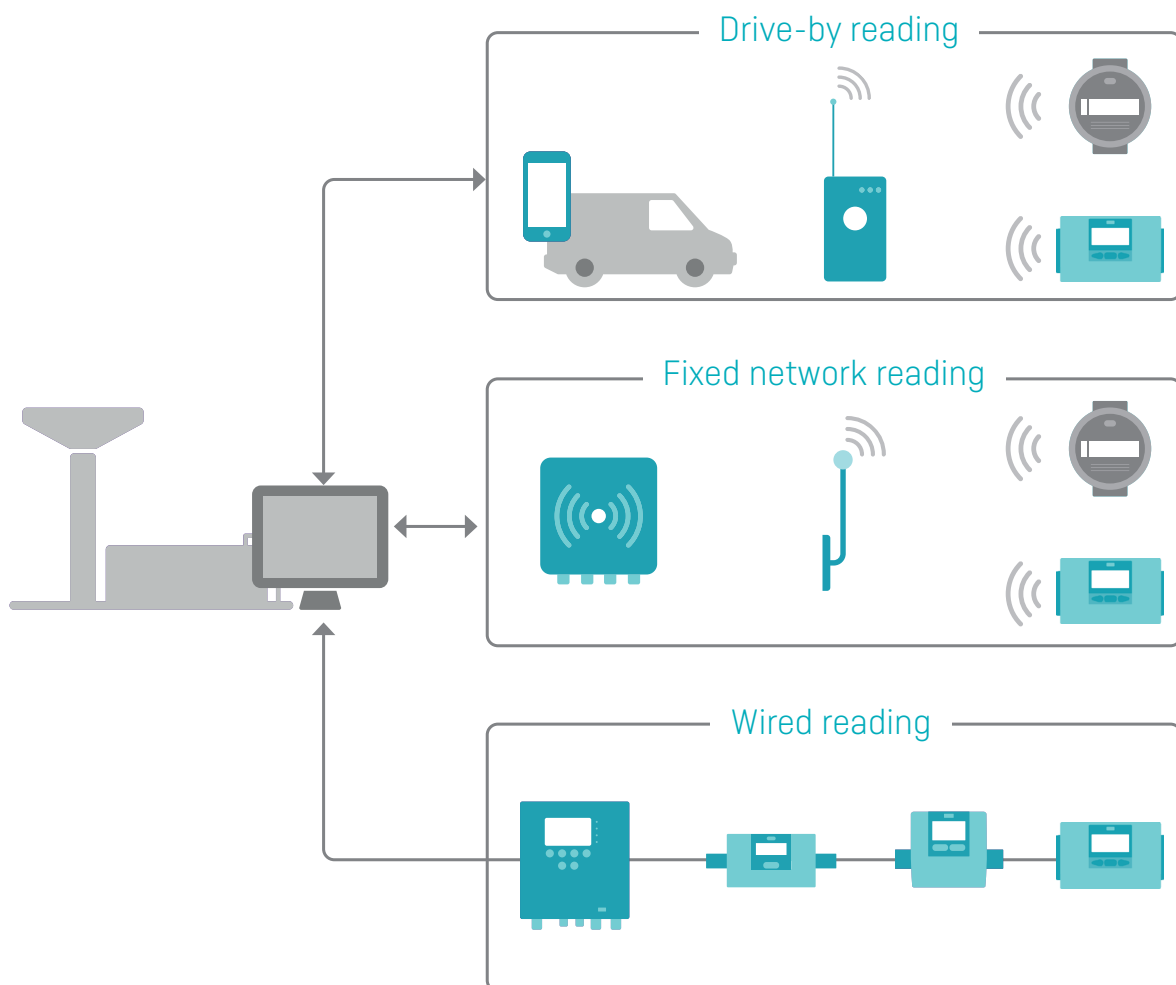
# Remote reading – your way

READY offers a variety of remote reading solutions ranging from drive-by reading of meters to direct reading from the utility.

READY is a flexible and modular solution for remote reading of meters. It is always possible to expand the selected reading solution or switch to a new one if needed. Current solutions range from semi-automatic (drive-by) remote reading to fully automatic remote reading directly from the utility and include both wireless and wired reading solutions.

The different reading solutions can be combined. For example, you can opt for a drive-by reading solution in general and then supplement it with automatic reading of meters from which you need more frequent data or which are located in areas where drive-by reading is inconvenient [e.g. a few houses located on an island].

READY can be used for remote reading of water meters, heat and cooling meters, combined heat/cooling meters, electricity meters and Kamstrup pressure sensors.

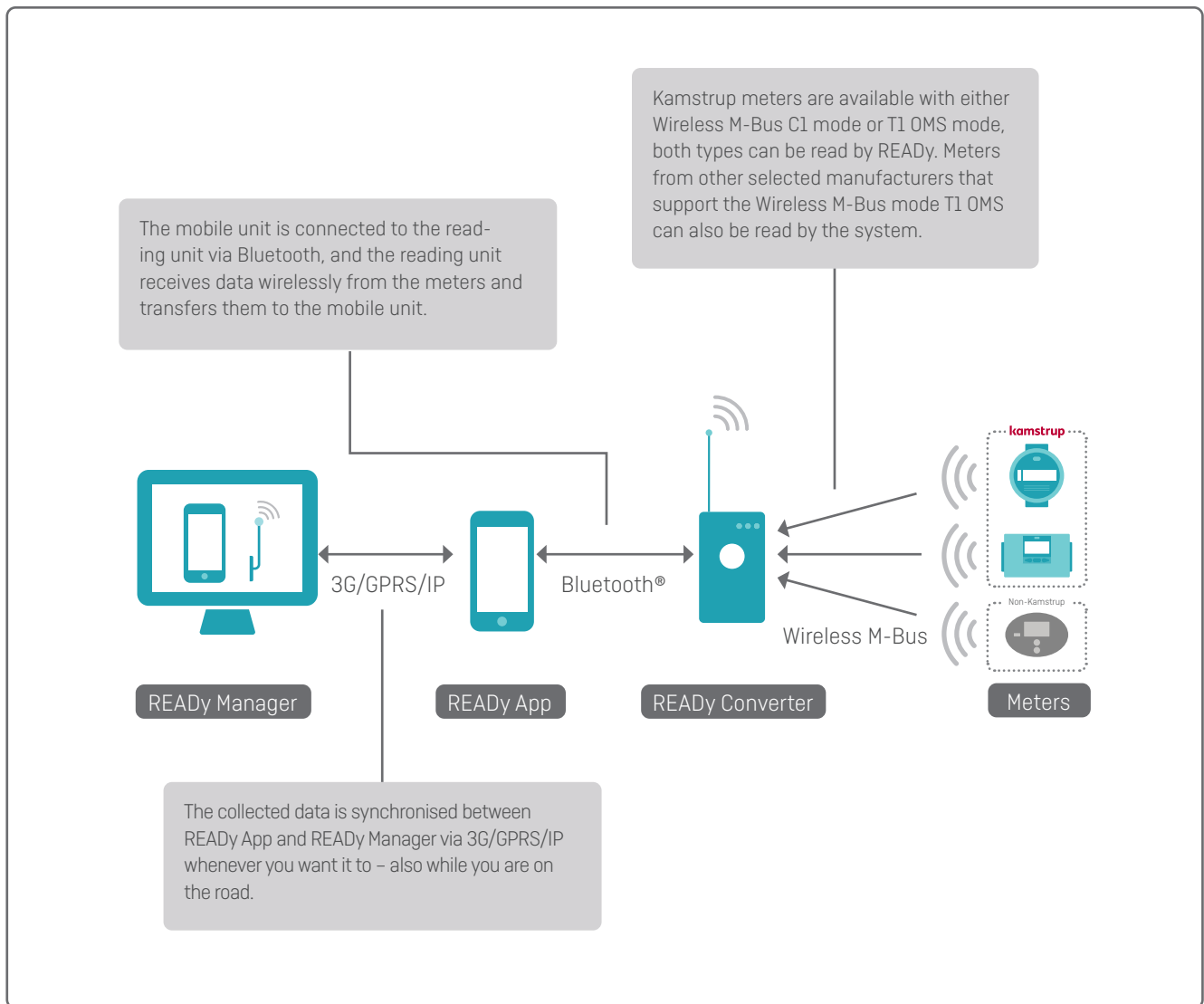


# Drive-by reading

With drive-by reading, the meters are read directly from the car by driving around in the supply area with an Android mobile unit (smartphone or tablet) and a reading unit (READY Converter). The collection of meter data takes place easily and intuitively via the app READy App.

When the reading is complete, the meter data is transferred easily to READy Manager which is a program on your PC that keeps track of and stores your meter data.

## Communication infrastructure for drive-by reading



## How it works

READY App is intuitive and easy to use. Reading meters and synchronising data with READY Manager is a completely smooth process.

Data is synchronised wirelessly between READY App and READY Manager by pressing the "Send/Receive" button in READY App.

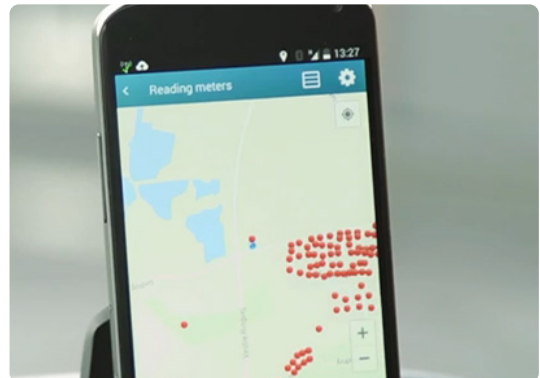
The reading of the meters can then be started by pressing "Read meters" in the start page of READY App.

With the addition of T1 OMS into READY Manager and READY App it is also possible to perform the following actions for non-Kamstrup meters that are T1 OMS compliant and verified by Kamstrup.



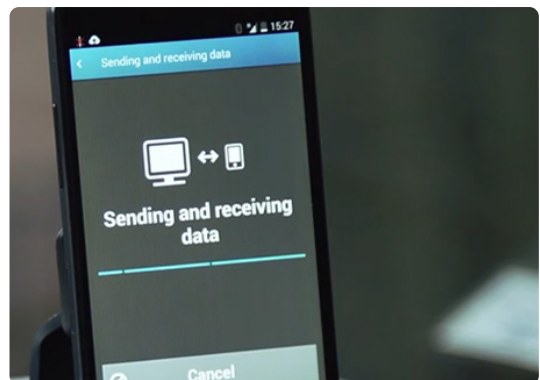
During the reading, an integrated Google Maps module (for China Baidu maps) in READY App shows the meters that have not yet been read making the reading very simple and efficient.

As soon as the meters are read, they disappear from the map which provides the operator with a clear picture of the remaining meters' positions. The map functions both as an indicator of the remaining meters and as navigation help during the reading. The reading continues during conversations, but can also be put on hold and continued later.



When the meters have been read, a single push on the button "Send/Receive" makes the data available in READY Manager.

This module ensures that the operator reading the meters can continue with other tasks without having to return to the office to transfer data.



## REAdy Solution description - Water

### Reading of logged data

In addition to reading meters, REAdy App can be used together with a Bluetooth®-connected optical eye for manual reading of the data logger of a water, heat or cooling meter.

When placing the optical eye on the infrared connection port of the meter, the data logger can be accessed from REAdy App. This makes REAdy App a very strong tool for entering into a dialogue with the consumer and for clarifying any questions and disputes.

Logger data that has been read with the optical eye can be made available in REAdy Manager by synchronising it in the same way as data read via a mobile unit.



The display of the daily consumption is a good tool for entering into a dialogue with consumers and for clarifying disputes.



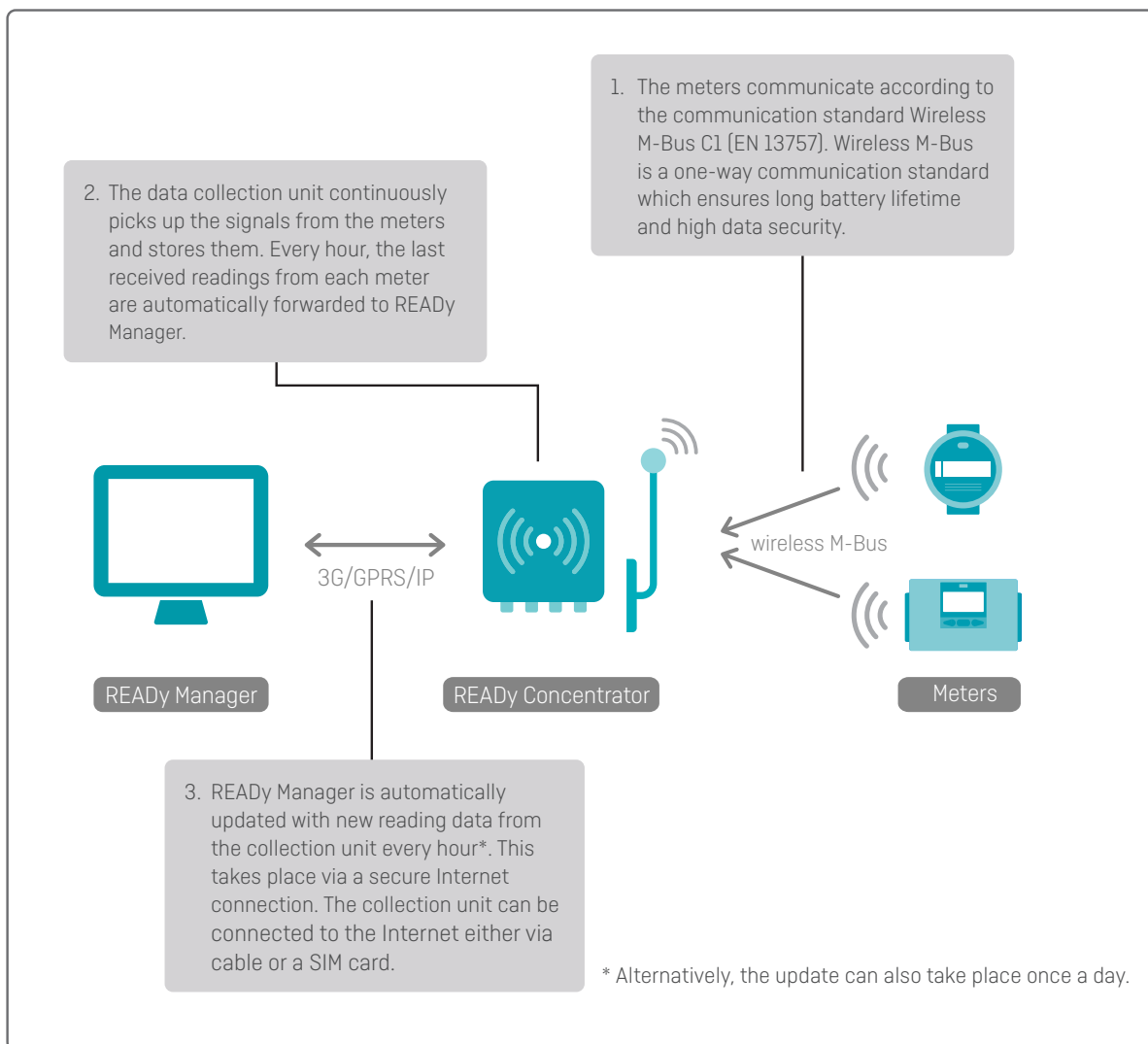
# Fully automated meter reading to you

By installing one or more fixed data collection units in a supply area, the meters can be read directly from the utility on a daily or hourly basis.

Fixed data collection units are also ideal for commercial buildings or industries where rewiring to meters is not possible.

## Communication infrastructure for network reading

A data collection unit consists of one or two antennas which pick up the signals from the meters via Wireless M-Bus. An antenna is connected via cables to a concentrator unit which, via GPRS or IP, sends data to REAdy Manager:



Note: T1 OMS Wireless M-Bus is not supported by Fixed network solutions.

## Fixed network reading

By installing one or more fixed data collection units in a supply area, the meters can be read automatically directly from the utility on a daily or hourly basis.

Fixed data collection units are also ideal for commercial buildings or industries where rewiring to meters is not possible.

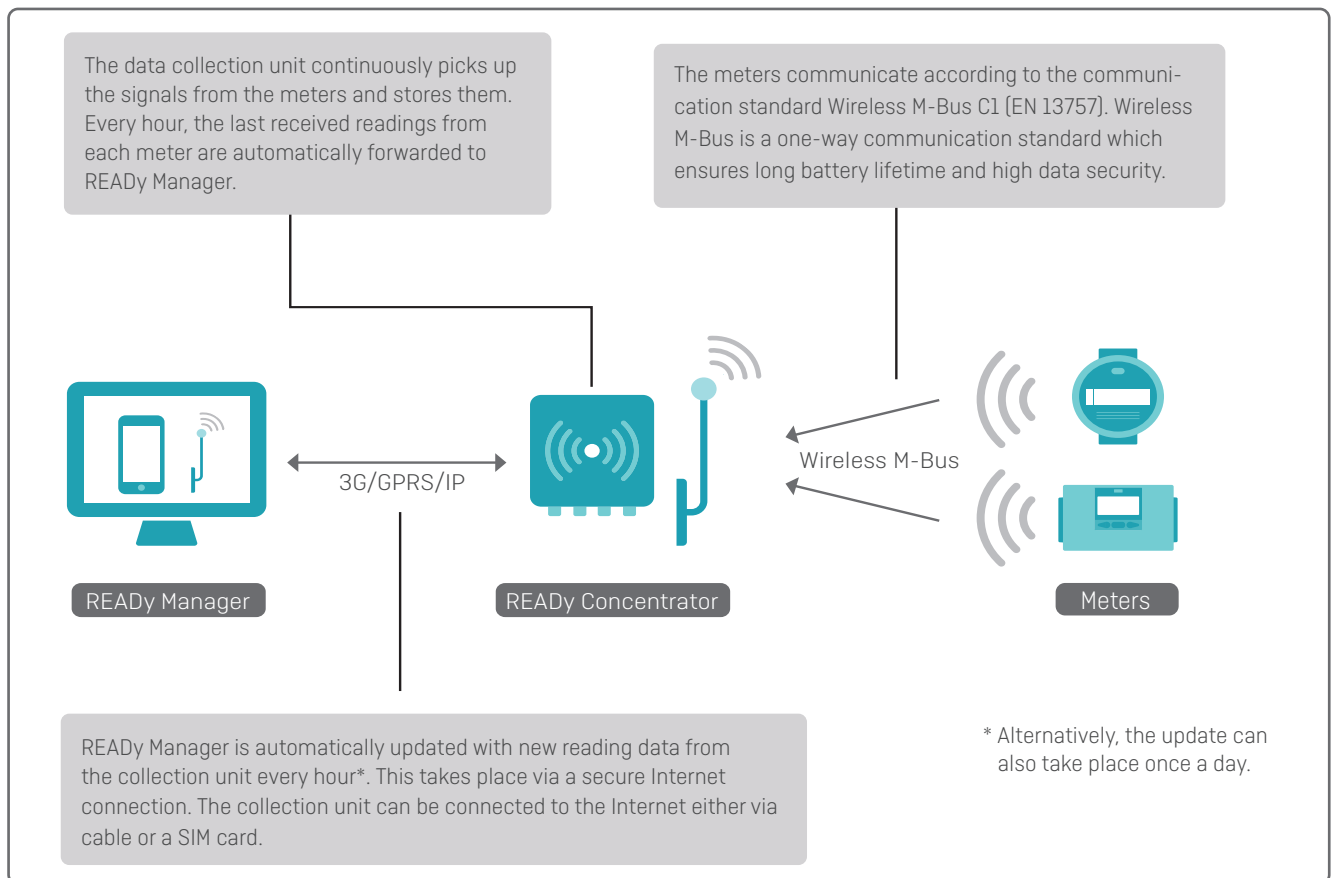
### Communication infrastructure for fixed network reading

Two types of communication infrastructures exist: wireless M-Bus and linkIQ®.

#### Wireless M-Bus network

The wireless M-Bus network is based on the wireless M-Bus standard, EN13757-4, mode C, meaning that this network can read all meters that comply with this standard. With a wireless M-Bus network, you will be able to establish the network yourself, if desired. Furthermore, you will be able to receive high-frequency data in 5-minute intervals.

A data collection unit consists of one or two antennas which pick up the signals from the meters via wireless M-Bus. An antenna is connected via cables to a concentrator unit which sends data to READY Manager via 3G, GPRS or IP:



Note: T1 OMS Wireless M-Bus is not supported by fixed network solutions.

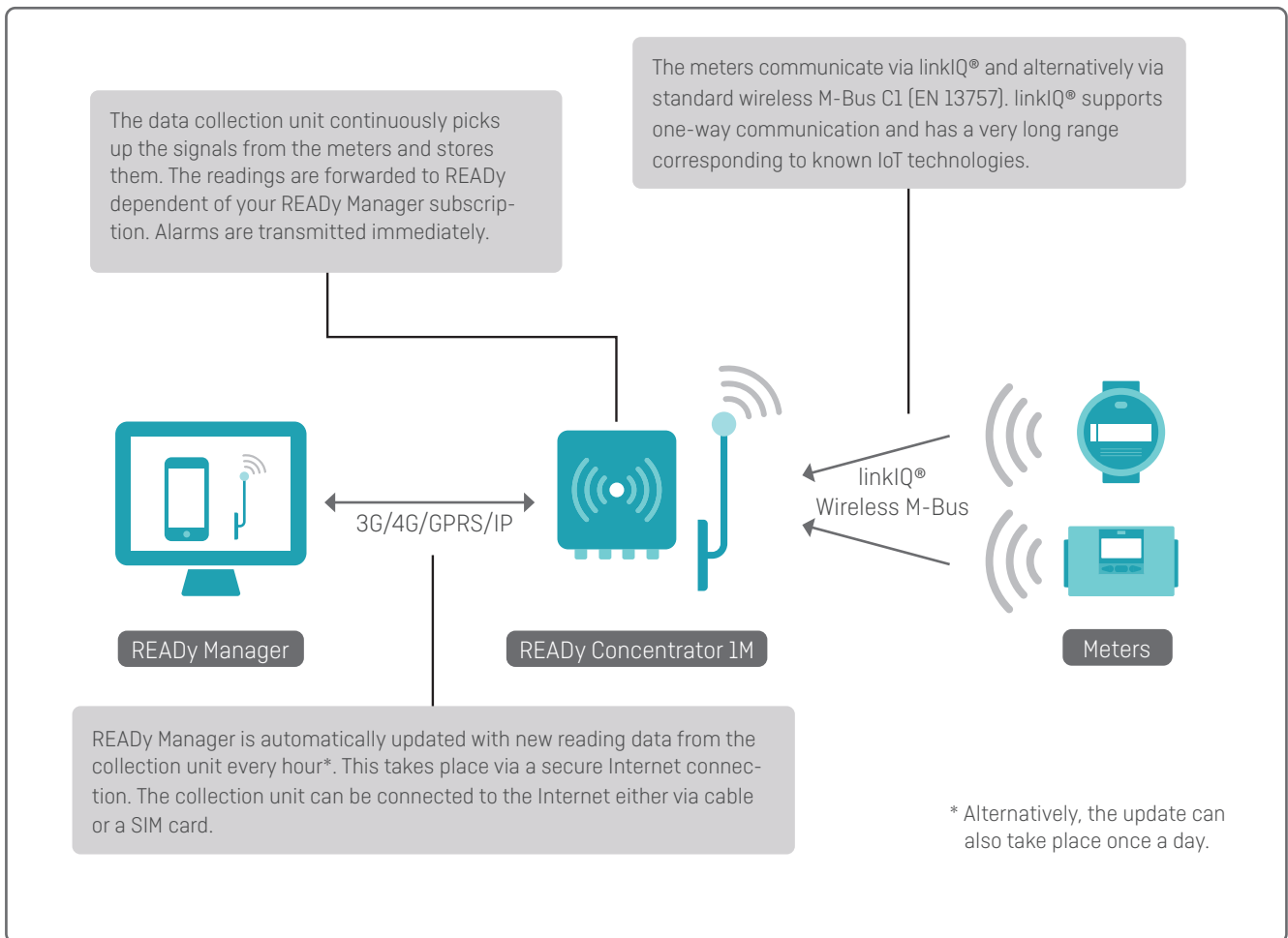
# READY Solution description - Water

## linkIQ® network

A linkIQ® network is designed by Kamstrup exclusively for smart metering purposes. This means that the network is designed for network-based remote reading with a high data quality and a low cost per metering point in view. In addition to its own optimised linkIQ® protocol, the linkIQ® network is also able to read Kamstrup meters.

The linkIQ® network offers improved range and coverage which means that fewer data collection units are required. Furthermore, linkIQ® supports smart data which means that meter data are divided into more packages and sent at different time intervals depending on the type of data (alarms, hourly and daily - or less frequent - values). Data are sent repeatedly to ensure a high level of data redundancy.

A data collection unit consists of a top unit and a base unit. The top unit picks up the signals from the meters via antennas connected to the top unit and sends data to READY Manager via the internet connectivity (3G/4G/GPRS or IP) provided by the base unit.



# READY infrastructure components

## READY Concentrator 1M

READY Concentrator 1M is the central data collection unit in a linkIQ® network. It is designed to collect data from the latest linkIQ® meters and backwards compatible to read wireless M-Bus meters as well. It is able to read up to 10,000 heat and cooling meters or 30,000 water meters.

READY Concentrator 1M is built to withstand tough weather conditions. It consists of two units: a top unit (READY Concentrator 1M) and a base unit (READY PSU-4). The base unit, supplying power and network for the top unit, is installed close to the ground for easy service.

READY Concentrator 1M has instant alarm notification, sending alarms to READY Manager as soon as detected and independent of the normal meter reading transmission schedule.



## READY Concentrator

READY Concentrator is the central data collection unit in the fixed network reading solution. It can read up to 10,000 meters. The concentrator is available in two versions: one for indoor mounting and one for outdoor mounting. The collection units only require connection to 230 volt and possibly also an IP connection. If IP is not available, the concentrator can be equipped with a GPRS modem and a SIM card for wireless transfer of data.



### Antennas for READY Concentrator and READY Concentrator 1M

The antennas are installed as high as possible to pick up the signals from as many meters as possible. Typically, the antennas are installed on the roof of buildings in the area, with special antennas placed in, for example, chimneys. It is possible to achieve large ranges using special equipment.

This requires a project from Kamstrup.



## READY Mini Concentrator

The mini concentrator is a small collection unit designed for indoor installation. It is connected to a power supply and is able to collect readings from up to 25 meters and forward the data to READY Manager via Ethernet, Wi-Fi or GSM.

Used in combination with a drive-by reading solution, the mini concentrator allows you to automatically read meters located in remote areas (where drive-by reading is problematic or inefficient) or meters for which you need more frequent data (down to 5-minute intervals).



# READY Solution description - Water

## READY 4G Bridge

READY 4G Bridge is a battery-powered collection unit that receives wireless M-Bus data from up to 5 meters and sends the data to READY Manager via GSM. It is designed for both indoor and outdoor installation.

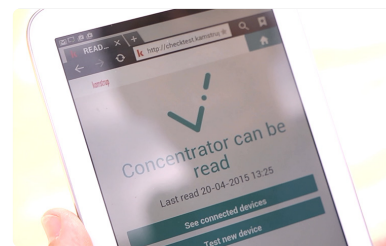
Used in combination with a drive-by reading solution, READY 4G Bridge allows you to automatically read meters located in remote areas (where drive-by reading is problematic or inefficient) or meters for which you need more frequent data.



## Verification of the connection to the meters

As soon as the concentrator is connected to 230 volt and IP or equipped with a SIM card, it is possible to check which meters can be read by the concentrator via a mobile unit or a PC. This can be used in determining the optimal position for the data collection unit.

Likewise, it is possible to test if an individual meter has established contact with the relevant concentrator – just by entering the meter's serial number on a mobile-friendly website. Thus, revisits to the consumers' homes can be avoided as it can be determined during the installation if the meter can be read.

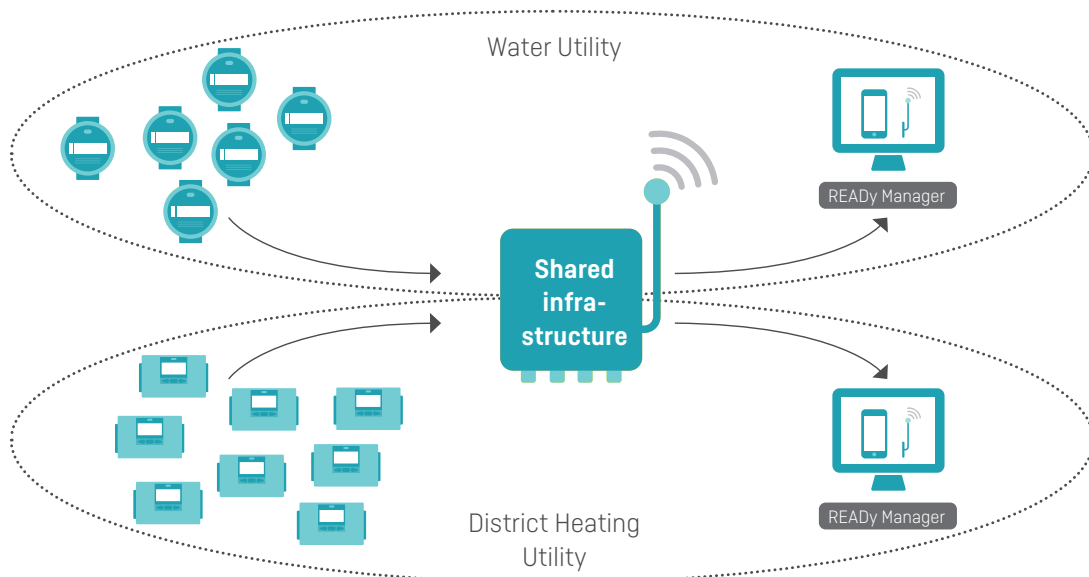


The contact between meter and concentrator can be verified quickly on a mobile-friendly website.

## Shared Infrastructure for Fixed Network

With Shared Infrastructure, it is possible to share/lease your current infrastructure with others. In general, this means that there is a potential to share concentrators with others, thus reducing the investment cost and making it easier to get onto a fixed network. This solution complies with the new GDPR as you will not be able to see each other's data, but only to share the infrastructure equipment. Sharing the infrastructure is easy and straightforward and can be done by sharing an ID number with anyone who wants to use your infrastructure and vice versa.

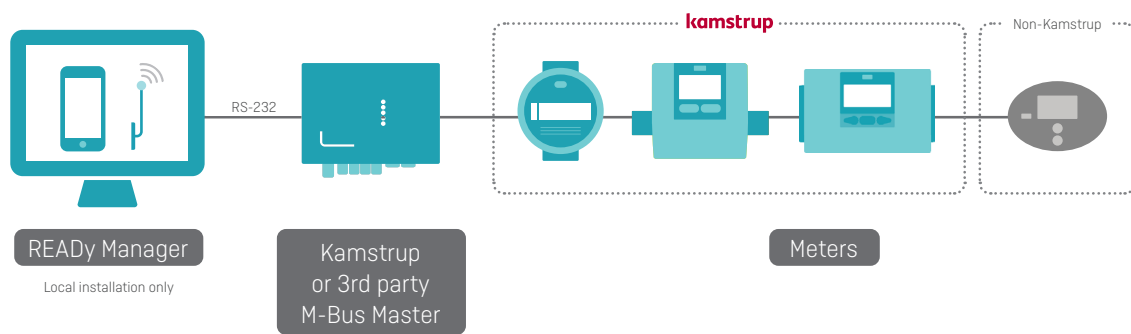
This feature is only available for Fixed Network licenses, and it is not possible to share infrastructure based on Drive-by licenses.



# Wired meter readings with READY Manager

Existing and new meters with wired M-Bus embedded can be read out by READY Manager via direct wired communication.

A wired communication for both Kamstrup and Non-Kamstrup meters is very useful in applications such as high-rise buildings, shopping malls, other commercial buildings, service buildings, etc. where wireless networks are challenged by concrete and heavy traffic on publicly available frequencies. Wired communication will be completely free of disturbances and will ensure full meter readings in tough surroundings.



## M-Bus Master

M-Bus Master is designed for the connection of up to 250 meters with M-Bus interface. M-Bus Master can be used as a master, a transparent level converter or as a repeater.

The total number of meters in one M-Bus system can be up to 1250 meters. Kamstrup offers two different M-Bus Masters.

M-Bus Master connects directly to your local READY Manager installation or may be connected via IP or wirelessly (3G) via additional external equipment.

### MultiPort 250D

With display and interface for Kamstrup optical eye



### MultiPort 250L

Without display and interface for Kamstrup optical eye



# READy Manager – handling and storage of meter data

The handling of meters and meter data takes place in READy Manager. READy Manager has a simple and logical user interface with a start page and icon-based navigation.

This makes the program very intuitive and easy to use. Information about the most basic modules can be found by clicking the help icon on the start page.

Both Kamstrup meters and some non-Kamstrup meters can be read via READy Converter and READy App in Drive By installations. A number of non-Kamstrup meters have been white listed for this purpose.

READy Manager handles meter encryption keys to support the best security possible. Once your meter encryption keys have been installed, you can read data from your meters.

In the map view, you can see both Kamstrup meters and non-Kamstrup meters, and they are visually differentiated to provide a better overview.

Once meters have been read via READy App, data is synchronized to READy Manager and data is available for further actions.

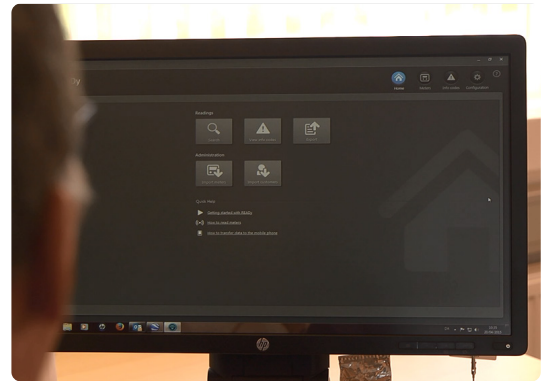
READy Manager supports up to 100,000 metering points.

## Presentation of meter data

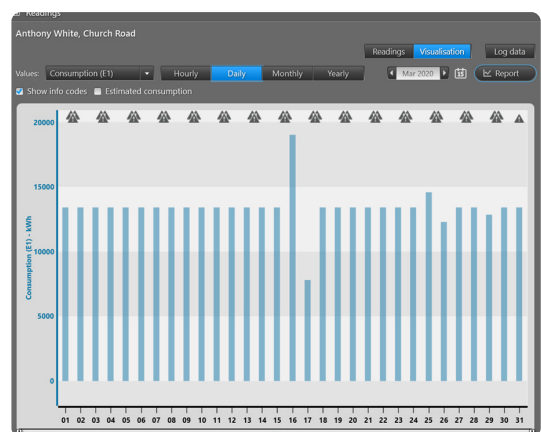
READy Manager gives you access to the consumption history (hourly, daily, monthly or yearly) of a consumer in the desired time interval - displayed in a simple and easy-to-use bar chart.

Tooltips with more details, such as information about meter exchanges, meter rollovers and meter events (info codes), are also available.

The consumption graph makes it a lot easier to deal with billing issues and explain the consumption to consumers. If you need to share the information with your consumer, for example by email, a report with the graph and its data can be created with a single click of the mouse.



READy Manager has a simple and logical user interface, making it very intuitive.

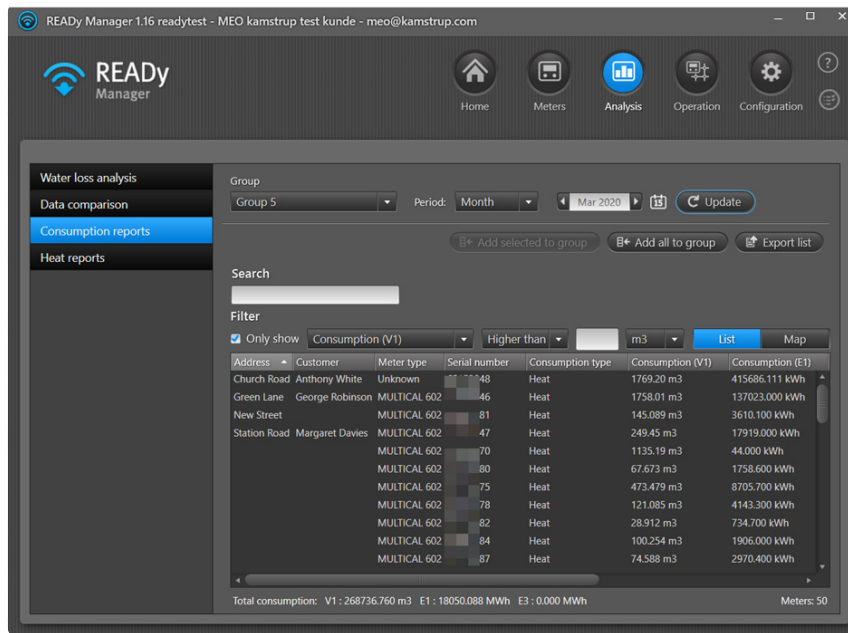


## Consumption reports

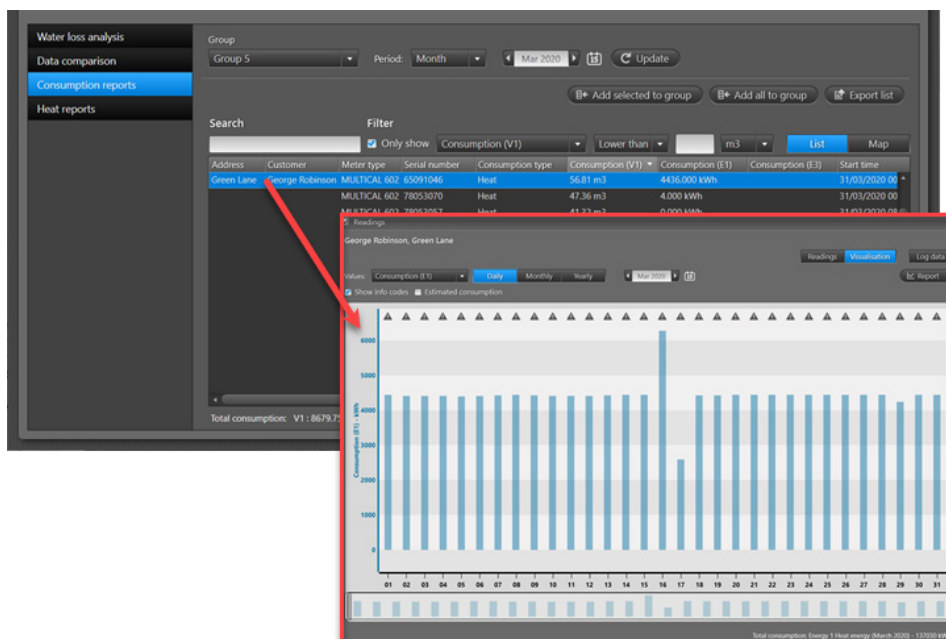
READY Manager keeps track of the consumption and lets you generate consumption reports that show the total consumption for both individual consumers as well as for all consumers included in the report and in the time interval of your choice.

A filtering option enables you to set up a consumption limit and only include the consumers with a consumption above or below the specified limit in your report, for example if you want to identify consumers with unusually high or zero consumption. If desired you can add them to a group for further investigation.

All reports can be exported for further use.



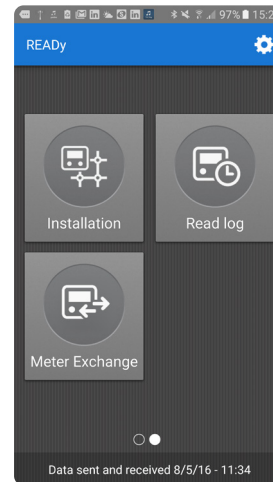
If you want to see detailed consumption information for a specific consumer in the report, you can go to the consumption graphs for that particular consumer directly from the consumption report.



## Meter exchange

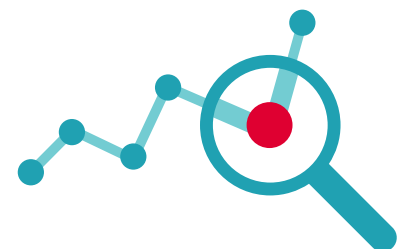
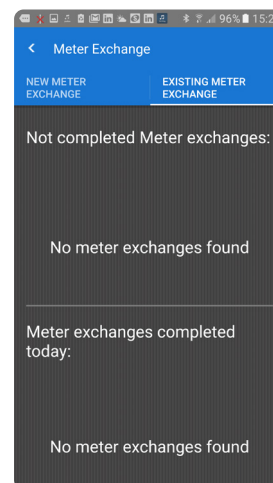
Many manual tiring processes are involved in the running maintenance of meters and the handling of meter exchanges.

The meter exchange feature in READY Manager and READY App simplifies the handling and maintenance of the meter exchange process which to a very high degree frees human resources to other tasks. In addition, the risk of manually caused errors is reduced to a virtual zero, which adds to the total efficiency of your utility.



### How it works

Exchanging a meter is a guided action that is generally performed via READY App, but it is also available in READY Manager. Once the meter is exchanged, READY App is synchronized with READY Manager where the historical data is stored. This flexibility leaves an option for you to perform meter exchange on-site or before the actual customer visit.



## Reading performance reporting and visualization

For remote reading networks, the demand for a very high performance is more and more evident. To have the right tool to validate and document the data collection success is therefore necessary. With the performance reading reporting and visualization module, it is hassle-free to get a network performance overview of meters selected.

You define what is good and what is bad performance. With a single setting of a parameter, you determine when meters are performing poorly.

### How it works – Performance overview

Address	Postal code	City	Serial number	Last missing reading in period	Average performance
			6791223	8/3/2016	0.00 %
			69744164	8/3/2016	0.00 %
			69744165	8/3/2016	0.00 %
			69744166	8/3/2016	0.00 %

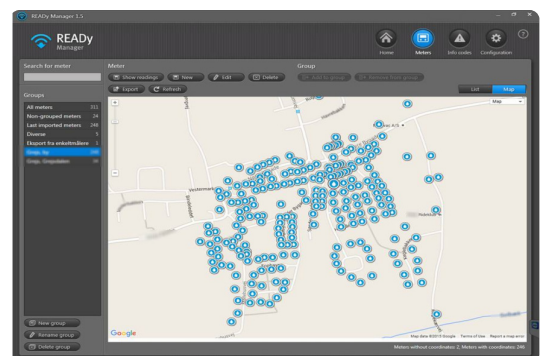
Meters that are available in READY Manager are listed for an easy overview. Each meter is shown within a user-defined interval, with its percentage of data messages received.

It is possible to create a report that shows the reading performance of a group of meters according to user-defined parameters. It is, for example, possible to retrieve a complete list of all poor-performing meters that are due to further investigation and optimization. If required, you may add comments to the generated report.

## See the meters on a map

The location of each meter is shown directly on a map in READY Manager to ensure the best overview of the installed meters. By clicking a meter on the map, further information about that meter is shown. The map is based on Google Earth (for China Baidu maps), and therefore, it is possible to use the Street View function to see comprehensive details about the installation sites.

Kamstrup meters are displayed in blue, red or green. Non-Kamstrup meters are displayed in orange.



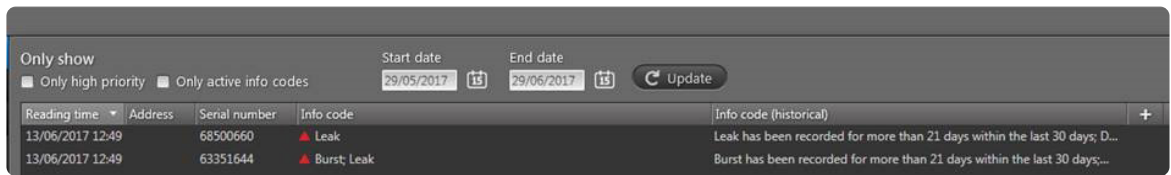
## Alarms and other meter notifications

All meters with alarms and other meter notifications are shown in the overview menu "Info codes".

Here, alarms can be sorted quickly so that the newest and most important can easily be found. Consumers can individually define which alarms are relevant and can be notified quickly to limit expensive consequential damages.

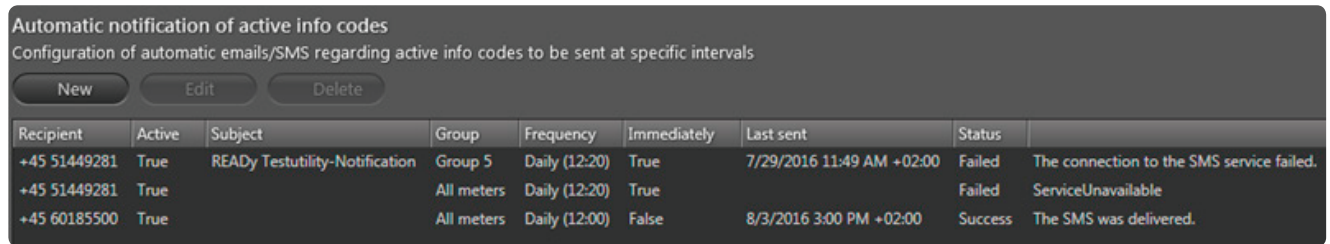
Once customers with active info codes have been located, it is easy to export the list of info codes if further customer interaction is needed. The export data is defined by the user which ensures flexibility.

To ease the overview, an icon representing the info codes is displayed in the meter overview window. This enables fast identification of customers with active info codes.



Immediately after the synchronisation, the read data is available in READY Manager. Alarms and other meter notifications are shown under "Info codes".

## System notification feature



In remote reading networks, it can be a big headache to follow occurring info codes and act accordingly. On the basis of customizable parameters, the Notification feature filters which info codes are relevant and which are not. The Notification feature forwards an info code by text message and/or email to a user-defined number of recipients. Forwarding settings determine if an info code is transmitted or not.

The Notification feature increases the occurrence of important info codes, to a large extent giving you full control of meter events.

## Graphical presentation of data for analytical uses

READY Manager can visualise the consumption of individual meters in a bar chart over time. This eases troubleshooting and makes it easier to conclude and make decisions based on data. In the same chart, any info codes are also shown, making it possible to correlate consumption data and infocodes.

It is also possible to compare more meters in the same graphical chart. The comparison includes data from either pressure, district or consumption meters. By comparing pressure and flow in one section, it becomes possible to discover dimensioning errors, and it is possible to assess the need for pressure boosters or pressure reducing valves in parts of the network.



## Priority meters

If you have established direct reading in a network, you quickly discover the benefit of receiving data from the meters frequently. In some cases, it may be desirable to receive data with very short reading intervals. For this purpose, READY Manager offers the functionality Priority meters which enables you to read up to 50 meters in 5 min. intervals.

The short reading interval provides you with a far more varied picture when you need to troubleshoot certain parts of the network. The module is also very useful in relation to pressure monitoring. With a reading interval of 5 minutes, pressure differences as a result of the flow in parts of the network can be mapped and the pressure optimised.

### Priority meters and Kamstrup PressureSensor

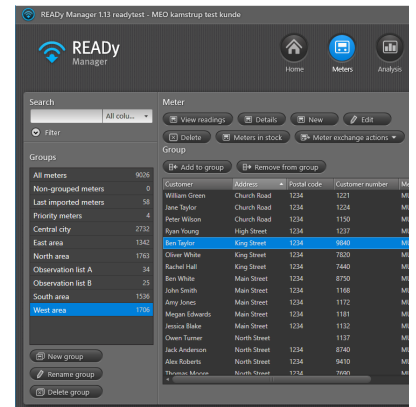
With priority meters and Kamstrup PressureSensor, it is possible to verify hydraulic pressure losses throughout the distribution network. Pressure information provides you with details about the distribution pumping and knowledge about the pressure losses in your distribution network. This can guide you when creating new distribution networks or expanding a network.



## Grouping of meters

To provide an overview of the meters in your distribution network, you can divide your meters into groups. Groups can be used to filter out which meters you want to show on the map and in the list in READY Manager. They can also be used to create logical reading groups and groups of meters that need special attention.

You can create as many meter groups as you like, and a meter can be part of more than one group, if required.



## Import of meters and customers

Meters and customers can be easily imported into READY Manager either ad hoc or automatically. Meters are imported automatically from My Kamstrup. Customers are imported automatically by setting up an automatic job that imports data from a selected location at certain intervals. The import format of customer data is flexible and can be defined by selecting the separator between values and by mapping imported customer values to values in READY.

# READY Solution description - Water

## Electricity meters

With fixed networks, wireless M-Bus and walk-by/drive-by meter reading, it is possible to read electricity meters. The electricity meter supported in READY Manager is Kamstrup OMNIPower®.

Data available in READY Manager: A+; A-; P+, P-.



## Export of data

To simplify the integration with billing systems, READY Manager makes it possible to export data in flexible export formats. It is possible to generate most formats by selecting the data to export, the order and the separator.

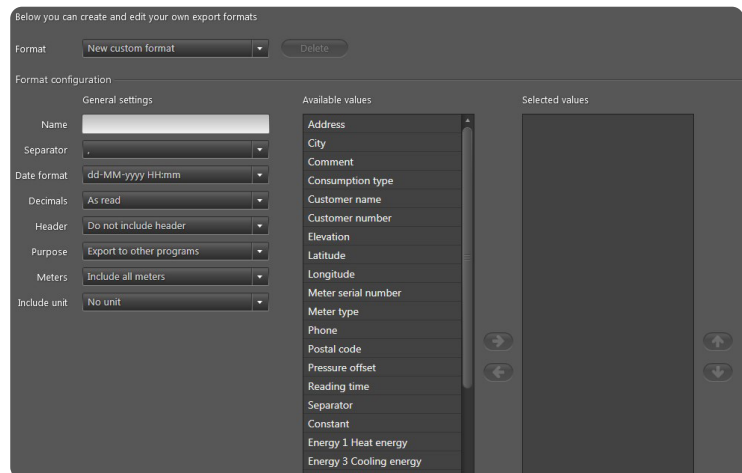
Data can be either exported ad hoc or by creating an automatic job which exports data to a selected place in certain intervals. Alternatively, you can set up READY Manager to automatically send out the read data via email in certain intervals.

Billing systems may require fixed width formats. This is solved with the flexible custom export function that supports both dynamic and fixed export widths together with a long list of data variables that can be exported.

Once the meter reading is received by READY Manager, the data can be exported to other programs for further usage.

Non-Kamstrup metering data is exportable in the same way as Kamstrup metering data. Note that T1 OMS data read from a non-Kamstrup meter, or meters that have been manually read, do not have the same amount of data variables as a Kamstrup heat/cooling or water meter.

For data exports, it is possible to enable the data interpolation feature, which is a tool for digitally enhancing the data quality by filling in missing values using advanced algorithms. Note that this feature requires a Fixed Network solution.



# Flexible access to data in READY with API Access

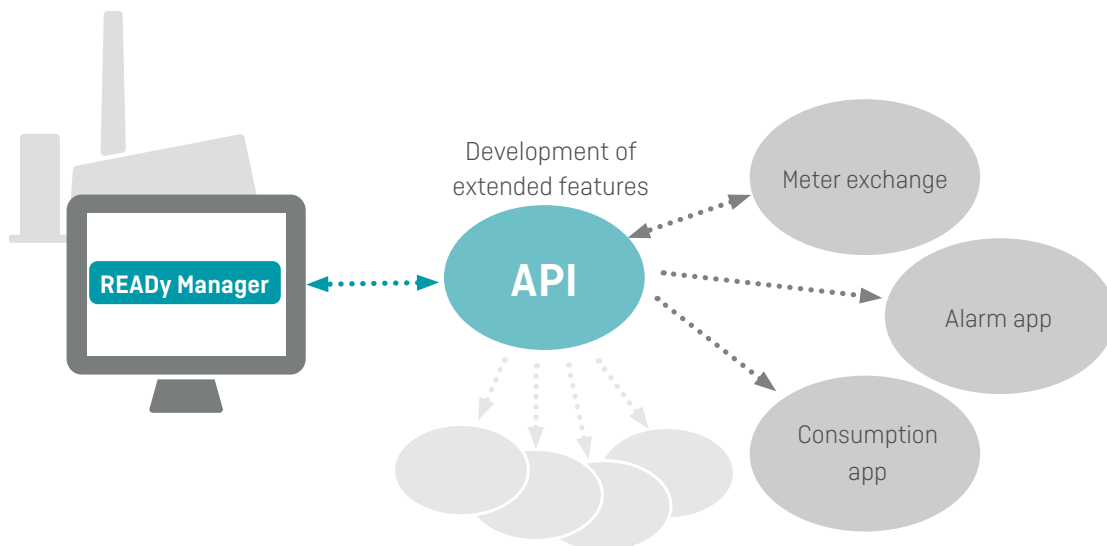
READY's API (Application Programming Interface) provides a flexible access to data in READY and enables you to share it more easily with other applications and services such as billing systems and customer portals.

This makes it possible for you to build the desired solutions based on READY data continuously made available as soon as they are received in READY and not according to a fixed export schedule

### Use case examples

The API can be used to develop new services and create internal tools to improve manual processes and workflows at the utility. For example:

- If you perform meter exchanges via your billing system, you can use the API to automatically update READY with meter exchange information.
- If you have or develop a consumption app, the API can be used to continuously send updated consumption data to the consumer.
- If you have or develop an alarm app, you can use the API to send info codes directly to the consumer as soon as they arrive in READY.



## General data protection regulation

At Kamstrup, we strive to protect your data and ensure that you can focus on what is important, rather than worrying about protecting your data.

With the addition of the new General Data Protection Regulation (GDPR), we have ensured that each user now has his own personal login. This means that you will have to use your My Kamstrup login credentials to get access to our products.

Remember that customer data you enter or import into READy must comply with the General Data Protection Regulation (GDPR).

## Data security

To ensure a very high degree of data security, the data communication from each Kamstrup wireless M-Bus meter is encrypted with an individual AES 128-bit encryption. This means that consumption data from the meter can only be decrypted by the associated READy Manager and by the mobile units authorised by READy Manager.

Encryption keys are automatically loaded into READy Manager via direct connection to My Kamstrup which ensures you that you receive the correct keys – in this way, new meters are automatically available in READy Manager, shortly after having purchased them from Kamstrup. Furthermore, meter and reading data are stored safely at Kamstrup via our hosting solution. We have ISO 27001 certification within IT security.

## Thinning of data

Data is stored only as long as required. By default, data that is collected via network and drive-by is automatically thinned according to the below procedure:

- All readings are saved at least 13 months
- After 13 months all readings are compressed to 1 reading per day
- After 10 years all readings are deleted

## Audit logging

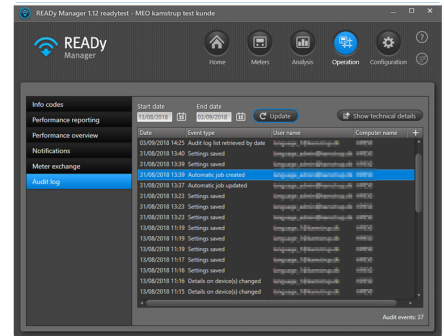
Managing the who, what and when of user actions in READY Manager.

An audit log of user actions is available in READY Manager.

For each event, you can see:

- the date and time of the event
- the type of event
- the name of the user who triggered the event
- the computer name of the user who triggered the event.

You can select the log period that interests you and see more technical details about an event.



## Role-based access control

To protect your meter, reading and customer data from potentially unwanted operations, such as delete, edit or rename, the permission to perform certain operations in READY Manager can be restricted by user roles. Three types of user roles exist: user, superuser and administrator.

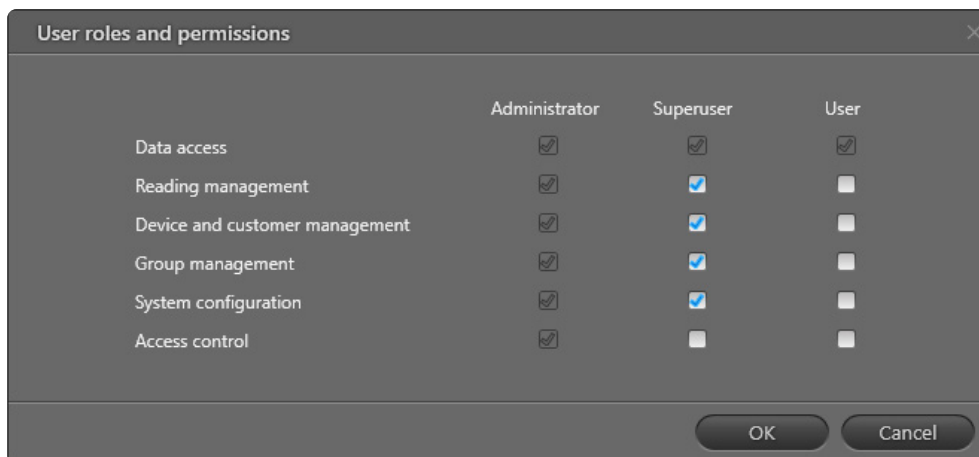
With the user roles and permission setup in READY Manager, you are able to control access to various operations in READY Manager and to change the permissions of user roles in the future.

### How it works

Your access to features in READY Manager is restricted by your user role. For example, the role “user” allows you to view meters and other data and to export information from READY Manager. However, you are not allowed to import, configure, create, edit or delete data.

Your READY Manager user role is attached to the login information you use when you log in to READY Manager.

Users with the role “administrator” can change the permissions of the “user” and “superuser” roles.



## READy Solution description - Water

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