

Data sheet

**NB-IoT  
- module 81**

**For water meters  
flowIQ® 2200 & 3200**  
– KWM2230 and KWM3230

- Communication module using 4G/5G mobile network infrastructure (Narrowband IoT)
- Toggle display menu
- Battery lifetime up to 15 years
- Flexible remote reading
- SIM card management and connectivity through Kamstrup Connect



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## Preface

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For Kamstrup water meters, different communication options are available. These communication options refer to communication modules defined by the capital letters XX in the type number:

02-x-XX-x-x-xx-x-xx (non-changeable)

The modules are not physical modules but software modules. The XX communication module cannot be changed after ordering.

The communication configuration is changeable by the YY-ZZZ choice in the configuration number:

DDD-JJ-LLL-MMMM-N-P-S-U-RR-CCC-V-T-YY-ZZZ (changeable with SW MeterTool).

Note: Communication module XX 81 does not support YY-ZZZ reconfiguring.

## Introduction

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NB-IoT (Narrowband Internet of Things) is one of the most popular LPWA (Low-Power, Wide-Area) technologies offered by most mobile network operators worldwide via the established 4G and 5G network infrastructures, meaning that no network ownership is required.

Unlike 2G and 3G, which are designed for mobile broadband communication at the expense of high power consumption, NB-IoT offers affordable data communication for power-constrained IoT devices. Most 4G and 5G networks support NB-IoT technology.

Kamstrup's NB-IoT meters are delivered with built-in SIM card and cellular connectivity service from the factory, ready to transmit data without any further configuration. Data is transmitted directly from the meter back to the meter data management system (MDM) REAdy Manager. The data transmitted to the MDM system is protected via end-to-end encryption.

## Technical data

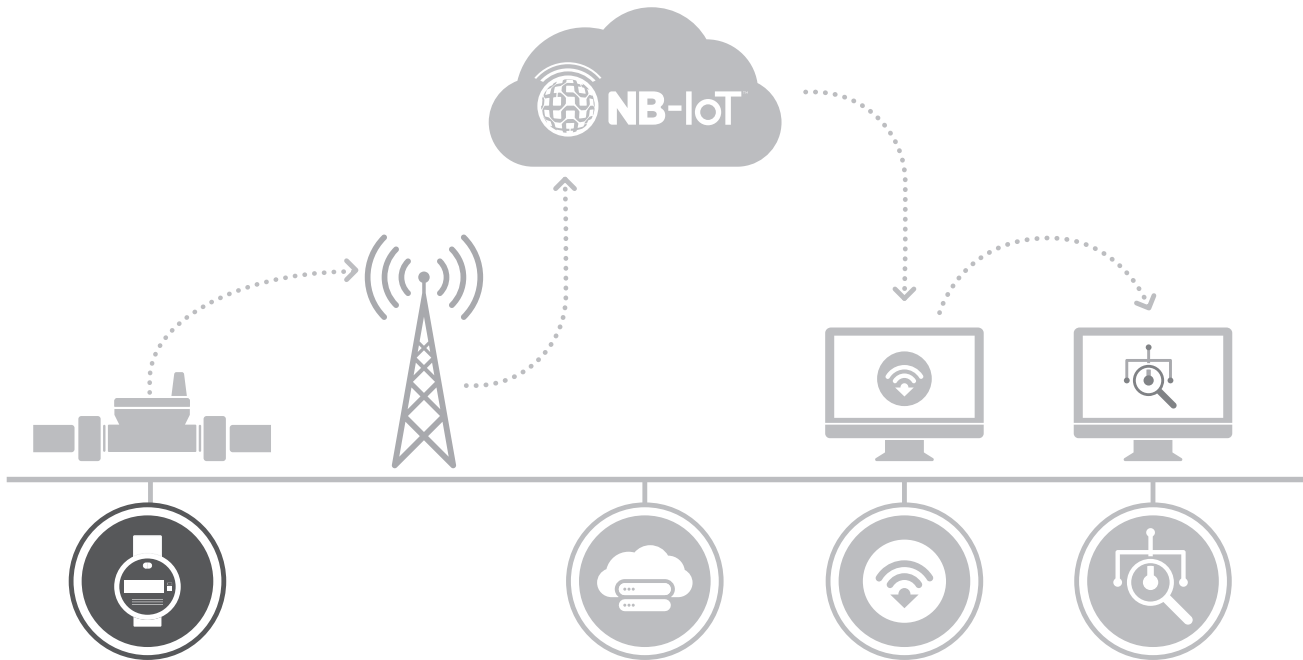
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### Communication

Data transfer	Unidirectional NB-IoT, compliant with 3GPP Release 14
Frequency bands (country dependency)	B1/B2/B3/B4/B5/B8/B12/B13/B17/B18/B19/B20/B25/B26/B28/B66/B71/B85
EU frequency bands	B3/B8/B20
SIM card	3FF non-exchangeable
Time synchronization	Time is synchronized after every transmission
Network acknowledgement	Each time a meter connects to the network, the network will acknowledge when data has been successfully delivered. If the meter does not receive an acknowledgement, it will store the data until the next transmission. The meter can store and re-transmit data for at least 30 days.

### Meter

Battery lifetime	Up to 15 years*
<i>* Battery lifetime depends on conditions such as radio coverage, signal quality, ambient temperature, transmission interval, data package, etc.</i>	
Module 81 supported by	KWM2230 and KWM3230
Antenna	Easy click-on antenna, delivered with the meter
EMC data	Fulfils MID classes E1 and E2



## Application overview

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The meter has a built-in antenna connection for mounting a click-on antenna, which communicates with the NB-IoT network infrastructure.

The application intention of NB-IoT is to support the existing communication infrastructure in rural areas where other communication technologies with short ranges are not sufficient.

The data from the meter is transmitted once a day and with hourly values. Each meter has an arbitrary daily transmission time. Prioritized info codes are transmitted immediately as info events.



### Kamstrup Connect

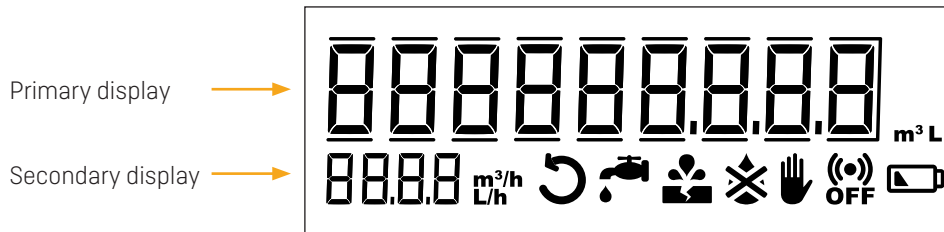
With Kamstrup Connect, we take care of all contact with the cellular operators, just as we take responsibility for both the meters and the connectivity between the meters and our systems.

A variety of different Kamstrup Connect offerings allow you to choose the plan and services that cover your specific needs.

This means that there are no infrastructure installation, rent, or maintenance costs. Instead, you will only have a data subscription fee per metering point per year.

## Display views

The meter display includes the following details:



It is possible to toggle through different display views by using a magnet on the optical IR interface at the meter front. Activate the menu by holding the magnet to the optical IR interface for 3 seconds, and navigate the menu by tapping the magnet on the optical IR interface for 1 second.

Menu order	Description	Primary display	Secondary display
1	Legal volume view	Volume	Flow
2	Display segment test	All segments ON	All segments ON
3	CALL menu	Call (do CALL / dont CALL)	Blank / done
4	Communication status	Link status	No49
5	Link quality	Link quality	No47
6	Configuration number	Configuration number [XXYYZZZ]	No31
7	Firmware revision	Firmware revision	No32
8	User test view	Volume +1 decimal point	Flow
9	Radio status [RF pause/RF On]	RF pause/RF on	Blank / done
10	Adjust log entries	Shows number of adjustments	02-2

### CALL menu

When installing the meter, the CALL menu is used to perform a network call in order to confirm network connection. When a call is performed, the meter connects to the network.

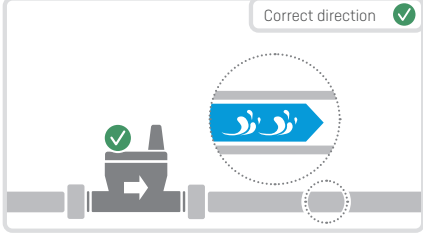
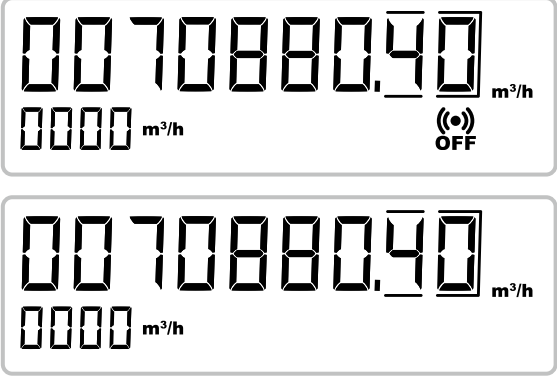
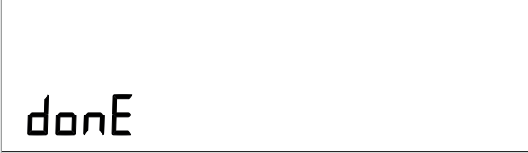
## Installation

### Easy in-display or app installation with signal quality check

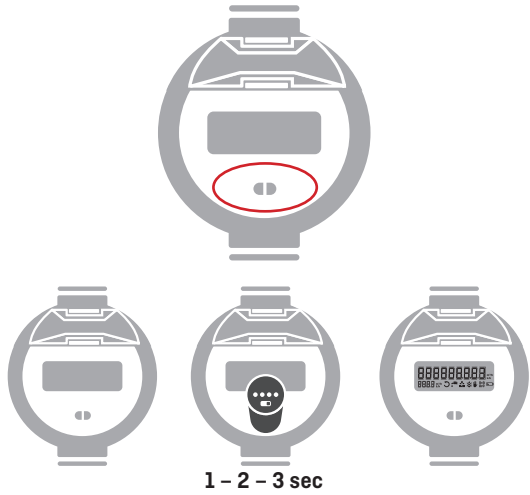
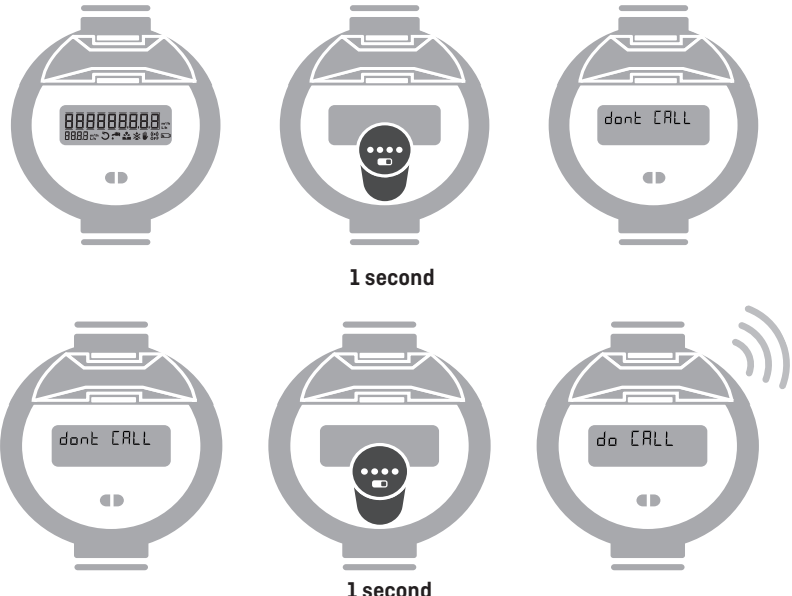
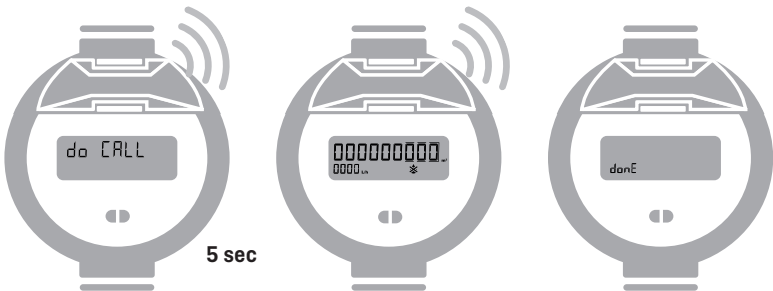
There are two ways to activate the meter radio:

#### 1. Activation with water flow

When the first water runs through the meter, the radio automatically turn on and performs a network "CALL".

<p>Let water run through the meter</p>	
<p>The meter turns off the "Radio OFF" symbol</p>	
<p>The meter performs a network "CALL".</p>	
<p>The meter writes "done" in the lower left corner if the connection is successful.</p>	

## 2. Activation with in-display menu

<p>Activate the menu by holding a magnet over the meter’s optical eye for 3 seconds.</p> <p>When activated, all the segments in the display are shown.</p>	 <p style="text-align: center;"><b>1 – 2 – 3 sec</b></p>
<p>Navigate to <b>“dont CALL”</b> by placing the magnet on the meter’s optical eye for 1 second.</p> <p><b>“dont CALL”</b> starts flashing after 5 seconds.</p> <p>Activate <b>“do CALL”</b> by placing the magnet over the optical eye for 1 second.</p>	 <p style="text-align: center;"><b>1 second</b></p> <p style="text-align: center;"><b>1 second</b></p>
<p>The meter returns to the legal volume display and performs a network call. This can take several minutes.</p> <p>The meter shows <b>“done”</b> in the lower left corner when the connection is successful.</p>	 <p style="text-align: center;"><b>5 sec</b></p>



### Checking the communication status



In the display menu, you can navigate to check the meter’s connection status.

If the signal quality is lower than 2, it is recommended to mount an external antenna.

**NOTE:** Be aware that NB-IoT devices use different antennas than other communications, e.g. Wireless M-Bus and linkIQ®!



The signal strength is rated from 0 to 4, which is visible in the display. See the below menu structure and the section about link quality.

<p>[Optional] Check the communication status in the menu <b>"no49"</b>.</p>	<p>Status codes during installation:                  255: No call/connection tried yet                  0: Transmission success                  1: Awaiting registration on network                  3: Awaiting acknowledgment                  10: Transmission pending                  33: Connection pending</p>  <p>See the complete list of communication status codes in "Communication status codes".</p>
<p>[Optional] Check the radio link quality status in menu <b>"no47"</b>. The second-last digit (9) shows the network connection:</p> <ul style="list-style-type: none"> <li>• 9: Connected to the NB-IoT network</li> <li>• 0: Not connected to the NB-IoT network</li> </ul> <p>The last digit shows the quality of the connection if the connection is achievable:</p> <ul style="list-style-type: none"> <li>• 0: Poor</li> <li>• 1: Weak</li> <li>• 2: Medium</li> <li>• 3: Good</li> <li>• 4: Excellent</li> </ul>	 <p>Second-last digit is 2 or higher = Connection is OK. Last digit is 1 or lower = Check the click-on antenna, mount an external antenna (e.g. pit antenna), or improve the external antenna location if already installed.</p> <p>Once the external antenna has been mounted, wait 1 minute and repeat the installation <b>"CALL"</b> process steps 1-4.</p>

## Communication status codes

The table below shows the communication status of the meter.

Code	Meaning	Details
255	No call/connection tried yet	Perform a call or let water flow through the meter to activate the radio
0	Transmission success	All data has been successfully forwarded
1	Awaiting network registration	
2	Registration on the network denied	Contact Kamstrup for support
3	Awaiting acknowledgement from system	
4	Failed to register on the network	Mount an external antenna or improve the external antenna location. If the issue persists, contact Kamstrup for support
5	Missing antenna	The meter requires an antenna to send data
6	Connection failed due to low voltage	The meter battery is low
7	Transmission success, but not all data delivered	Mount an external antenna or improve the external antenna location. If the issue persists, contact Kamstrup for support
8	Data delivery timeout without any acknowledgement	Mount an external antenna or improve the external antenna location. If the issue persists, contact Kamstrup for support
9	Failed to bind on network	Contact Kamstrup for support
10	Transmission pending	
11	DNS lookup failed	Contact Kamstrup for support
12	Connection aborted by user	
16	Flash write failed	Contact Kamstrup for support
32	Server error	Make sure that the meter is imported in READy Manager. If the issue persists, contact Kamstrup for support
33	Connection pending	
34-35	Internal errors	Contact Kamstrup for support

### Link quality

Shows the network connection quality.

Second-last digit	Last digit
<ul style="list-style-type: none"> <li>• 9: connected</li> <li>• 0: No connection</li> </ul>	<ul style="list-style-type: none"> <li>• 0: Poor</li> <li>• 1: Weak</li> <li>• 2: Medium</li> <li>• 3: Good</li> <li>• 4: Excellent</li> </ul>

## Module overview

### XX-YY-ZZZ relations

Meter type(s)	Top number(s)	XX	YY	ZZZ	Description
flowIQ® 2200	KWM2230	81	11	501	NB-IoT
flowIQ® 3200	KWM3230	81	11	501	NB-IoT

### YY option

The YY option defines the transmission behavior and info events.

YY	Info codes pushed immediately	Name	Transmission
11	Leak, Burst	Balanced	1 transmission per day

### ZZZ data package content

For information regarding info code content, see section 'Info codes'.

Description	501 – NB-IoT (RID)	
	Log	RID (register identification)
Volume_V1	24 hourly values	68
InfoFull	24 hourly values	578
InfoFull	Daily values	578
FlowMax	Daily values	241
AcousticNoise	Daily values	583
TempAmbientMin	Daily values	303
TempAmbientMax	Daily values	304
FlowMin	Daily values	242
TempMediaMax	Daily values	297
TempMediaMin	Daily values	296
Date	Daily values	348

Info code content:

InfoFull – Actual log
Info code
Dry
Reverse
Leak
Burst
Tamper
Low battery
Low ambient temp.
High ambient temp.
Flow above Q <sub>4</sub>
No consumption

The InfoFull register is transmitted daily together with the rest of the radio package (ZZZ code). The meter has a maximum limit of 3 events for info code events. For every occurrence, one event is used. The event is incremented by one each day if the number of events is less than 3.

## Ordering details

The features included in the type number cannot be changed once the meter has been produced.

<b>flowIQ® 2200</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Meter generation</b>								
Second generation	02							
<b>Mechanical design</b>								
1-part body, composite meter housing		K						
2-part body, st. steel 1.4408 housing		L						
<b>Communication module</b>								
NB-IoT			81					
<b>Power supply</b>								
D-cell				D				
<b>Dynamic range</b> <i>(depending on meter size and country code)</i>								
R160						B		
R250						C		
R400						E		
<b>Meter size</b>			<b>Dynamic range</b>					
¾" 110 mm, 1.6 m <sup>3</sup> /h*	DN15		R160, R400				1A	
¾" 110 mm, 2.5 m <sup>3</sup> /h	DN15		R250, R400				1B	
1" 105 mm, 2.5 m <sup>3</sup> /h*	DN20		R160, R400				2A	
1" 130 mm, 2.5 m <sup>3</sup> /h	DN20		R400				2B	
1" 190 mm, 2.5 m <sup>3</sup> /h*	DN20		R160, R400				2D	
1" 190 mm, 4.0 m <sup>3</sup> /h	DN20		R160, R250, R400				2E	
1¼" 260 mm, 4.0 m <sup>3</sup> /h*	DN25		R160				3C	
1¼" 260 mm, 6.3 m <sup>3</sup> /h*	DN25		R160, R250				3D	
1¼" 260 mm, 10 m <sup>3</sup> /h	DN25		R160, R400				3E	
<b>Meter type</b>								
Warm-water meter <i>(not available for all meter sizes)</i>								7
Cold-water meter								8
<b>Country code</b>								
								XX

\* Also available as a warm-water meter. Please note that warm-water meters are only available with dynamic range R160.

The country code is used for:

- Language and approval on type label

## Ordering details

The features included in the type number cannot be changed once the meter has been produced.

<b>flowIQ® 3200</b>	□ □	□	□ □	□	□ □	□ □	□	□ □
<b>Meter generation</b>								
Second generation	02							
<b>Mechanical design</b>								
2-part body, st. steel 1.4408 housing	L							
<b>Communication module</b>								
NB-IoT	81							
<b>Power supply</b>								
D-cell	D							
<b>Dynamic range</b> <i>(depending on meter size and country code)</i>								
R160	B							
R250	C							
<b>Meter size - thread</b>	<b>Dynamic range</b>							
1½" 260 mm, 6.3 m <sup>3</sup> /h [DN32]	R160			3M				
1½" 260 mm, 10 m <sup>3</sup> /h [DN32]	R160, R250			3N				
2" 300 mm, 10 m <sup>3</sup> /h [DN40]*	R160			4A				
2" 300 mm, 16 m <sup>3</sup> /h [DN40]	R160, R250			4B				
<b>Meter size - flange</b>								
DN50 270 mm, 16 m <sup>3</sup> /h*	R160			4J				
DN50 270 mm, 25 m <sup>3</sup> /h	R160, R250			4K				
DN65 300 mm, 25 m <sup>3</sup> /h*	R160			4T				
DN65 300 mm, 40 m <sup>3</sup> /h	R250			4U				
DN80 300 mm, 40 m <sup>3</sup> /h*	R160			5A				
DN80 300 mm, 63 m <sup>3</sup> /h	R250			5B				
DN100 250 mm, 63 m <sup>3</sup> /h*	R160			AA				
DN100 250 mm, 100 m <sup>3</sup> /h	R250			AB				
DN100 360 mm, 63 m <sup>3</sup> /h*	R160			AE				
DN100 360 mm, 100 m <sup>3</sup> /h	R250			AF				
<b>Meter type</b>								
Warm-water meter	7							
Cold-water meter	8							
<b>Country code</b>	XX							

\* Also available as a warm-water meter. Please note that warm-water meters are only available with dynamic range R160.

The country code is used for:

- Language and approval on type label

## Configuration

The table below shows the available configuration number dependencies related to the XX communication module. If a configuration parameter is not dependent on the communication module, it is shown as not applicable (N/A). For further information, see the meter documentation.

	Config code	DDD	JJ	LLL	MMMM	N	P	S	U	RR	CCC	V	T	YY	ZZZ
		□□□	□□	□□□	□□□□	□	□	□	□	□□	□□□	□	□	□□	□□□
<b>Display views</b>															
KWM2230 & KWM3230		806													
<b>GMT offset – time zone</b>															
-			N/A												
<b>Target date</b>															
-															
<b>Max values – average over time</b>															
-				N/A											
<b>Customer label (alphanumeric)</b>															
Customer label					5000										
<b>Leakage message limit</b>															
-						N/A									
<b>Pipe burst limit</b>															
-							N/A								
<b>Indicative ambient temperature low limit</b>															
-								N/A							
<b>Indicative ambient temperature high limit</b>															
-									N/A						
<b>Data logger profile</b>															
-										N/A					
<b>Display resolution</b>															
-											N/A				
<b>Temperature units of measure</b>															
-												N/A			
<b>Encryption level</b>															
-													N/A		
<b>Transmission behavior</b>															
NB-IoT														11	
<b>Data packages</b>															
NB-IoT															501



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