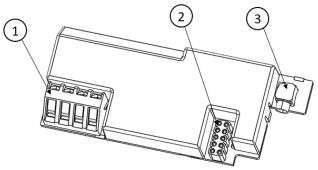
CMi4140

Integrated MCM for Kamstrup Multical® 403/603/803, LoRaWAN

INTRODUCTION

CMi4140 is an integrated meter connectivity module mounted inside a Kamstrup Multical meter to deliver meter data via a LoRaWAN network. For a complete description of the product or for information in other languages, please visit the Elvaco AB website, https://www.elvaco.com.



1. Pulse inputs
2. Power connector
3. Antenna connector

MOUNTING

CMi4140 is mounted in the module slot of a Kamstrup Multical meter. Grab the device by the outer edges and gently press it into position and connect the power connector (2) to the meter power supply.

NOTE

Electrostatic-sensitive device. Please observe the necessary ESD protective measures when installing the module.

ANTENNA

CMi4140 is available in two different versions, with internal antenna (CMi4140Int) and with external antenna (CMi4140Ext). If using the external antenna version of the module, the antenna is connected using an MCX connector.

NOTE

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.

ACTIVATION

Upon delivery, CMi4140 is set to passive mode, which means no messages will be transmitted from the module. The module can be activated in one of the following ways:

By using the front buttons of the Kamstrup Mutical meter.

-On Kamstrup Mutical 403: press down both front buttons simultaneously until "CALL" is displayed on the meter display.

-On Kamstrup Multical 603 and 803: press down both arrow buttons simultaneously until "CALL" is displayed on the meter display.

By using the Elvaco OTC App: Open the Elvaco OTC app (downloadable in Google Play) and scan the module (make sure NFC is activated on the phone). Remove the front enclosure of the meter if needed. Go to Apply mode, set the Power mode to "active" and click Apply settings. Place the phone next to the module. New settings are applied via NFC.

When activated, CMi4140 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 is performed once every day in order to conserve battery.

A new join attempt cycle can be manually started anytime by deactivating and activating the module using the Elvaco OTC App.

INITIAL DATA RATE CALIBRATION

When activated, CMi4140 will initially transmit messages every minute in order to let the LoRaWAN network adjust to an optimal data rate. After three minutes, the module will start using its normal settings where the message transmit interval is determined by the device configuration.

DEVICE CONFIGURATION

Before activating the module, you should make sure to apply the correct configuration profile by using the Elvaco mobile application. Settings are transferred to the device using NFC.

Join EUI - The Join EUI sets the identification number of the application server where data from the module will be delivered. The JoinEUI is by default set to 94193A030B000001 (16 zeroes) in all CMi4140 devices.

Activation type - There are two different activation types for LoRaWAN - Over-the-air activation (OTAA) and Activation by personalization (ABP). 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.

Application key - The application key of each CMi4140 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.

Message format - CMi4140 supports seven different message types: Standard, Compact, JSON, Scheduled-daily redundant, Scheduled Extended, Combined heat/cooling and Heat Intelligence. Please refer to the CMi4140 user's manual for more information about the structure and payload of each message format.

Transmit interval - The transmit interval parameter is used to set how many messages per day the module transmits.

EcoMode - EcoMode can be enabled to guarantee a battery-life of 11 years. The device-specific EcoMode table of the module is then used to determine how often the module is allowed to transmit data for each data rate. If the transmit interval exceeds the limit in the EcoMode table, it will be lowered accordingly.

Configuration lock - CMi4140 has a configuration lock feature which can be used to prevent unauthorized users to access the module. When configuration lock has been enabled, a user needs the device-specific Product Access Key in order to access the device. Keys are managed in a secure way using Elvaco's OTC solution which includes the mobile application for configuration.

After you have set all configuration parameters, place the phone next to the meter and click Apply settings. Hold the phone still until it vibrates three times. This confirms that new settings have successfully been transferred to the device via NFC.

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SERVER CONFIGURATION

Before CMi4140 is able to transmit messages on the LoRaWAN network, device information needs to be added to the network server. More specifically, the following parameters needs to be registered (in OTAA mode) in order to enable the network server to receive messages from the module:

- Device EUI (16-digit number printed on the device label)
- Application key
- Join EUI

NOTE

If 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, application session key and device address.

TECHNICAL SPECIFICATIONS

Mechanics	
Dimensions	90 x 35 x 12 mm
Weight	33 g
Mounting	In module slot of Kamstrup Multical® 403/603/803
External antenna connector	MCX
Electrical connections	
Supply voltage	Internal meter battery
Electrical characteristics	
Nominal voltage	3.0 VDC
Power consumption (max)	50 mA
Power consumption (sleep mode)	2.5 µA
Environmental specifications	
Operating temperature	+5 °C to +55 °C
Operating humidity	0 - 93 % RH, no condensation
Operating altitude	2000 m
Pollution degree	Degree 1
Usage environment	Indoors
Storage temperature	-20 °C to +60 °C
Radio characteristics	
Frequency	868 MHz
Output power	14 dBm
Receiver sensitivity	-135 dBm
LoRaWAN characteristics	
Device class	Class A, bi-directional
LoRa version	1.0.2
Activation	OTAA or ABP
Data rate	DR0-DR5 (250 bit/s-5470 bit/s)
User interface	
Configuration	NFC via Elvaco mobile application or downlink data
Approvals	
EMC	EN 301 489-1, EN 301 489-3
LoRa Alliance	LoRaWAN® Certified

SAFETY

The warranty does not cover damage to the product caused by usage in any other way than described in this manual. Elvaco AB can not be liable for personal injury or property damage caused by usage in any other way than described in this manual.

CONTACT INFORMATION

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EU DECLARATION OF CONFORMITY

This declaration of conformity is issued under the sole responsibility of the manufacturer:
Elvaco AB, Kabelgatan 2T, S-434 37 Kungsbacka, Sweden.

Product	**Year of CE-marking**
CMi4140	2020

The object(s) of the declaration listed above is in conformity with the relevant Community harmonization legislation:
Low Voltage Directive 2014/35/EU
EMC Directive 2014/30/EU
Radio Equipment Directive 2014/53/EU
RoHS 2011/65/EU

And are in conformity with the following harmonization standards or other normative documents:

EN 62368-1 2018 (Safety requirements for information and communication technology equipment)
EN 301 489-1 v2.1.1 (EMC standard for radio equipment and services)
EN 301 489-3 v2.1.1 (EMC standard for radio equipment and services)
EN 300220-1 v3.1.1 (SRD Low power radio equipment)
EN 300220-2 v3.1.1 (SRD Low power radio equipment)
EN 55032 2015 (Radiated emission)
EN 61000-4-2 2008 (Immunity to ESD)
EN 61000-4-3 2006 (Immunity to RF field)
EN 61000-4-4 2012 (Immunity to electrical fast transient/burst)
EN 61000-4-5 2017 (Immunity to surge measurement)
EN 61000-4-6 (Immunity to HF injections)
EN 61000-4-11 (Immunity to voltage dips/short interruptions and variations)

Kungsbacka, Sweden, 2020-01-13

Håkan Saxmo, Chief Technology Officer

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