kamstrup

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

Contents

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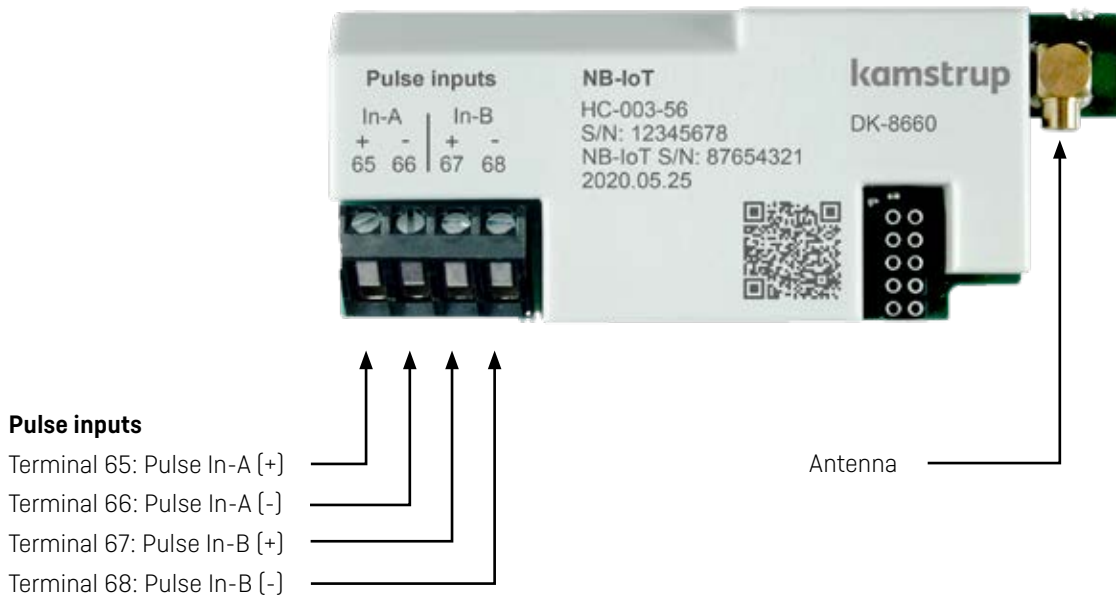
The module can also be integrated into third-party reading systems and by signing a one-way NDA, Kamstrup can hand out an implementation guide (doc. no. 55122704). The guide is a complete guide from collecting encryption keys to interpreting data from the module.

Cable connections

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HC-003-56: NB-IoT, inputs (In-A, In-B)
Terminals
Max cable size 1.5 mm²

Pulse inputs

Terminal 65: Pulse In-A (+)

Terminal 66: Pulse In-A (-)

Terminal 67: Pulse In-B (+)

Terminal 68: Pulse In-B (-)

Antenna

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.
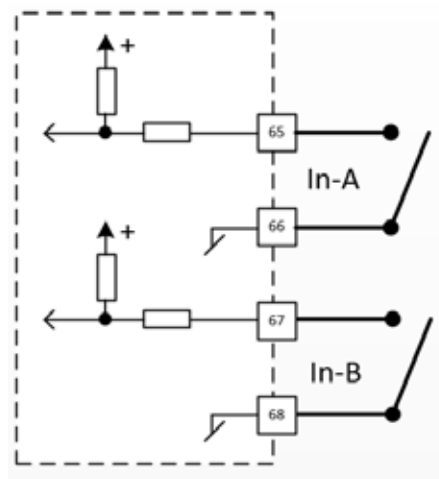
Antenna

⚠️ 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
                                       – Batteriy 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   ≤ 5 µA
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

MULTICAL® 603

High Power

IoT C-cell

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

CE level 0

CE level 1

CE level 2

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	Ordering No.
Module	HC-003-56
USB configuration cable for H/C modules	6699 035
External antenna (Mini Triangle)	6699 448
Output cable	5000 292
Extension cable 5 m	5000 429
Extension cable 10 m	5000 441
Extension cable 15 m	5000 442
Extension cable 20 m	5000 443
Extension cable 25 m	5000 444
External antenna for extension	6699 484
METERTOOL HCW	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 dissapear 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	5620.1.1.0
2-x01-1	32	Module firmware and revision	16140.30.1
2-x01-2	33	Module serial number	79700062

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   +   6699 484
5000 441: 10 m
5000 442: 15 m
5000 443: 20 m
5000 444: 25 m