# *MIVO* CONNECT

## MANUAL ENGLISH
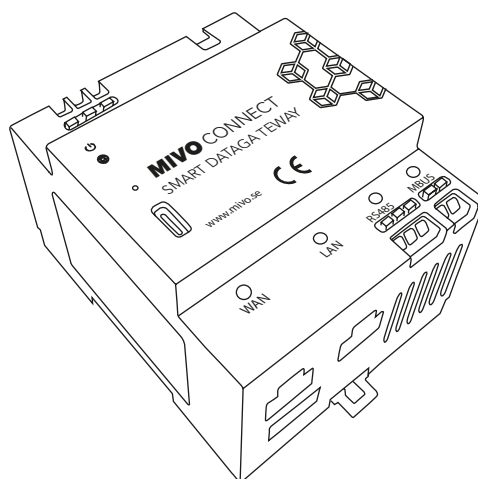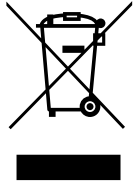
# Content

# Important Notes

All information contained in this manual is based on the time of publication and in subject to change without prior notice. It's always recommended to download the latest manual from www.mivo.se/doc.

**EU Waste Electrical and Electronic Equipment (WEEE) Directive**

This Symbol on the product indicates that this product should not be treated as household waste. Instead, it should be taken to an applicable collection point for the recycling of electrical and electronic equipment. If the product is disposed correctly the recycling of materials will help to conserve natural resources. For more information about recycling this product, please contact your local city office, your household waste disposal service or the distributor where you purchased the product. Please also make sure to separate the packaging and dispose this in accordance with local guidelines.

# Symbols

The warning symbol is used to mark information that is of high importance for safe operation, to avoid damage to the product and/or risk of losing data.

The high voltage sign indicates a location or section where hazardous voltage might be present and extra precaution is necessary to avoid serious injury or death.

# Safety Information

Make sure to read and understand this manual before installing, operating, or servicing an installation containing a MIVO Connect. MIVO Technology AB assumes no liability for customer's failure to comply with these precautions.

Installation should be performed by a qualified electrician in accordance with local electrical standards.

This equipment design typically applies to commercial or industrial equipment expected to be installed in locations where only adults are normally present.

# Introduction

The MIVO Connect is a smart data gateway, its primary use is to collect data from local sensors using any of its built-in interfaces or externally connected interfaces and pass this information to one or more local or cloud-based systems. On top of this the device adds additional value by storing the data, monitoring the local sensors and simplifying troubleshooting and administration.
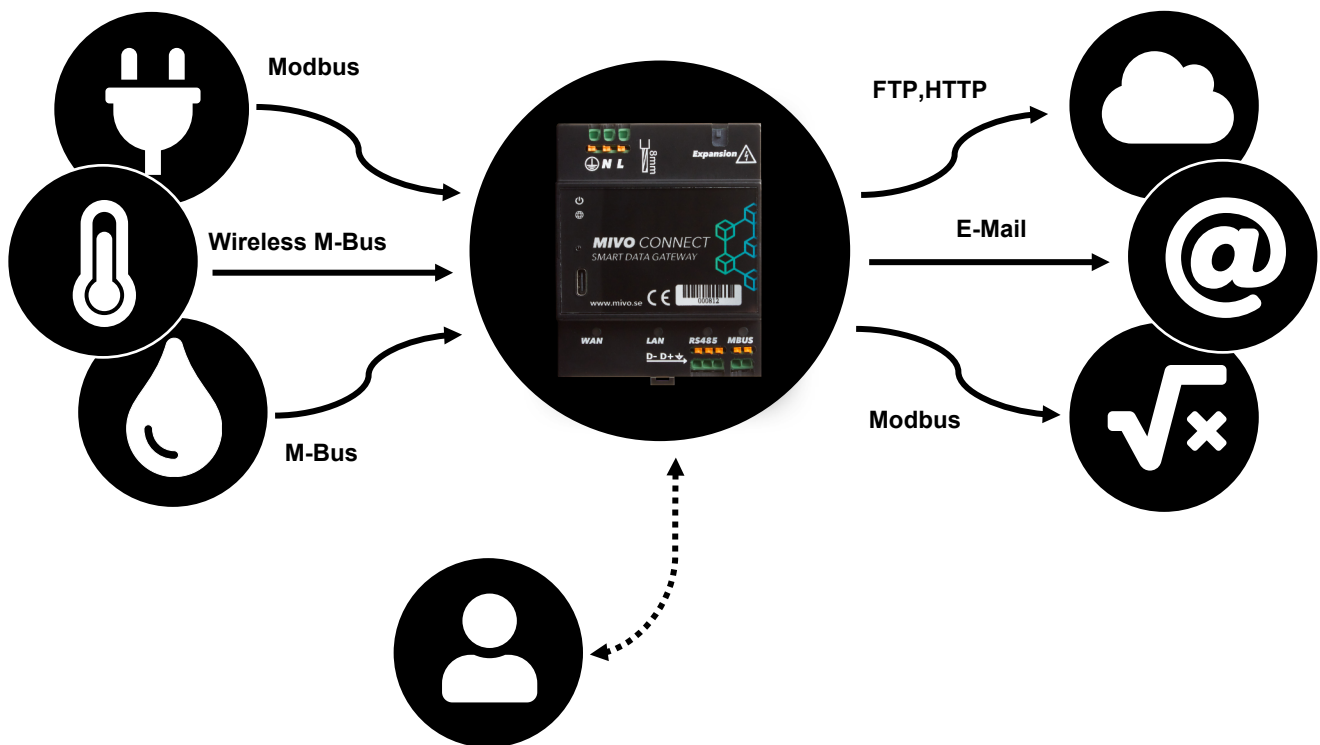


*Figure 1 Basic concept*

# Installation

## Device Overview
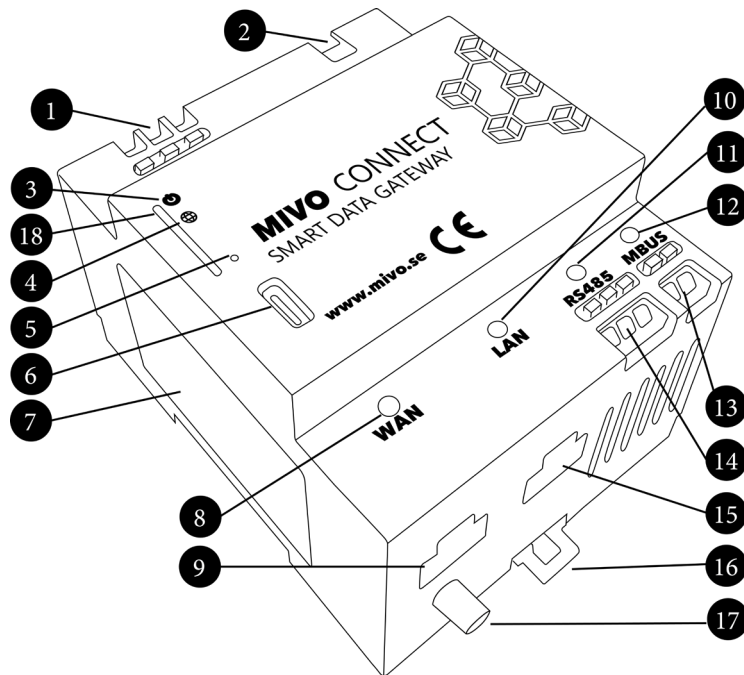


*Figure 2 Product description*

1. Mains connection terminals for 230V 50Hz (0.75 to 1.5mm$^2$, peel 8mm)
2. Connector for additional expansions (Contains hazardous voltage)
3. Combined power and status LED
4. Network connection status
5. Factory reset button
6. USB-C port (for user interface)
7. Product information label
8. WAN link status LED
9. WAN ethernet port
10. LAN link status LED
11. RS485 RX (green), TX (orange) LED
12. MBUS RX (green), TX (orange), error(red) LED
13. MBUS connection terminal (0.2 to 1.5mm$^2$, peel 8mm)
14. RS485 connection terminal (0.2 to 1.5mm$^2$, peel 8mm)
15. LAN ethernet port
16. DIN rail fixing latch
17. LTE antenna connection SMA (optional)
18. SIM Card slot (optional)

# LED Description

**Combined power and status LED**

| Color | Description: |
|---|---|
| **Solid Red** | Serious failure, please contact MIVO support. |
| **Solid Green** | System operating successfully |
| **Red / Green blink** | System is booting up (should take around 1-2 minutes) |
| **Solid Blue** | System is operating in configuration mode |
| **Red blink** | Serious failure, please contact MIVO support. |

**Internet connection status**

| Color | Description: |
|---|---|
| **Solid Red** | No WAN Link |
| **Solid Green** | WAN connected and IP address acquired |
| **Solid Blue** | Connected via LTE. |
| **Blinking Red** | Unit is acquiring an IP address, please see the chapter about Troubleshooting if this happens for a prolonged time. |

**WAN / LAN link status LED**

| Color | Description: |
|---|---|
| **No light** | No link |
| **Green** | Link Found |
| **Flashing Green** | Ethernet communication |

**RS485 RX(green)/TX(orange)**

| Color | Description: |
|---|---|
| **No light** | No communication on interface |
| **Flashing Green** | The product is receiving data on the RS485 interface (RX) |
| **Flashing Orange** | The product is transmitting data on the RS485 interface (TX) |
| **Solid Green** | Connection failure, there is some issue with the RS485 connection |

**MBUS RX(green)/TX(orange)/error(red)**

| Color | Description |
|---|---|
| **No light** | No communication on the interface |
| **Flashing Green** | The product is receiving data from a slave on the MBUS interface (RX) |
| **Flashing Orange** | The product is transmitting data to a slave on the MBUS interface (TX) |
| **Short red flash** | No load detected on the MBUS line, during communication this would indicate a collision. |
| **Solid Red** | Bus overload or short circuit |

# Mounting

The MIVO Connect is designed for indoor use and must be mounted in an electrical enclosure with a suitable IP rating and supported on a DIN-Rail. The Enclosure must cover the power terminals and the expansion connector.

The product must be mounted vertically with terminal connector 1 and 2 in figure 2 facing upwards, no other rotation is allowed.

Always allow good ventilation clearances, 40mm above and 20mm below, to prevent it from overheating. Keep other heat generating devices more than 10mm from this product.

**Mounting**

1. Tilt the product up and place the topmost latches on top of the DIN-Rail.
2. Tilt the product down until the bottom latch snaps in place, if necessary use a small screwdriver to pull the latch(item 16 in Figure 2) down.

**Removal**

Make sure power is disconnected before proceeding.

1. Disconnect all cables
2. Pull the bottom latch (item 16 in Figure 2) down with a screwdriver and tilt the product upwards.
3. Lift the device up and then move the product straight out.

# Power

The device must only be used on 230V 50Hz ac mains protected by a fuse of 16A or less, a fuse of 6A is recommended. Power should be connected to the three power terminals (item 1 in Figure 2)  on the top left side of the device. The terminals support cables ranging from $0.75mm^2$ to $1.5mm^2$. A circuit breaker must be installed breaking both Line and Neutral to the device during servicing. Protective Earth must be connected.

**Fixing the Power Cables**

1. Strip 8mm of all 3 wires (the figure on the side of the terminal could be used as length reference).
2. Push down the orange button with a screwdriver, insert the cable with a 45° angle and release the button.
3. Continue with the other two terminals.

**Disconnection of power cables**

Push down the orange button using a screwdriver and pull the cable out before releasing the button.

**Powering The device from USB**

For configuration purposes the device can be powered from the USB port in the front. This is especially useful for configuration before assembly or when no mains power is easily available.

When the device is powered from USB functionality will be limited, the internal M-Bus and module communication is shut down.

# Ethernet

The Product contains two ethernet interfaces, one marked WAN and one marked as LAN

**WAN – Wide Area Network**

This connection is intended for internet connectivity and uses a standard RJ-45 ethernet connector (item 9 in Figure 2) . For heavy industrial use Cat. 5 FTP or better should be used, otherwise Cat. 5 UTP or better is sufficient. If link is found the green LED should light up (item 8 in Figure 2) .

**LAN – Local Area Network**

This connection is intended for local connections and uses a standard RJ-45 ethernet connector (item 15 in Figure 2) . By default, this port will work as a router, providing internet connectivity for all devices connected to this port. For heavy industrial use Cat. 5 FTP or better should be used, otherwise Cat5 UTP or better is sufficient. If link is found the green LED should light up (item 10 in Figure 2).

# LTE (Optional)

**Important! LTE is disabled at delivery; LTE is activated in the web interface under System->Network.**

The MIVO Connect can be purchased with a built in LTE modem which enables connectivity in locations where no fixed internet connection is available.

**SIM Card assembly**
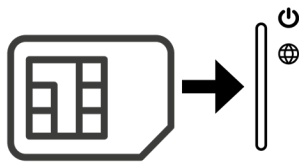


*Figure 3 SIM-Card direction*

1. Insert the SIM card into the slot with the contacts facing right and the notch inwards.
2. Use a flathead screwdriver to push the last millimeters (spring loaded), when correctly inserted the SIM cards edge should be flush with the front.

**SIM Card disassembly**

1. Use a flathead screwdriver to gently push the SIM card inwards a few mm and then release.
2. The SIM Card should pop out sufficiently to grab it and pull it straight out.

**Antenna assembly**

1. Attach the SMA connector and screw the nut clockwise, avoid spinning the whole antenna.
2. Tighten hand tight.

**Antenna disassembly**

1. Rotate the connector counterclockwise.

# RS485

The built in RS485 port is non-isolated and must only be used between products bonded to the same protective earthing with a low resistance path (for example within the same room) and with a maximum cable length of 30 meters. Failure to comply with these recommendations might result in harmful situations.

**Connections**

RS485 is a multidrop balanced bus using two data wires Data+ and Data-, these lines are also often named by A and B but unfortunately this varies between manufacturers and therefore D+ and D- is the preferred naming for these terminals. If unsure, please refer to the other manufacturers documentation to find out what is data+ and data -. If this is not possible there is no damage caused by switching these lines so trial and error will also work. The third connection contains the signal reference level, this must be used with caution as this conductor could carry high currents in the case of an earthing error in any of the nodes on the network.

**2-wire connection**

A two-wire connection (D+ and D-) should be used in situations where all nodes on the network are Non-isolated and connected to the same protective earth with a low impedance path.

**3-wire connection**

A three-wire connection (D+, D- and SC/GND) should be used in situations where all other nodes on the network are isolated from Protective Earth.

The connectivity terminals support $0.2mm^2$ to $1.5mm^2$ cables.

**Fixing RS485 cables**

1. Strip 8mm of all wires.
2. Push down the orange buttons for the rs485 terminals (item 14 in Figure 2) with a screwdriver, insert the cable with a 45° angle and release the button.
3. Continue with the other terminals.

**Disconnection of RS485 cables**

Push down the orange button using a screwdriver and pull the cable out before releasing the button.

# M-Bus

The MIVO Connect features an isolated M-Bus master for 10 M-Bus loads. Typically, one sensor uses one load but there are sensors requiring two or more. The interface is non-polarized (switching the cables will work just as well) and provides both power and communication to the sensors.

The connectivity terminals support $0.2mm^2$ to $1.5mm^2$ cables.

**Fixing M-Bus cables**

1. Strip 8mm of both wires.
2. Push down the orange buttons for the MBUS terminals (item 13 in Figure 2) with a screwdriver, insert any of the two cables with a 45º angle and release the button.
3. Continue with the other cable.

**Disconnection of M-Bus cables**

Push down the orange button using a screwdriver and pull the cable out before releasing the button.

# Expansions

The Expansion interface is used when more interfaces are needed, please consult www.mivo.se for other expansion options.

The Expansion connector contains both high voltage power and communication. Always disconnect power using the circuit breaker before adding or removing any expansion interfaces. Do not extend or tamper with the expansion cables.

The expansion interface is designed to be daisy chained between the interface modules. This means that a maximum of 10 expansion modules could be connected to one MIVO Connect.

**Adding one or more expansion modules**

1. Make sure power is disconnected.
2. Attach the expansion module to the right of the MIVO Connect(item 2 in Figure 2) or the last expansion module using a similar approach as the MIVO Connect. See the chapter Mounting for more information.
3. Connect the expansion cable to the neighboring MIVO Connect or expansion module.
4. Repeat the process if more than one expansion is to be installed
5. Connect the communication terminals, refer to the expansion modules manual for more information.
6. On power-on all expansions will be discovered automatically.

**Removing one or more expansion modules**

1. Make sure power is disconnected.
2. Disconnect the expansion cable towards both neighboring modules by pushing down the leaver and pulling the connector straight out.
3. Remove the expansion modules other connections.
4. Remove the expansion module using a similar approach as the MIVO Connect. See the chapter Mounting for more information.
5. If the module is to be replaced, follow "Adding one or more expansion modules" above.
6. If the module is not the last module all expansion modules must be moved towards the MIVO Connect and the expansion connection re-established.
7. On power-on all expansions will be discovered/removed automatically.

## Factory Reset

⚠ **Following this procedure will reset the MIVO Connect to its factory default values, continuing with this process will erase all settings and data collected.**

Boot the device and wait for the status led to turn Green, Push and hold the factory reset button (item 5 in Figure 2) using a sharp object like a pen or a piece of wire for 20 seconds until the status light starts blinking rapidly red release the button and wait for the device to reboot.

# Operation

# Accessing the device

### Using USB

The USB-C connection (item 6 in Figure 2) typically does not require any special drivers when using windows 10. If you are having problems with this step please refer to the troubleshooting section.

Connect a standard USB-C cable to the front USB-C port of the MIVO Connect and wait for the status led to turn blue. Open your favorite web browser and enter http://192.168.98.1 in the web browser address bar. (Internet explorer is not supported)

### Using LAN

The product could also be accessed using the LAN interface. Please make sure the computers network interface is set to DHCP and automatic selection of DNS servers. Connect to the LAN port and enter http://10.10.10.1 in your favorite web browser address bar. (Internet explorer is not supported)

### Using WAN

The product can as standard also be reached on the WAN port, however this is configurable. Since the ip-address might vary the simplest approach is to use the alternative address described below.

### Alternative address

An alternative way to reach the device is by using its serial number, this is always enabled on USB and LAN interface and is configurable on the wan port.
Go to http://mivo-{serialnumber}.local, for example: http://mivo-9.local for a MIVO Connect with serial number 9.

# Logging in

By default, the Username is "admin" and the password is "admin" its strongly advisable to change this password on the first login.

# Using the wizard

The product contains a wizard that is accessible by a wand in the top right corner of the interface, this wizard is specially designed to guide users through the steps of adding new sensors, delivery schedule and more. This view will open automatically if no sensors are present in the system.

# Help function

The MIVO Connect is equipped with a built-in help functionality that can be reached using the Lifebuoy symbol in the upper right corner of the web interface.
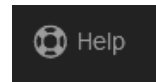
# Licenses

The MIVO Connect uses a software licensing model to enable or disable features, the idea is to provide a feature rich product where the user only pays for the feature they use. Adding more features or more sensors can be done at any time making a MIVO Connect installation flexible and future proof without affecting the cost of a simple installation. Every license is individually created for every device and new features can be added using the web interface.

# Troubleshooting

| Problem | Indication | |
|---|---|---|
| **No Operation** | Status led off | Check power connection. |
| **No Operation** | Status led is solid red | Contact support |
| **No Operation** | Status led is flashing red | Contact support |
| **Cannot access the login page using USB-C** | Status led is green or blue | Check USB connection. Try with a different USB-C cable. Contact support. |
| **Product does not send reports** | Status led is green or blue, Internet status is Green | Check if the report is correctly configured. Test report connectivity Check that the reported group contains meters. |
| **No internet connectivity** | Status is green or blue, Internet status is Green | Make sure the WAN settings are correct. Check internet connectivity between router and internet. Check router firewall setup. |
| | | |

# Support

If you run into problems or have any questions, please don't hesitate to contact us at support@mivo.se

# Technical Specification

| Mechanics | |
|---|---|
| Dimensions (width x height x depth) | 70 x 85 x 57 mm (4 DIN Modules) |
| Weight | 200g |
| Protection class | IP20 |
| **Environmental** | |
| Storage temperature | -25 to +55°C |
| Operating temperature | -25 to +55°C |
| Operating humidity | 5 to 90% non-condensing |
| Max operating altitude | 2000m |
| Pollution degree 2 | 2 |
| Usage environment | Indoors |
| **Connections - Power** | |
| Input voltage | 230Vac ±10%, 50Hz |
| Power consumption (max) | <20W |
| Power consumption (nom) | < 3W |
| Installation / Overvoltage category | CAT 3 |
| Connection terminals | Spring loaded terminals 0.75 – 1.5 mm², strip 8mm. |
| **Connections - Expansion** | |
| Output Power | 230Vac, 2A |
| **Connections - Ethernet (WAN, LAN)** | |
| Connection | RJ45 |
| Cable requirement – Industrial | CAT 5 FTP or better |
| Cable requirement - Other | CAT 5 UTP or better |
| Speed | 10/100 Mbit |
| Duplex | Full / Half |
| **Connections - LTE** | |
| Type | LTE Cat-M |
| SIM Card | Mini-SIM (2FF) |
| Antenna connector | SMA (50Ω) |
| **Connections - RS485** | |
| Type | Non-Isolated |
| Speed | 9600 to 115200 Baud |
| Termination | None |
| Biasing | Weak (1kΩ) |
| Maximum number of nodes | 10 |
| Maximum cable length | 30m |
| Cable | Shielded cable required for Industrial use |
| **Connections - MBUS (EN 13757)** | |

| Speed | 300 / 2400 / 4800 / 9600 |
|---|---|
| Nominal voltage | 30V |
| Addressing | Secondary |
| Unit loads | V1.0*            10<br>V1.1* or later    32 |
| Maximum output current | V1.0*            45mA (peak)<br>V1.1* or later    85mA (peak) |
| Maximum cable length | 1Km |
| Electrical Isolation | 1500V |
| **Connections - General** | |
| USB Host connector type | Type A |
| Front USB connector type | Type C |
| **Other** | |
| Maximum number on sensors | 2000 |
| Storage examples | 100 sensors, hourly values -> 20 years<br>500 sensors, hourly values -> 4 years<br>1000 sensors, hourly values -> 2 years<br>2000 sensors, hourly values -> 1 year |
| Configuration interface | USB-C / LAN (typically no drivers required) |
| Application interface | WEB / HTTP (no software installation) |
| **Approvals** | |
| EMC | EN 61000-6-2, EN 61000-6-3 |
| Safety | EN 62368-1 |
| Environmental | RoHS, WEEE |

* Version refers to hardware version (printed on the devices label)