

User Manual



MC55i-Q

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1 General

These instructions enable the safe and efficient handling of the product. The instructions are an integral part of the product and must be kept accessible at all times to installation, commissioning and operating personnel.

1.1 Warranty provisions

Unauthorized use, non-observance of this documentation, the use of insufficiently qualified personnel and unauthorized modifications exclude the manufacturer's liability for resulting damages. Any modification to the device will void the manufacturer's warranty. The provisions of our General Terms of Sale (AGB) apply. These can be found on our website (www.mc-technologies.net/en/terms-and-conditions.php)

2 Safety

The Safety section provides an overview of the safety instructions to be observed when operating the product.

The product has been constructed in compliance with the current valid rules of technology and is safe to operate. It has been tested and has left the factory in perfect condition in terms of safety. In order to maintain this condition during the operating time, the information in the applicable publications and certificates must be observed and followed.

The basic safety instructions must be strictly maintained when operating the product. In addition to the basic safety instructions, the individual sections of the documentation contain descriptions of procedures and operating instructions with specific safety information.

Furthermore, the local guidelines for the prevention of accidents and general safety regulations for the area of application of the device should be applied.

Only the consideration of all safety instructions enables the optimum protection of personnel and the environment against hazards as well as the safe and trouble-free operation of the product.

2.1 Technical limiting values

The product is exclusively intended for use within the technical limits specified in the data sheets. The following limit values must be observed:

- The surrounding temperature limits must not be exceeded or dropped below.
- The supply voltage range must not be violated under or above.
- The maximum air humidity must not be exceeded and condensation must be avoided.
- The maximum switching voltage and the maximum switching current load must not be exceeded.
- The maximum input voltage and the maximum input current must not be exceeded.

2.2 Obligations of the operator

The operator must always observe the national regulations applicable in his country regarding the operation, functional testing, repair and maintenance of electronic devices.

2.3 Qualification of personnel

Installation, commissioning and maintenance of the product may only be carried out by trained personnel authorised by the system operator. The qualified personnel must have read and understood this documentation and follow the instructions.

The electrical installation and commissioning of the product may only be carried out by a person who, due to his or her specialist training, knowledge and experience as well as knowledge of the relevant standards and regulations, is able to carry out work on electrical systems and independently detect and avoid possible hazards.



2.4 Guidelines for transport and storage

The following instructions must be observed:

- Do not expose the product to moisture or other potentially harmful environmental conditions (radiation, gases, etc.) during transport and storage. Pack the product properly.
- Pack the product so that it is protected from shocks during transport and storage, e.g. by using air-cushioned packaging.
- Before installing the product, check it for possible damage that may have been caused by improper transport or storage. Damage in transit must be noted on the shipping documents. All claims for damages must be made immediately and before installation to the carrier / company responsible for storage.

2.5 Labels on the product






The type plate of the product is located as a sticker on one surface of the product. It may contain the following markings, among others, which are explained in more detail here.

	Dispose of old equipment in an environmentally responsible manner This symbol indicates that old devices must be disposed of separately from residual waste at suitable collection points. See also the disposal section in this manual.
	CE-label By affixing the CE marking, the manufacturer confirms that the product complies with the product-specific applicable European regulations.

2.6 Environmental protection

Dispose the product and its packaging in accordance with the relevant environmental protection regulations. Refer to the disposal section of this manual for instructions on how to dispose the product. Separate the packaging components made of cardboard and paper as well as plastic and recycle them using the appropriate collection systems.

2.7 Basic safety requirement

	<p>Electrostatic discharges can damage the product! Damage the product. Observe the general precautions for handling electrostatically sensitive components.</p>
	<p>Moisture and liquids from the surrounding area can get inside the product! Risk of fire and damage to the product. The product must not be used in wet or humid environments or in the immediate vicinity of water. Install the product in a dry place protected from splashing water. Turn off the power before performing any work on a device that has been exposed to moisture.</p>
	<p>Short circuits and damage due to improper repairs and modifications and opening of maintenance areas! Risk of fire and damage to the product. It is not permitted to open the product for repair work or modifications beyond the removal and insertion of the plug-in cards provided for this purpose.</p>
	<p>Overvoltage and voltage peaks from the power supply system! Fire hazard and damage to the device due to overvoltage. Install a suitable surge protection.</p>
	<p>Distance between antennas and persons! Too small distance between mobile phone antennas and people can affect their health. Please note that the mobile phone antenna must be at least 20 cm away from persons during operation.</p>

3 Content

The package includes the accessories listed below. Please check that all accessories listed are included in your box. If a part is missing or damaged, please contact MC Technologies directly.

- MC55i-Q
- Quick Installation Guide

Optional accessories are not included. Among others, the following parts are available at MC Technologies:

- DIN Mount Clip-in for DIN Rail
- DIN Rail
- GSM (LTE)-Antenna
- Power supply

4 Technical specifications

The following specifications apply to all versions of the MC55i-Q. If these variants differ from one another, the different values are indicated separately.

4.1 Technical Data

4.1.1 Physical properties

Physical characteristics	Value
Supply Voltage	8 V ... 30 V DC
Dimensions (W x H x D)	74 x 33 x 65mm
Operation temperature	-20°C to +70°C
Housing	Plastic

The extended temperature range allows temporary operation at increased temperatures. This may result in functional restrictions (especially during data transmission). This serves to protect the internal electronics.

4.1.2 Mobile network features

Technological feature	Description
Supporting networks	LTE Cat M1: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26/B27/B28/B66/B85
	LTE Cat NB2: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B28/B66/B71/B85
	GSM/EDGE: 850/900/1800/1900 MHz
Transmission rates LTE-M	Cat M1: Up to 1119 kbps upload and 588 kbps download
Transmission rates NB-IoT	Cat NB2: Up to 158.5 kbps upload and 127 Kbps download Cat NB1: Up to 70 kbps upload and 32 kbps download
Transmission rates EDGE	Up to 236.8 kbps upload and 296 kbps download
Transmission rates GPRS	Up to 85.6 kbps upload and 107 kbps download
Antenna connections	SMA (female)

5 Installation

The MC55i-Q is a series of multi-mode LPWA modem supporting LTE Cat M1/Cat NB2/EGPRS and integrated GNSS.

Please follow the instructions step by step and configure the settings for the SIM card. An incorrect PIN can lead to the SIM card being blocked.



Warning: user must be at least 20 cm away from the transmitting antenna during device long-term operation.

5.1 Antenna

Mount the supplied antenna on the SMA connector of the MC55i-Q. Check whether there is sufficient local network coverage from your mobile phone provider.

5.2 Power supply

The MC55i-Q is operated with a supply voltage of 8 - 30V DC. Please connect an external DC power supply with an output voltage of 8 - 30V DC to the power supply socket.

Please connect the power supply unit to the power supply or switch on the power supply.

5.3 Configuration via Putty

1. In Putty, "Serial" as a Connection type.
2. Choose the right Serial port for your USB-Serial connector.
3. Set the speed to "115200".
4. Expand the connection tab on the right side, then under "SSH" click on "Serial".
5. Set "Flow control" to "None"

5.4 Configuration via STTY

You can use "stty" to configure your "tty" and connect to the Modem using "cat" and "echo".

1. Using Command Prompt, give the command:

```
stty -F /dev/ttyUSB0 -crtcts 115200 cs8 -cstopb -parenb -echo -echon1
```

2. Execute `cat /dev/ttyUSB0` in one terminal and `echo "AT+CSQ" >/dev/ttyUSB0` in another.

5.5 Configuration via Minicom

You can use the Linux command line tool minicom to connect to the MC55i-Q.

- 1 Using Command Prompt, give the command:

```
minicom --device /dev/ttyUSB0 --baud 115200,8,N,1
```

- 2 Disable flow control by pressing CTRL+A followed by O to get into configuration. Then go down to "Serial port setup", press "Enter" to enter and press "F" do toggle "Hardware Flow Control"

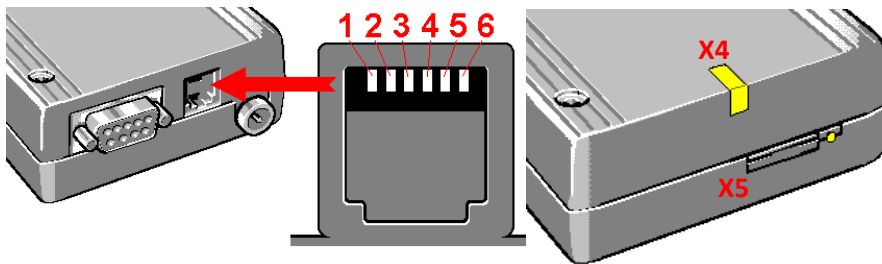
The Modem will now respond to AT-Commands.

5.6 Configuration via C/C++

The following snippet should help you in order to get a connection to the modem:

```
Portname = "/dev/ttyUSB0";
serial_port = open(portname, O_RDWR);
// Check for errors
if (serial_port < 0) {
    fprintf(stderr, "Could not open %s: %s\n", portname, strerror(errno));
    exit(EXIT_FAILURE);
}
// Create new termios struc, we call it 'tty' for convention
struct termios tty;
memset(&tty, 0, sizeof tty);
// Read in existing settings, and handle any error
if (tcgetattr(serial_port, &tty) != 0) {
    fprintf(stderr, "Error %i from tcgetattr: %s\n", errno, strerror(errno));
    fprintf(stderr, "Could not get options for modem connection%s\n", portname);
    exit(EXIT_FAILURE);
}
tty.c_cflag &= ~PARENB; // Clear parity bit, disabling parity
tty.c_cflag &=
~CSTOPB; // Clear stop field, only one stop bit used in communication
tty.c_cflag |= CS8; // 8 bits per byte
tty.c_cflag &= ~CRTSCTS; // Disable RTS/CTS hardware flow control
tty.c_cflag |=
CREAD | CLOCAL; // Turn on READ & ignore ctrl lines (CLOCAL = 1)
tty.c_lflag &= ~ICANON;
tty.c_lflag &= ~ECHO; // Disable echo
tty.c_lflag &= ~ECHOE; // Disable erasure
tty.c_lflag &= ~ECHONL; // Disable new-line echo
tty.c_lflag &= ~ISIG; // Disable interpretation of INTR, QUIT
and SUSP
tty.c_iflag &= ~(IXON | IXOFF | IXANY); // Turn off s/w flow ctrl
tty.c_iflag &= ~(IGNBRK | BRKINT | PARMRK | ISTRIP | INLCR | IGNCR | ICRNL); // Disable
any special handling of received bytes
tty.c_oflag &= ~OPOST; // Prevent special interpretation of output bytes (e.g. // newline
chars)
tty.c_oflag &= ~ONLCR; // Prevent conversion of newline to carriage return/line feed
tty.c_cc[VTIME] = 10; // Set timeout, returning as soon as any
// data is received.
tty.c_cc[VMIN] = 0;
// Set in/out baud rate to be 115200
cfsetispeed(&tty, B115200);
cfsetospeed(&tty, B115200);
// Save tty settings, also checking for error
if (tcsetattr(serial_port, TCSANOW, &tty) != 0) {
    fprintf(stderr, "Error %i from tcsetattr: %s\n", errno,
strerror(errno));
    fprintf(stderr, "Could not set options for modem connection %s\n", portname);
    exit(EXIT_FAILURE);
}
```

6 Ports, display and operating elements



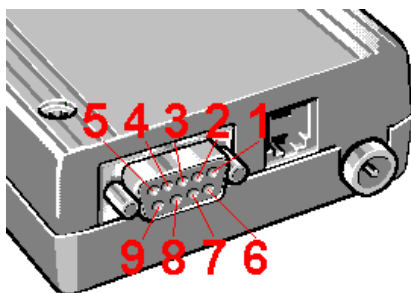
Port	Description
X1	RS232 Male DB9 Serial port connected directly to Module UART interface
X2	Power Power (RJ-11 connector)
X3	ANT SMA antenna
X4	LED Status LED
X5	SIM Sim Card holder

6.1 Power Supply

Connection to an AC power supply must be made by using a suitable power supply unit. The DC voltage must be between 8 and 30V, typical supply voltage is 12V.

Port	Signal	Description
1	Supply in	Supply in (8...30V)
2	dnc (IN)	Reserved, internally connected, must not be connected!
3	PD_IN	Not Connected
4	IGN (IN)	Ignition
5	dnc (IN)	Reserved, internally connected, must not be connected!
6	GND	Ground

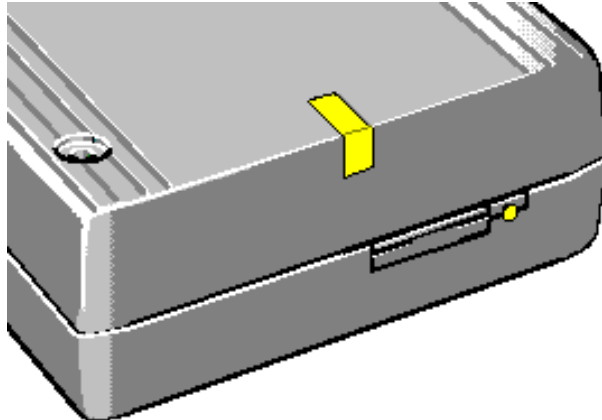
6.2 RS232



Standard DSUB-9 female connector for RS232 communication.

Port	Signal	Description
1	DCD (out)	Data Carrier Detect
2	RXD (out)	Receive Data
3	TXD (IN)	Transmit Data
4	DTR (IN)	Data Terminal Ready
5	GND	Ground
6	DSR (out)	Data Set Ready
7	RTS (IN)	Request To Send
8	CTS (out)	Clear To Send
9	RI (out)	Ring Indicator

6.3 LED Indicators



Logic Level Changes	Network Status
Brighting Red	Booting
Short flicker (200 ms High/1800 ms Low)	Network searching
Long flicker (1800 ms High/200 ms Low)	Idle
Flicker quickly (125 ms High/125 ms Low)	Data transfer is ongoing
Always high.	Calling

7 AT Commands

7.1 AT commands for SIM presence and status

7.1.1 SIM Presence

1. Enable the extended error codes to get a verbose format:

```
AT+CMEE=2
OK
```

2. Now get the status of SIM presence:

```
AT+cpin?
+CME ERROR: SIM not inserted
```

Above AT command response indicates that SIM card is not present.

3. Verify that SIM is inserted properly and check again:

```
AT+cpin?
+CPIN: READY
OK
```

When the SIM card is ready, above AT response will be received from the module.

7.1.2 SIM PIN Status

1. Get the status of SIM PIN:

```
AT+CPIN?
```

Pin status can be:

- READY: SIM PIN is already unlocked or lock has been disabled.
 - SIM PIN: This means SIM PIN is locked and code is required.
 - SIM PUK: Maximum number to retries to unlock has reached. PUK code is required from network provider
2. If SIM PIN is required enter the following command to unlock the SIM:

```
AT+CPIN="XXXX"
```

Enter the SIM PIN instead of XXXX

7.2 Send SMS using AT commands

7.2.1 Setting up the device

- Activate SMS text mode using the following command:

```
AT+CMGF=1
```

- In text mode there are some additional parameters that can be set. Using the following command, we can read the current values:

```
AT+CSMP?
```

The device will respond with a string like this:

```
> +CSMP: 1,169,0,0  
> OK
```

The first value is a combination of some option bits:

bit 7	RP	Reply path, not used in text mode
bit 6	UDHI	User Data Header Information
bit 5	SRR	Set this bit to request a delivery report
bit 3,4	VPF	Validity Period, set b4=1 if a VP value is present
bit 2	RD	Reject Duplicates, do not return a message ID when a message with the same destination and ID is still pending
bit 0,1	MTI	Message Type Indicator b1=0 & b0=0 -> SMS-DELIVER b1=0 & b0=1 -> SMS-SUBMIT

Bit 0 of the message is always set when sending messages (SMS-SUBMIT). So, the first value should be 1 or higher. The second parameter sets the Validity Period of the message. This value is encoded as follows:

0 - 143	(VP + 1) x 5 minutes
144 - 167	12 Hours + ((VP-143) x 30 minutes)
168 - 196	(VP-166) x 1 day
197 - 255	(VP-192) x 1 week

The third parameter contains the PID (Protocol Identifier). This parameter is only used for advanced messaging. The fourth parameter contains the DCS (Data Coding Scheme). This parameter is used to select the character set/message type. When setting the DCS parameter to '0' standard 7-bit text is sent. When setting this parameter to '16' the message is sent as a flash message.

To send a message with a validity period of 1 day, the parameters have to be set like this:

Bit 0 and 4 of the first field has to be set, so the first value will become $1 + 16 = 17$.

Send the following command to the modem to set these parameters:

```
AT+CSMP=17,167,0,16
```

If the modem responds with "OK", the modem is ready to send (flash) text messages with a validity period of 1 day.

7.2.2 Sending the message

- To send the SMS message

```
AT+CMGS="+4917604069083"
```

- Replace the above phone number with the wanted phone number. The device will respond with:

```
>
```

- Type the message text and send the message using the <CTRL>-<Z> key combination:

```
> Test! <CTRL-Z>
```

```
<wait>
```

```
> +CMGS: 62
```

```
Message was sent correctly
```

7.2.3 Sending a Unicode SMS message

To check whether your device supports this mode, just type the following command:

```
AT+CSCS=?
```

This command displays the code pages supported by the device. The device will respond like this:

```
+CSCS: ("IRA","GSM","UCS2")
```

If this string contains "HEX" or "UCS2", Unicode seems to be supported. To specify that you will use a UCS2 string to send the message, set the codepage to "UCS2" depending on the device response. In our example we will set the device to "UCS2":

```
AT+CSCS="UCS2"
```

Next, specify the correct DCS (Data Coding Scheme) for Unicode messages, which is 0x08. Set this value by changing the fourth parameter of the AT+CSMP command to '8':

```
AT+CSMP=1,167,0,8
```

The device is now ready to send messages as Unicode.

8 Maintenance, repair and troubleshooting

9.1 Maintenance

The product is maintenance-free and requires no special regular maintenance.

9.2 Troubleshooting

If a fault occurs during operation of the product and you need assistance, please contact MC Technologies support. You can reach our support department by e-mail at support@mc-technologies.net.

9.3 Repair

Send defective products with a detailed error description to:

MC Technologies GmbH, Kabelkamp 2, 30179 Hannover

Before shipping the device:

- Call our support team and ask for an RMA (Return to Manufacturer Authorisation) number.
- Remove possibly inserted SIM cards.
- Back up the configurations on the device and any other data stored on it.
- Back up any applications running on the device.

It is not permitted to open the product for repair work or modifications.

9 Disposal

10.1 Return of the old equipment

In accordance with WEEE regulations, the return and recycling of old MC Technologies equipment for our customers is regulated as follows:

Please send your old devices carriage paid to the following address:

**MC Technologies GmbH
-Entsorgung-
Kabelkamp 2
30179 Hannover**