CMi4160
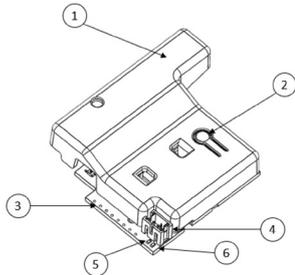## Integrated MCM for Diehl Sharky 775, LoRaWAN

INTRODUCTION

CMi4160 is an integrated meter connectivity module mounted inside a Diehl Sharky 775 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. NFC antenna
2. Push button
3. Meter interface*
4. Power connector
5. Green LED
6. Red LED

*Ribbon cable, not shown in figure

MOUNTING

CMi4160 is mounted in module slot 2 of a Diehl Sharky heat meter. Grab the device by the outer edges, gently mount it into position and connect the meter interface cable to the meter interface (ribbon cable) (3). Connect the battery pack to the module's power connector (4) and gently place it in the meter with the module.

NOTE

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

ANTENNA

CMi4160 is available in two different versions, with internal antenna (CMi4160Int) and with external antenna (CMi4160Ext). 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, CMi4160 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 module push button: Press down the push button of the module for at least five seconds until the green LED lights up.

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, CMi4160 will attempt to join the LoRaWAN network. This is indicated by a short flash on red LED, then green and red LED lights up for 1 second, followed by short flashes on the green LED until the module has joined the LoRaWAN network. When CMi4160 succeeds in joining the LoRaWAN network, the green LED will light up for 8 seconds.

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.

A new join attempt cycle can be manually started anytime by using the push button to reboot the module (Press and hold the push button (2) for 5-15 seconds to reboot the module. Release the button when the green LED is lit.) or by deactivating and activating the module using the Elvaco OTC App.

INITIAL DATA RATE CALIBRATION

When activated, CMi4160 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 94193A0303000001 in all CMi4160 modules with internal antenna and to 94193A0304000001 in all CMi4160 modules with external antenna.

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 CMi4160 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 – CMi4160 supports seven different message formats: Standard, Compact, JSON, Scheduled-Daily redundant, Scheduled - Extended, Combined heat/cooling and Scheduled Extended+. Please refer to the CMi4160 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 – CMi4160 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 CMi4160 is able to transmit messages on the LoRaWAN network, device information needs to be added to the network server. More specifically, the following parameters need 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.

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.

SIMPLIFIED DECLARATION OF CONFORMITY

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

EU:

- 2014/53/EU (RED)
- 2014/30/EU (EMC)
- 2014/35/EU (LVD)
- 2011/65/EU + 2015/863 (RoHS)

UK:

- 2017 No. 1206
- 2016 No. 1091
- 2016 No. 1101
- 2012 No. 3032

The complete Declaration of Conformity can be found at www.elvaco.se/en > Search on product.

CONTACT INFORMATION

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TECHNICAL SPECIFICATIONS

Mechanics

Dimensions	63 x 50 x 15 mm
Weight	19 g
Mounting	In module slot of Diehl Sharky heat meter
External antenna connector	MCX

Electrical connections

Supply voltage	Battery, lifetime up to 11 years

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 sensivity	-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

Green LED	Start-up / reboot / switch-off indicator
Red LED	Supercap indicator
Push button	Start-up / reboot / switch off module
Configuration	NFC via Elvaco OTC app or downlink data

Approvals

EMC	EN 301 489-1, EN 301 489-3
LoRa Alliance	LoRaWAN® Certified