

Data sheet

NB-IoT inputs (In-A, In-B)

MULTICAL® 403

MULTICAL® 603

MULTICAL® 803

- Reading of meter data via mobile network
- 8-year subscription included
- Accurate time stamp of reading data
- Hourly or daily reading data
- Up to 16 years' battery lifetime
- Pulse input for the connection of water and electricity meters



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General description and applications

With this module, it is possible to install meters and read these remotely without installing further infrastructure because of the communication via the NB-IoT network. By default, the module is delivered with a factory-mounted SIM card and comes with prepaid 8-year subscription. After 8 years, it is possible to buy additional subscription time.

The module can be mounted in MULTICAL® 403, MULTICAL® 603 and MULTICAL® 803 and requires either an IoT battery or a high-power mains supply depending on the required transmission interval. For battery-operated meters, 24 hour registers can be delivered once a day and with a mains-supplied meter, data can be delivered each hour. The module automatically adjusts the clock in the meter according to the network and data is thus delivered precisely on time. With this module, it is not possible to have other systems adjusting the clock in the meter as this will result in a conflict. The module uses end-to-end encryption by which data is encrypted with the device encryption key (DEK) of the meter and the transport layer itself is protected through the transport encryption key (TEK) of the module. To use the module, an external antenna is always required.

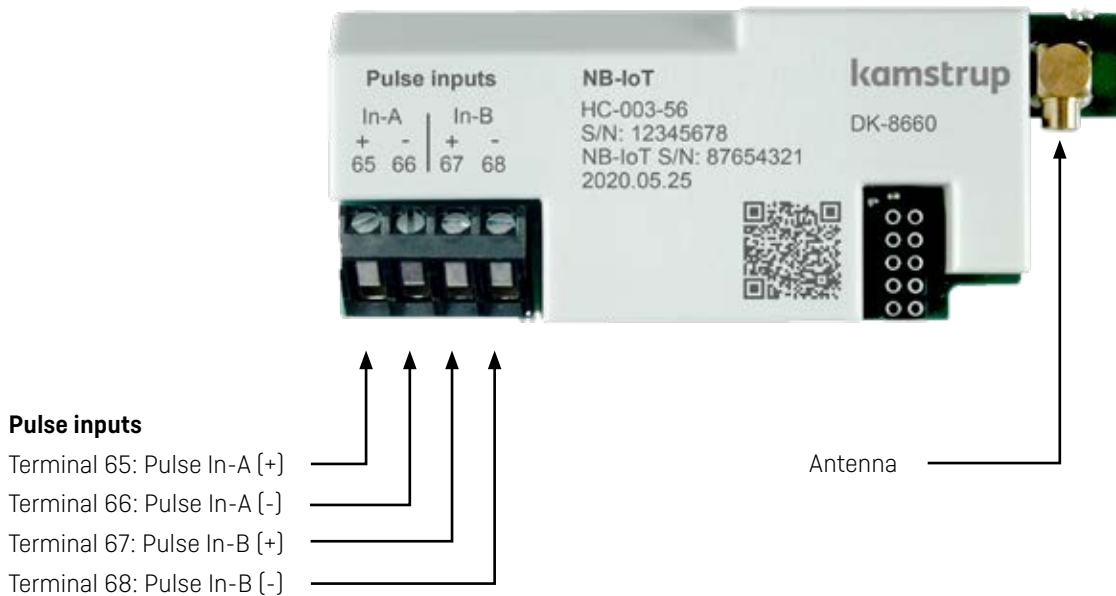
The module can also be integrated into third-party reading systems and by signing a one-way NDA, Kamstrup can hand out an implementation guide (doc. no. 55122704). The guide is a complete guide from collecting encryption keys to interpreting data from the module.

Cable connections

HC-003-56: NB-IoT, inputs (In-A, In-B)

Terminals

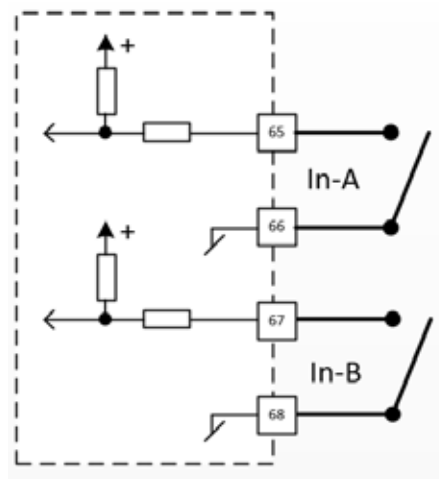
Max cable size 1.5 mm²



The module is equipped with two pulse inputs, In-A and In-B, to collect and accumulate pulses, e.g. from water and electricity meters.

The pulse inputs are physically placed on the module. However, the accumulation and logging of values are performed by the MULTICAL® calculator.

When installing a module with pulse inputs in slot 2 of MULTICAL® 603 and MULTICAL® 803, the pulse inputs will be registered in the meter as In-A2 and In-B2.



Antenna



This radio-based module must have an external antenna connected. The module is only CE-marked for use with Kamstrup's factory-delivered antennas and must not be used with third-party antennas. When mounting, it must be ensured that the antenna cable is not bent more than 90 degrees as the range will otherwise be influenced.

Technical data

Physical

For installation in MULTICAL® 403, MULTICAL® 603 and MULTICAL® 803

Mechanical data

Dimensions [L X W x D] 90 x 35 x 14 mm
Weight < 45 g

MULTICAL® supply



Battery IoT or High-Power supply
– Battery IoT for MULTICAL® 403: C-cell (battery IoT only available for daily transmission)
– Battery IoT for MULTICAL® 603: D-cell (battery IoT only available for daily transmission)

Radio

Frequency bands 20, 8 and 3
Maximum transmitting power: 23 dBm (200 mW)

Data logger size

1800 readings in total:
– 1800 days of readings every day
– 30 days of readings every hour

Pulse inputs

Input type Contact input
Open voltage 3.6 V
Current $\leq 5 \mu\text{A}$
Max cable length 10 m

Environment

Operating temperature 5 °C – 55 °C
Humidity 25 – 85 % RH non-condensing
Marking/approvals CE, MID, RED together with the type approval of MULTICAL® 403/603/803

Programming

Configuration/firmware Via the multipole connector on the module using METERTOOL HCW

Technical data

Power supply

It is possible to use either a high-power power supply or an IoT battery in MULTICAL® 403 and MULTICAL® 603. For MULTICAL® 803, a high-power power supply must be mounted.

See table for correct mounting.

Supply	MULTICAL® 403	MULTICAL® 603	MULTICAL® 803
230V High Power	X	X	X
24V High Power	X	X	X
IoT battery, D-cell		X	
IoT battery, C-cell	X		

MULTICAL® 403

High Power



IoT C-cell



MULTICAL® 603

High Power



IoT D-cell



Technical data

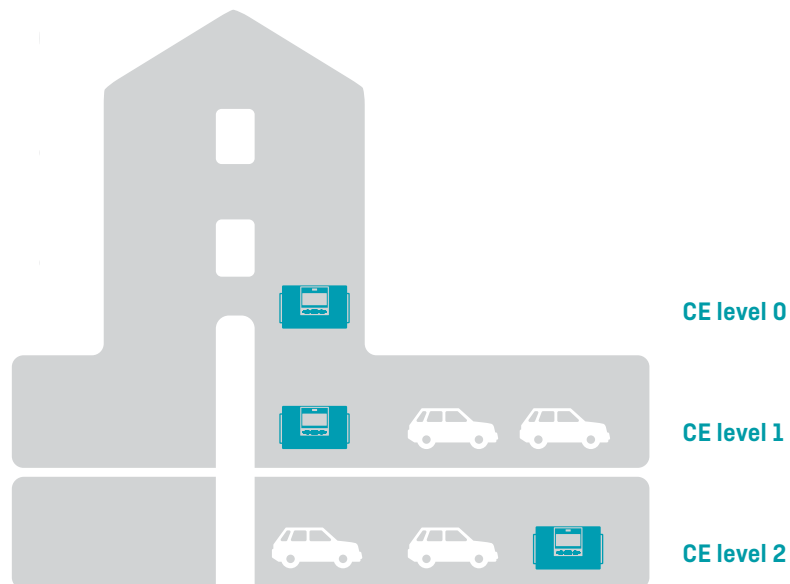
Battery lifetime

Expected

Up to 16 years (daily transmission) depending on the installation site and the NB-IoT coverage level called "CE level"

CE level	MULTICAL® 403	MULTICAL® 603
0	Up to 12 years	Up to 16 years
1	Up to 11 years	Up to 15 years
2	Up to 6 years	Up to 12 years

CE level



SIM card

The module can be ordered with a factory-mounted SIM card and comes with prepaid 8-year subscription. The price of the subscription depends on the amount of data and thus the required transmission interval. For hourly data, 8 MB/year are expected and for daily data, 1 Mb/year are expected. The module is offered with different providers depending on the country in which the module is to operate. Kamstrup has entered into agreements with Telia, Vodafone and Deutsche Telekom that together cover most of Europe.



SIM card mounted in the module

Ordering

Description

Module
 USB configuration cable for H/C modules
 External antenna (Mini Triangle)
 Output cable
 Extension cable 5 m
 Extension cable 10 m
 Extension cable 15 m
 Extension cable 20 m
 Extension cable 25 m
 External antenna for extension
 METERTOOL HCW

Ordering No.

HC-003-56
 6699 035
 6699 448
 5000 292
 5000 429
 5000 441
 5000 442
 5000 443
 5000 444
 6699 484
www.kamstrup.com

Troubleshooting

There are several ways to test if the module is connected to the NB-IoT mobile infrastructure and all the way to READy Manager.

1. Forced call

Press the front buttons until "CALL" is shown in the meter display.

This message will disappear and the display will return to its normal state.

An "OK" will be shown shortly in the lower-left corner of the display within a few minutes, indicating that READy Manager is able to receive data from the meter.

2. check.kamstrup.com

You can also test if the meter has been read via your mobile phone.

1. Open a browser and enter <https://check.kamstrup.com/>.
2. Enter the serial number of the meter or the module.
3. Press the button "Test the connection".




The answer is either that the meter can be read by READy Manager or various suggestions for troubleshooting.

3. Display information

The meter display can be used for testing if the module status is OK and if the module is connected to the mobile infrastructure.

The module information can be found in "TECH loop" on the display.

- Module in module slot 1: Choose menu 2-101 in "TECH loop".
- Module in module slot 2: Choose menu 2-202 in "TECH loop".

Menu	Menu index	Information	Example of display reading
2-x01	31	Module type and configuration	 <p>The screenshot shows the meter display with the following text: INFO MIN MAX TA € 3-1, EL. VOL. LOG N° TL, 5620.110, DATE TIME, p1, 4p°C GJkWh, OK, bar m7/h GCALMWh.</p>
2-x01-1	32	Module firmware and revision	 <p>The screenshot shows the meter display with the following text: INFO MIN MAX TA € 3-2, EL. VOL. LOG N° TL, 16140.301, DATE TIME, p1, 4p°C GJkWh, OK, bar m7/h GCALMWh.</p>
2-x01-2	33	Module serial number	 <p>The screenshot shows the meter display with the following text: INFO MIN MAX TA € 3-3, EL. VOL. LOG N° TL, 79700062, DATE TIME, p1, 4p°C GJkWh, OK, bar m7/h GCALMWh.</p>

2-x01-3: Connection information

Menu	Menu index	Information	Example of display reading
2-x01-3	47	Connection information with 2 digits of information	

The first digit indicates the mobile connection:

- 9: Connected to the NB-IoT infrastructure

The second digit shows the quality of the connection if connection is possible:

- 0: Poor [CE level 2]
- 1: Weak [CE level 2]
- 2: Medium [CE level 1]
- 3: Good [CE level 1]
- 4: Excellent [CE level 0]

If the second digit is between 2 and 4, the installation is OK.

If the second digit is 1 or 0, an alternative location for the external antenna is needed.

Once the alternative location is found, make a forced call and wait 1 minute for the module to update the status. Then test if the connection quality has improved.

2-x01-4: Module status

Menu	Menu index	Information	Example of display reading
2-x01-4	49	Module status	

Typical status codes during installation:

- 255: No connection to the NB-IoT network tried yet
- 0: Transfer OK – all data registers sent
- 1: Waiting for registration on the NB-IoT network
- 2: Registration to the NB-IoT network rejected
- 3: Waiting for reply from MDM
- 4: Registration to the NB-IoT network failed
- 5: Missing external antenna
- 6: Connection failed due to low voltage
- 7: Timeout - not all data stored in the module is delivered
- 8: Timeout - data not delivered
- 32: Error code from MDM - e.g. missing TEK (Transport Encryption Key)
- 33: First transmission from module is missing response from MDM

If any other status code is shown, please contact Kamstrup A/S.

Datagram overview

HC-003-56	XX	YY	ZZZ
Type			
NB-IoT module	56		
Transmission			
Transfer of hourly data every hour, 8 years of data communication, High-Power supply only		14	
Transfer of hourly data every day, 8 years of data communication, Battery and High-Power supply		20	
Datagrams			
Standard registers			110
Alternative registers			111
High-Power – standard registers			210
High-Power – standard + Permanent Performance Monitoring (PPM) registers			211
High-Power – Standard registers + pressure registers			212
...			...

For a complete overview of the contents of the different datagrams, please refer to document 55122746, datagram description for NB-IoT module HC-003-56.

Accessories

As external antenna, the mini triangle antenna, 6699 448, with 2.5 m antenna cable and MCX connector must be used.



If there is a need for more antenna cable, the solution below can extend the installation with up to 25 m cable.

Recommended solution



MULTICAL® 603

+



5000 292

+



5000 429: 5 m
5000 441: 10 m
5000 442: 15 m
5000 443: 20 m
5000 444: 25 m

+



6699 484

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