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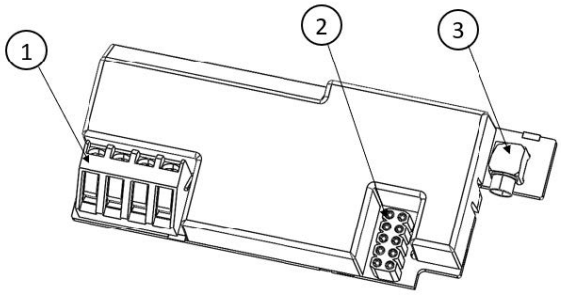
Quick manual

Introduction

CMi4140 is a meter connectivity module mounted inside a Kamstrup MULTICAL 403/603/803 heating/cooling meter to deliver meter data to a receiving server via a LoRaWAN® network. The module is energy-efficient and offers 11 years of battery lifetime with EcoMode enabled. It can be retro-fitted into deployed meters and is ideal for applications where long range is required. CMi4140 is easily configured through Elvaco OTC mobile app, or via downlink commands. With CMi4140, Elvaco offers a meter connectivity module designed for customers that require a user-friendly and cost-effective solution.

For a complete description of the product, or for information in other languages, visit the Elvaco AB support website, http://support.elvaco.com.

Parts overview



1. Pulse inputs In A and In B (allowing to connect adjacent pulse meters)
2. Power connector
3. MCX antenna connector

NOTE
The MCX antenna connector is used for connecting either an internal or an external antenna.

Mounting the product

CMi4140 can be used in either a Kamstrup MULTICAL® 403, MULTICAL® 603, or a MULTICAL® 803 heat/cooling meter. If the module is not mounted in the meter upon delivery, it is easily inserted and installed:

1. Grab the device by the outer edges.
2. Gently press it into position in the module slot.
3. Connect the power connector to the meter power supply.

CAUTION
This is an electrostatic-sensitive product. Observe the necessary ESD protective measures when installing the product.

Connection of the LoRaWAN® antenna

CMi4140 has an option for using either an internal or an external LoRaWAN® antenna. Since both antennas are using the MCX connector, they are interchangeable.

1. Connect the internal or external or antenna with MCX connector to the module in the meter.
2. Route the antenna cable (if using an external antenna)
3. Push the connector gently into the socket on the module.

CAUTION
If using an external antenna, make sure to mount it at least 0.5 meters away from the meter in order not to cause interference.

Activating the module

NOTE
Before activating the module, and trying to join a LoRaWAN® network, make sure the LoRaWAN® network server of use is prepared with necessary device and security related information. Security keys for Elvaco devices can be accessed in Elvaco EVO, Elvaco EVO Login.

Upon delivery, the module is set to inactive mode, which means no messages will be transmitted from the module before being activated. The module can be activated either via the buttons on the meter, or via the Elvaco OTC App:

Module activation via meter buttons

- On MULTICAL® 403, press and hold both buttons on the front of the meter until “CALL” is displayed.
- On MULTICAL® 603 and MULTICAL® 803, press down the two arrow buttons on the front of the meter until “CALL” is displayed.

Module activation via Elvaco OTC App

1. Open Elvaco OTC app (available for Android and iOS).
2. Scan the module (make sure NFC is activated on the phone).
3. Go to **Apply mode**.
4. Set the power mode to **Active**.
5. Select **Apply settings**.
6. Scan the module to apply new settings.
   To verify that the module has been activated, go to **Inspect**, scan the module, and make sure that power mode is set to **Active**.

TIP

- If the module is mounted inside a MULTICAL® 403, the NFC field is easiest accessible if placing your phone in the middle of the higher part of the back.
- MULTICAL® 603 has two module slots. If mounted in the left module slot, the NFC field is easiest accessible if placing your phone in the middle of the higher part of the back. If the module is mounted in the right module slot, place your phone to the right of the higher part of the back.
- If the module is mounted in MULTICAL® 803, the meter needs to be open to access the NFC field. Place your phone close to the CMi4140 when making the NFC scan.

Joining the LoRaWAN® network

When activated, the module will attempt to join the LoRaWAN® network. If the module fails to join the LoRaWAN® network it will perform retries until it succeeds. The time between each attempt will increase for every attempt until it’s performed once every day. A new join attempt cycle can be manually started anytime by deactivating and activating the module using the Elvaco OTC App.

When the module has joined the LoRaWAN® network, meter data will initially be transmitted from the module every minute (regardless of transmit interval settings) in order to set the right data rate. After three minutes of calibration, the module will start to deliver meter data using its configured settings. By using the Elvaco OTC App, you can easily verify that the module is successfully communicating with the meter (“Meter communication”) and is connected to the LoRaWAN® network (“Network joined”).

LoRaWAN® network end-device activation

Before being able to transmit data over a LoRaWAN® network, the module must be personalized and activated. This

can be done in two different ways for LoRaWAN®, Over-the-air activation (OTAA) or Activation by Personalization (ABP). For security reasons, Elvaco strongly recommends using OTAA, where all network keys are generated each time the module joins the LoRaWAN® network. In contrast, for ABP, all keys are set manually and stay constant over time.

In OTAA mode

Before the module is able to transmit messages via the LoRaWAN® network, device information needs to be added to the network server. More specifically, the following parameters needs to be registered in order to enable the network server to receive messages from the module:

Device EUI	16 digit module unique identification number. It is not configurable.
Application key	The application key of each device is generated by Elvaco and used in OTAA mode to generate network keys when the module joins the LoRaWAN® network. Keys are managed in a secure way using Elvaco's OTC (One Touch Commissioning) solution which includes the mobile application for configuration.
JoinEUI	Sets the identification number of the join server. The identification number is set to a default value in all devices. The default value is presented in Elvaco OTC configuration options.

In ABP mode

If the activation mode is set to ABP, the application key does not need to be added to the network server. Instead the following information will be needed:

Network session key	Used by both the module and the network server.
Application session key	Used for payload encryption and decryption.
Device address	Unique identifier of the module.

Simplified Declaration of Conformity

Hereby, Elvaco declares that CMi4140 is in compliance with the following directives:

EU	UK
2014/53/EU (RED)	2017 No. 1206 (RED)
2014/30/EU (EMC)	2016 No. 1091 (EMC)
2014/35/EU (LVD)	2016 No. 1101 (LVD)
2011/65/EU + 2015/863 (RoHS)	2012 No. 3032 (RoHS)

See EU Declaration of Conformity for a complete EU DoC.

See UK Declaration of Conformity for a complete UK DoC

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Technical specifications

Mechanics	Value
Dimensions (w x h x d)	90 x 12 x 35 mm
Weight	33 g
Mounting	In module slot of Kamstrup MULTICAL® 403/603/803
External antenna connector	MCX

Electrical connections	Value
Supply voltage	Internal meter battery (up to 11 years lifetime, having EcoMode enabled, using Kamstrup's D-Cell meter battery).

Electrical characteristics	Value
Nominal voltage	3.0 VDC
Power consumption (max)	50 mA
Power consumption (sleep mode)	2.5 µA

Environmental specifications	Value
Operating temperature	+5 - +55 ºC
Operating humidity	0 - 93 % RH, no condensation
Operating altitude	2000 m
Pollution degree	Degree 1
Usage environment	Indoors
Storage temperature	-20 - 60 ºC

Radio characteristics	Value
Frequency	868 MHz
Output power	14 dBm
Receiver sensitivity	-135 dBm

LoRaWAN® characteristics	Value
Device class	Class A, bi-directional
LoRaWAN® version	1.0.2
Activation	OTAA or ABP
Data rate	DR0 - DR5 (250 bit/s-5470 bit/s)

User interface	Value
Push button	Start-up / reboot / switch off module
Configuration	NFC via Elvaco OTC app or downlink data

Approvals	Value
LoRa Alliance®	LoRaWAN Certified^{CM}
EMC	EN 301489-1, EN 301489-3