OUMAN

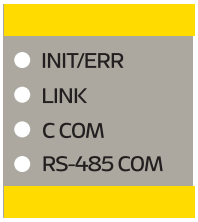
Network adapter with Access function M-LINK

Communication protocols:
- Modbus RTU
- Modbus TCP/IP

M-LINK is a media converter for converting Ouman's Modbus (RTU / TCP) based devices, or those of other manufacturers, to the Ouman system. The device can be linked to an existing internet connection, through which the device creates a secure connection between M-LINK and the Ouman Ounet online monitoring service. If an internet connection is not available, it is possible to use a 3G-MOD4 modem, for example, to establish a ready-to-use connection to the subject. M-LINK can also be used in a local area network without an internet connection.

- An internal WEB user interface for device management: Connected devices are deployed using the Ouflex BA Tool.
- Ethernet connection (DHCP / Fixed IP) with Access function. Access is a service offered by Ouman for creating a secure VPN connection between the device and the Ounet online monitoring service. With the service, the device can also be operated remotely through an internet browser. The service is included in the price throughout the device's life cycle.
- Modbus RTU connection using screw connectors: (Max 10 devices or 2,000 points, RTU + TCP)
- Modbus TCP connection RJ45: (Max 10 devices or 2,000 points, RTU + TCP)
- With a C connector (RJ45), it is also possible to connect (one) Ouman controller (Ouflex M, Ouflex M BA, S203, C203, H23) + GSM Modem when using S203 or C203.
- Possible to make point transfers from one device to another (Modbus RTU / Modbus TCP) (requires the Ouflex BA Tool)

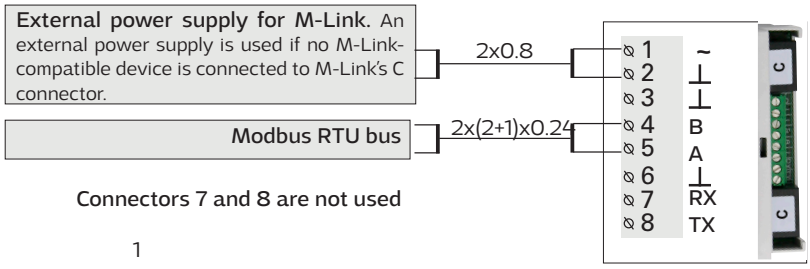
LED functions



LED indicator light	Description of the function
INIT/ERR	• A red indicator light indicates the status of the device. • A red indicator light flashes when the device starts up. • The indicator light goes off when the device has been initialized. • If the indicator light continues to flash, initializing of the M-Link was not successful, or a no response alarm is received from a device in the RTU or C bus.
LINK	• A green indicator light indicates the status of network connection. • When the signal light is off, there is no connection with the LAN. • When the signal light is off most of the time but blinks occasionally, the LAN connection is operational. • When the signal light is on almost constantly but is turned off for brief moments, the Internet connection is operational. • When the signal light is constantly on, the Access connection is operational.
C COM	• When the signal light blinks, M-Link is receiving data from a device connected in the C connector.
RS-485 COM	• When the signal light blinks, M-Link is receiving data from the Modbus RTU bus.

Installation and connections

Installation:
Fixed on a DIN rail.
Commissioning of M-Link's connections:
1. The network cable is connected in M-Link's Ethernet connection.
2. M-Link is connected to the connector of an M-Link-compatible device using a direct RJ45 cable. M-Link's power supply is available at this C connector. The GSM modem of a C203 or S203 device (GSMMOD) is connected to the free C connector. M-Link's terminal strips:



Connectors 7 and 8 are not used

M-Link C connection

These connections are only used with Ouman's own devices fitted with an RJ45 connector. The C connections are identical. You can connect M-Link-compatible Ouman device in one connector and a GSM modem (GSMMOD) in the other for text message communication (C203 and S203 only). When connecting an Ouman device to a C connector, make sure that Access is on (System settings →Network settings → Access "On"). For further information, see p. 4.

C203 or Ouflex C

RJ45 connector

Ouflex M or Ouflex M BA

RJ45 connector

S203 or H23

RJ45-**I** connector

Features
- Connecting an Ouman device to M-Link interfaces, importing network features
- Conversion of the registers to Modbus RTU and TCP/IP buses
- The platform version of a connected Ouman device can be remotely updated
- Downloading applications via an LAN / remote connection
- Process monitoring of devices with a Ouflex C platform
- **The power supply of an M-Link device comes from an Ouman device connected in the C connector**

Supported Ouman devices:
- C203 v.1.5.1 (the older versions must be updated to obtain M-Link support)
- Ouflex C (Platform v. 4.0.0 →)
- Ouflex M (Platform v.1.2.0→)
- Ouflex M BA (Platform v.1.0.0→)
- S203 (v. 1.2.0 →)

Modbus RTU bus

Older Ouman devices, such as EH-203 and EH-105, as well as third-party devices, can be connected via this connection.

Features
- Connecting a device to M-Link interfaces
- Resetting the alarm registers of EH-203 and EH-105 devices via Ounet

Supported devices
- All Ouman devices with MB-RTU support
- All third-party devices with MB-RTU support

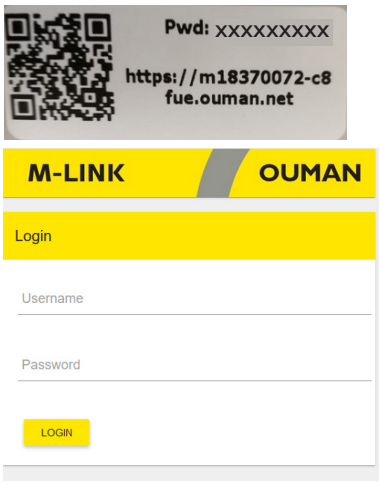
Modbus TCP/IP bus

The devices can communicate with the MB TCP/IP network via this connection (the general network cabling can be utilised).

Features
- Connecting a device to M-Link interfaces

Supported devices
- All Ouman devices with MB-TCP/IP support
- All third-party devices with MB-TCP/IP support

Establishing a browser connection to M-Link



If you have a QR reader, read the QR code in the label on the M-Link device.

Username = service The password is shown in the label at the end of the M-Link device. The password can be changed on the "Update" tab. For further information on browser use, see p. 15

M-Link device in an internal network

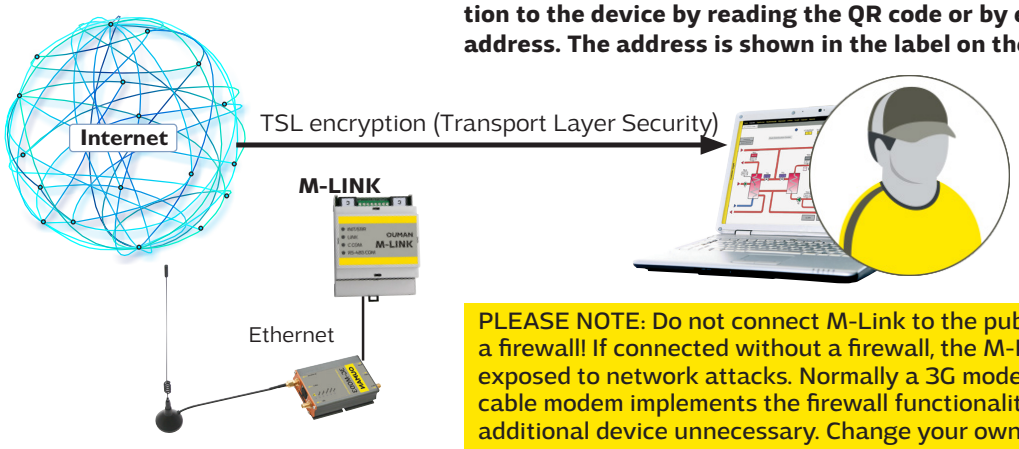
If the device is in an internal network, you can establish a browser connection to the device by reading the QR code or by entering the www address in the label.

The address is in the format https:// and enter then the web address on the label so that the "ouman.net" is replaced by text "ouman.local". For example, https://m00000735-40rxr.ouman.local

If you do not know the www address of the M-Link device, you can find the M-Link device in the LAN using the NetworkDiscovery program. The program is available free of charge from Ouman Oy.

M-Link device in a public network

If the device is in a public network, you can establish a browser connection to the device by reading the QR code or by entering the Access-IP address. The address is shown in the label on the M-Link device.

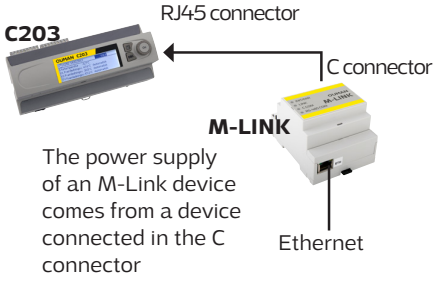


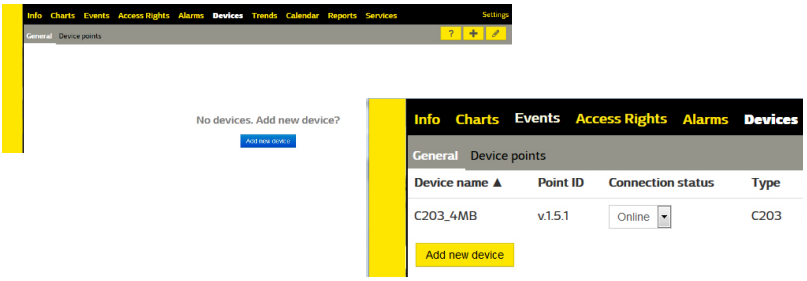
Browser use requires logging in.
The password can be changed.

PLEASE NOTE: Do not connect M-Link to the public Internet without a firewall! If connected without a firewall, the M-Link device can be exposed to network attacks. Normally a 3G modem, an ADSL/WDSL/ cable modem implements the firewall functionality, making a separate additional device unnecessary. Change your own login password.

Ounet connection of an Ouman unit controller

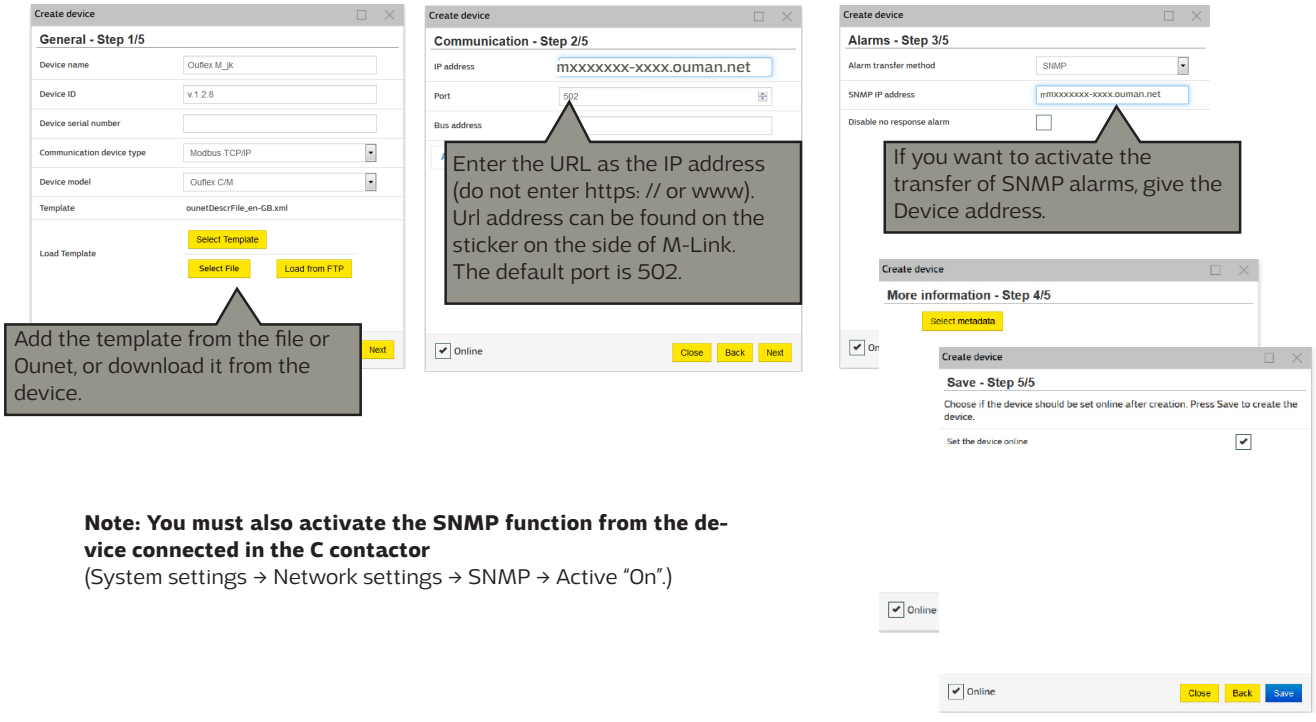
When you want to read the information of one M-Link-compatible device in a browser, connect the device directly to M-Link's C connector. This also allows you to perform a remote update on the device, if required.



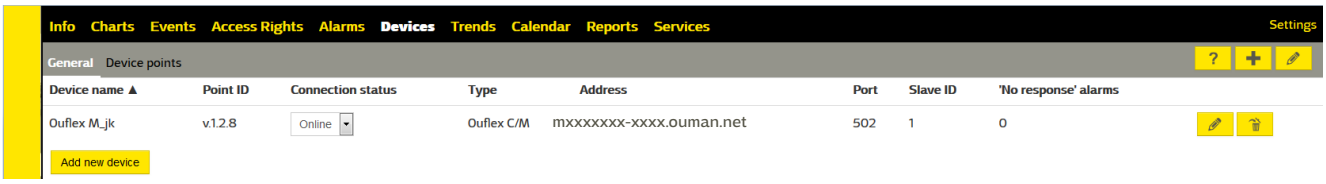


When connecting an Ouman device to a C connector, check in the device's network settings (System settings) that.

- The DHCP setting is "ON" (If you change the setting, select "Update network settings")
- The port address is the same as in Ounet (Modbus TCP/IP → Port 502)
- The Access setting is "ON"
- In SNMP settings, the Access IP address is given as the IP address, and "ON" is selected as the "Function on" setting.



Note: You must also activate the SNMP function from the device connected in the C contactor
(System settings → Network settings → SNMP → Active "On".)



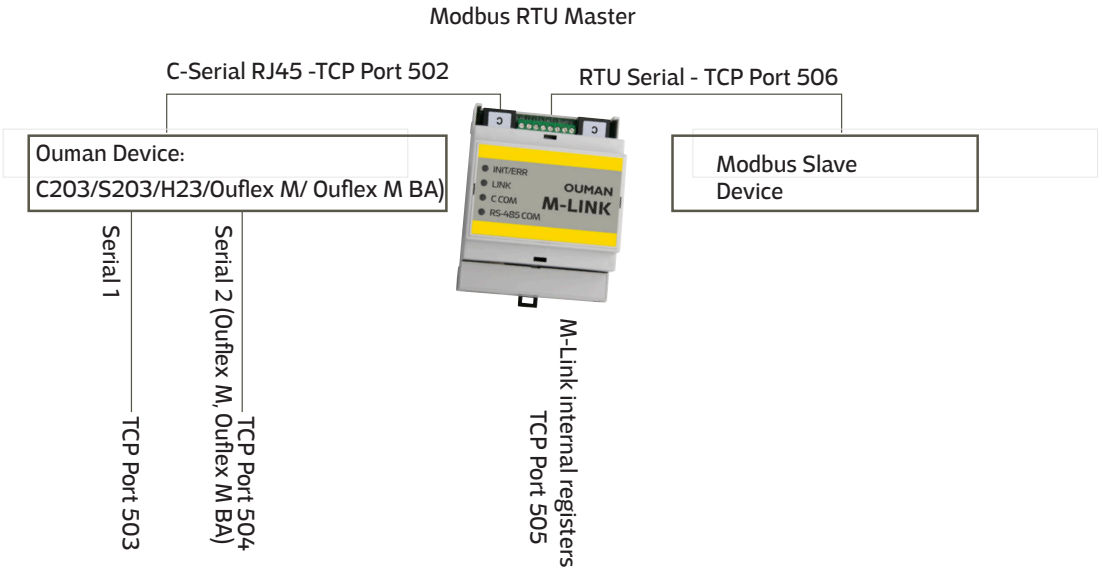
Connecting several devices to M-Link

C bus connector / connectors (RJ45)

- You can only connect one Ouman device to one of the RJ45 connector (Ouflex M / Ouflex M BA, S203, C203 or H23).
- M-LINK receives its operating voltage via the connected device. (An external operating voltage source is not required.)
- The firmware (version) of the device connected via the C bus can be updated remotely, where necessary.
- The application of the device connected via the C bus can be uploaded remotely (Ouflex M BA and Ouflex M, if the Ouflex M device has a memory card in place).
- Through the device connected to the C bus, you can read Modbus devices that have been connected under it as Modus RTU slave devices. (Ports 503 & 504)

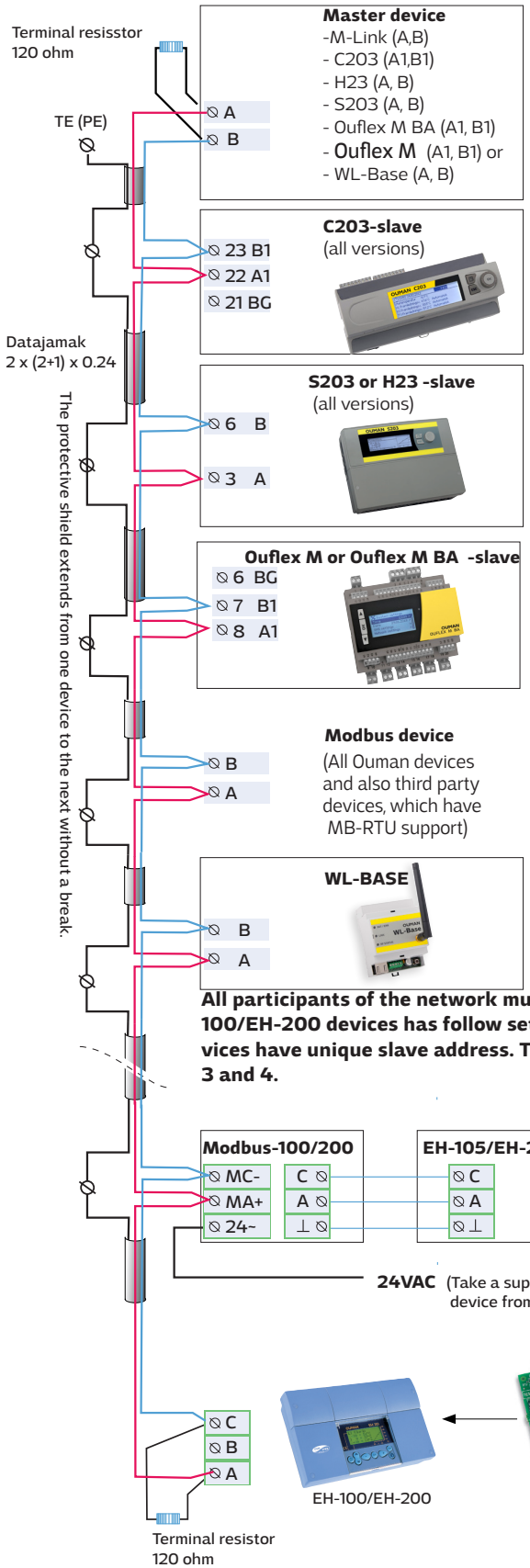
Modbus RTU (screw connectors)

- It is possible to connect several Modbus devices to the RTU bus (max. 10 devices).
- When M-LINK is the Modbus master device, point transfers can be made between the devices.



Modbus RTU wiring diagram

If you want to read the data of several devices using a browser, connect the devices to the RTU bus. You can bring bus devices up to Ounet using the M-Link. We recommend that you connect a maximum of 10 devices to the RTU bus.



Attention! Ouman Ouflex C devices have the following factory default settings:

Modbus slave address 10

Baud rate	**9600**
Data bits	**8**
Stop bits	**1**
Paritity	**None**

If the Modbus-RTU bus has multiple devices, the Modbus slave addresses must be unique.

Do changes to the controller:
Systen settings→ Network settings→ Modbus RTU settings.

A twisted pair cable must be used for network cabling, e.g., Datajamak 2x(2+1)x0.24. The network must be like a chain, with the cable going from one device to the next and stubs are not recommended (max. length of stub 0.5m). The maximum length of the whole network is 1200m. **120 ohm terminating resistors are connected to both ends of the network.** The twisted pair cable's protective shield can be connected if needed in to protective earth in order to eliminate interference. The connection is made only from the other end of the protective shield, e.g., always from the cable leaving the controller.

All participants of the network must have the same baud rate, data bits, stop bits and paritity. EH-100/EH-200 devices has follow settings: data bits 8, stop bits 1 and paritity "None".Be sure that devices have unique slave address. The address of EH-200/EH-105 devices will be set by DIP switches 3 and 4.

DIP1	DIP2	Biasing resistors
0	0	Not in use
1	0	In use

If EH-200/EH-100 is the first or last device in the bus, biasing resistor must be taken into use

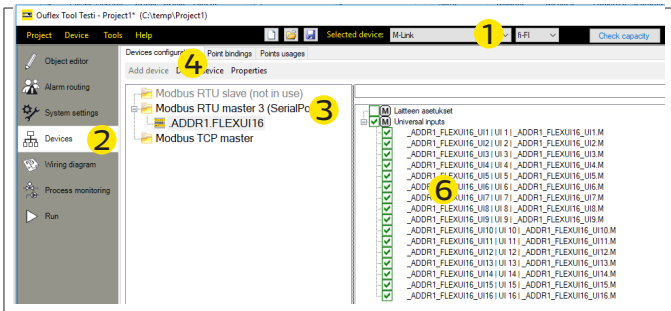
DIP3	DIP4	Baud rate
0	0	4800
1	0	9600
0	1	19200
1	1	38400

DIP switches, 1 = ON

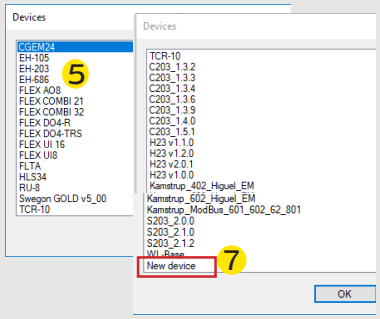
DIP 5					DIP 9 = Address
1	0	0	0	0	= 1
0	1	0	0	0	= 2
1	1	0	0	0	= 3
0	0	1	0	0	= 4
1	0	1	0	0	= 5
...	...	...	...	...	...
1	1	1	1	1	= 31

Connecting a bus device to an M-Link device

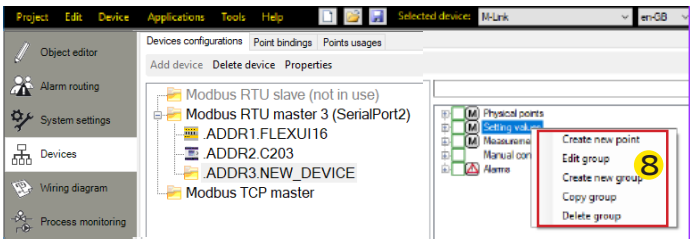
The M-Link device can read the device points of a device connected to its own Modbus/RTU bus. The device points may be physical measurement results, settings, controls etc. The read points can be brought up to Ounet or other SCADA systems or transferred as a point transfer to another device via the TCP/IP bus. The device whose device points are read, is added as a bus device using the OuflexTool.



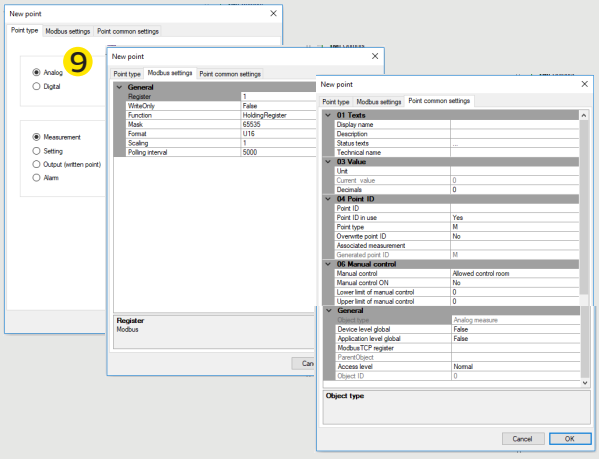
1. Open OuflexTool. Select M-Link.
2. Select “Devices”
3. Select Modbus master (SerialPort2)
4. Select “Add device”.
5. If the device you want to add is on the list, select the device.
6. Just select points from the list of points you want to read



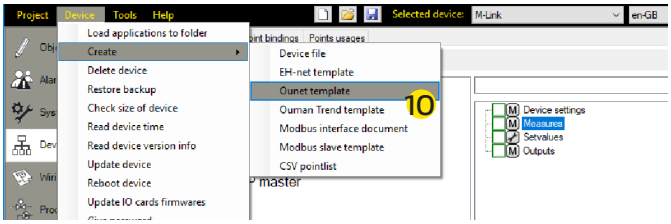
7. If the device cannot be found from the list, select ”New device” → name the device → and enter a unique device address



8. Add the new device’s points to the points list. Create the points for the device by right-clicking a group in the point list.



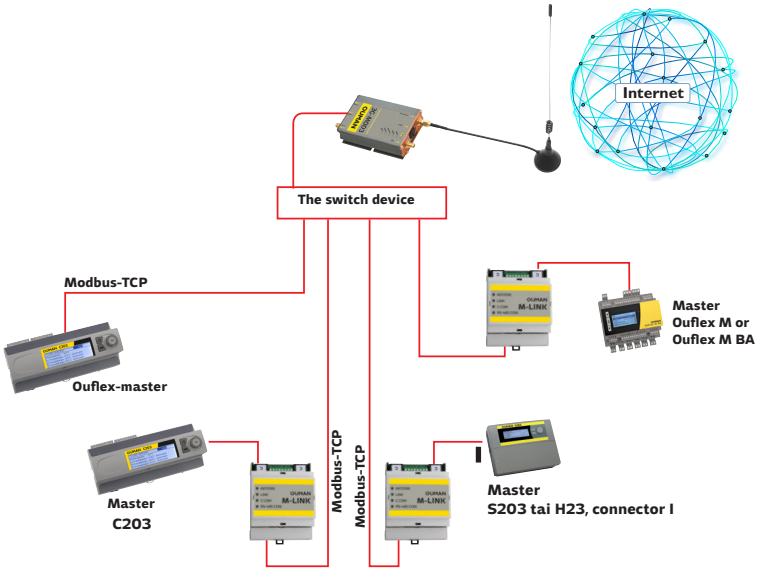
9. Fill out the form data, “Point Type,” “Modbus settings,” and “Point common settings”.



10. When the desired Modbus points have been added, select “Device” tab and then “Create” “ounet template”. The device can now be brought up to Ounet.

Modbus TCP/IP communication

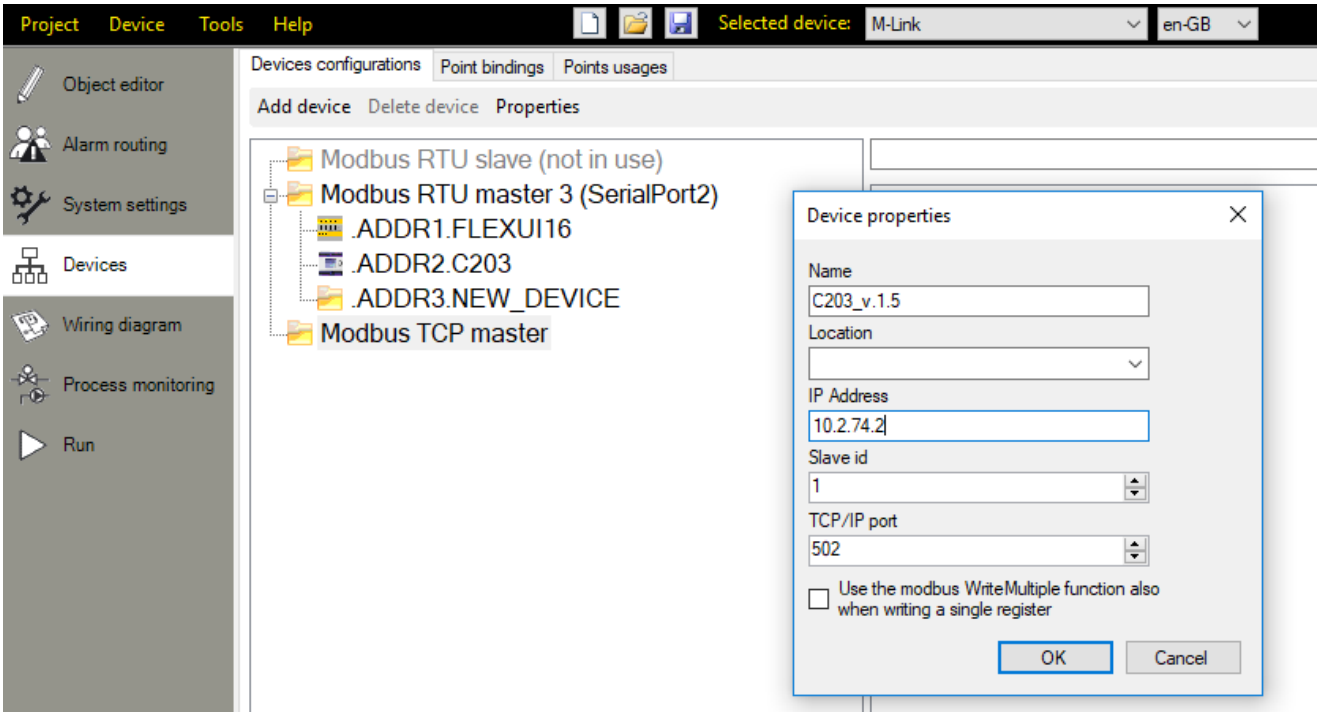
If you want Master devices to communicate with each other, connect the Master devices to the same subnet. This M-Link device works as a slave device. Modbus TCPIP server and client devices must have fixed IP.



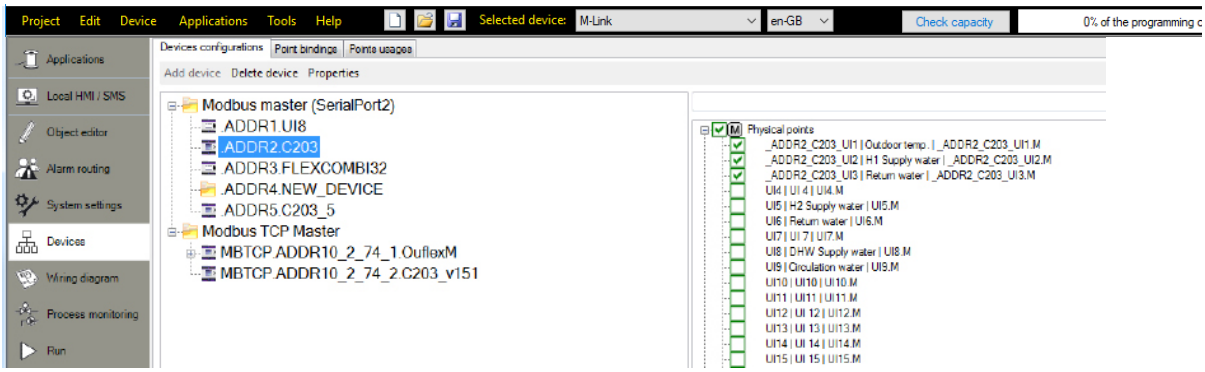
Point transfer from device to another

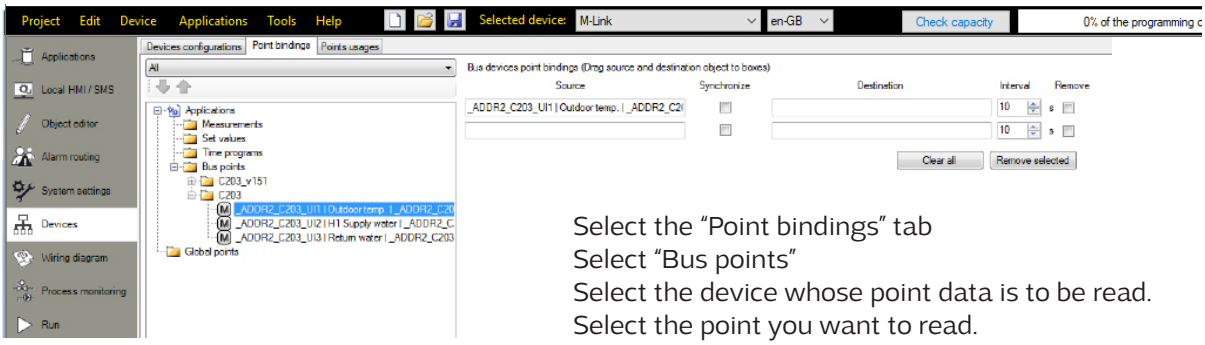
If you want to do the point transfer between devices, connect devices to the bus of the M-Link.

Add a device you want to write or read through the bus. Enter the IP address. You can read the device points of another device. Make a point transfer.

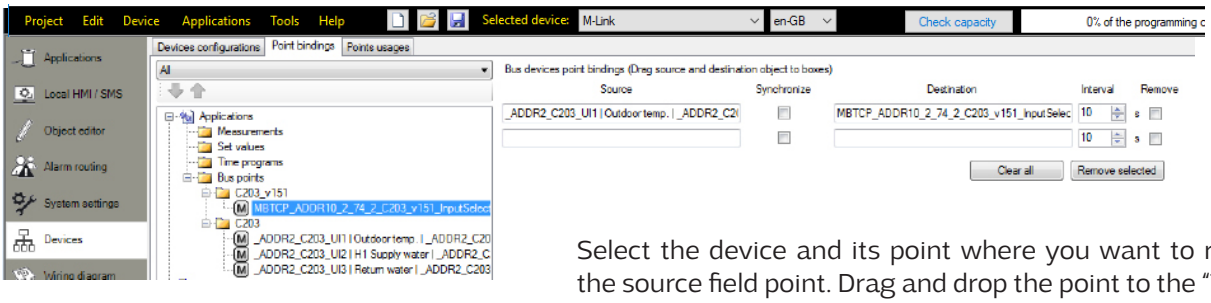


Points are transferred as follows: Select the device whose points are to be imported to M-Link.





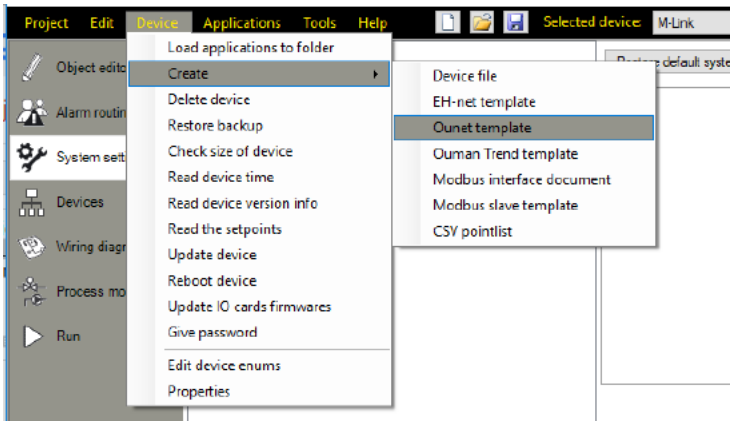
Select the "Point bindings" tab
Select "Bus points"
Select the device whose point data is to be read.
Select the point you want to read.
Drag and drop the point to the "Source" field.

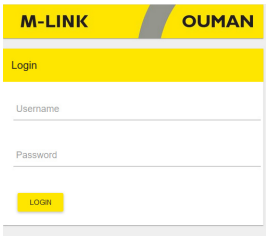


Select the device and its point where you want to read the source field point. Drag and drop the point to the "Target" field.

If you select "synchronize", you can both read and alter the device point (you can alter the value of the point from either device).

Create a template for the M-Link device and add the device to Ounet (see page 4).

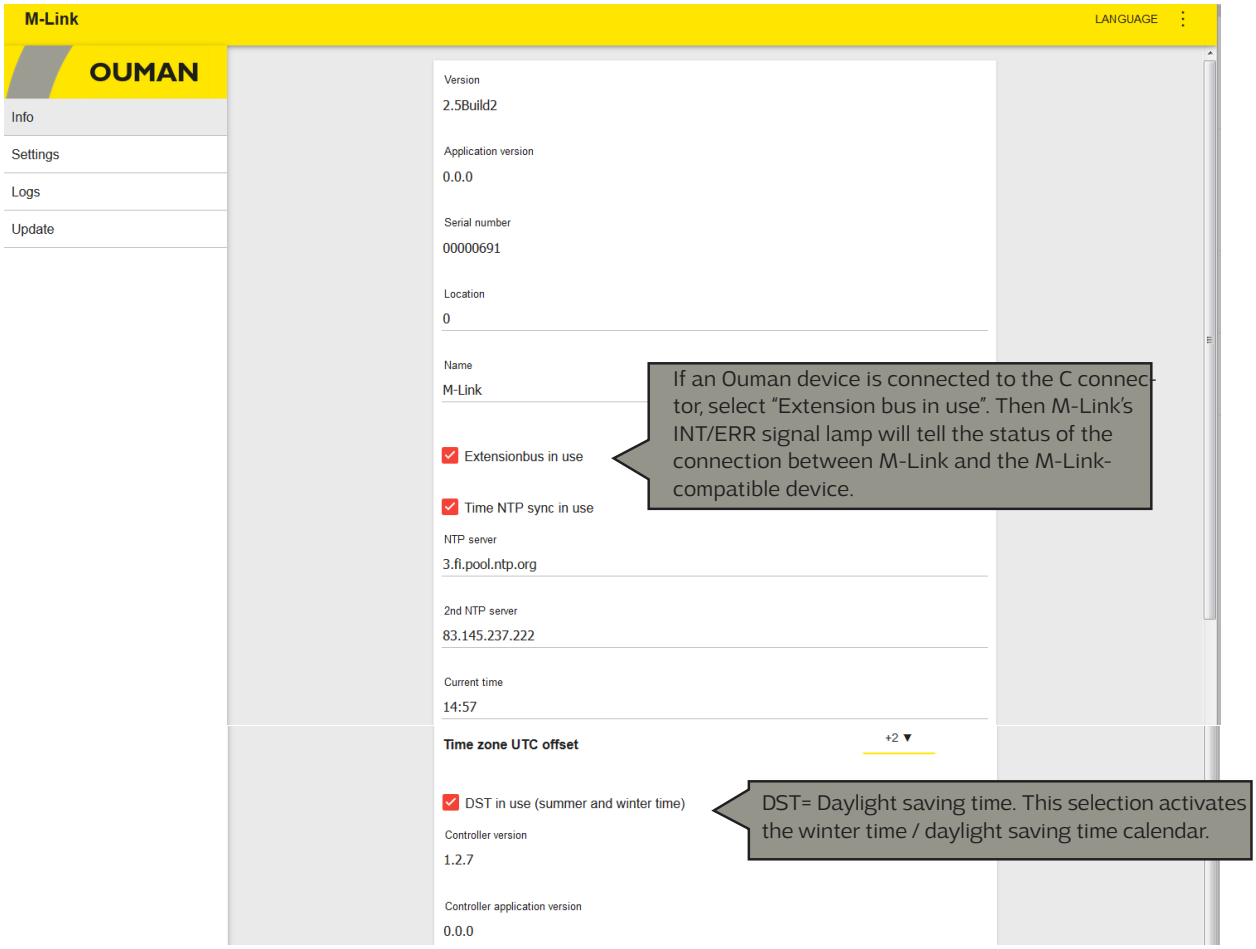




M-Link's web user interface

Log into the browser view (see p. 2).

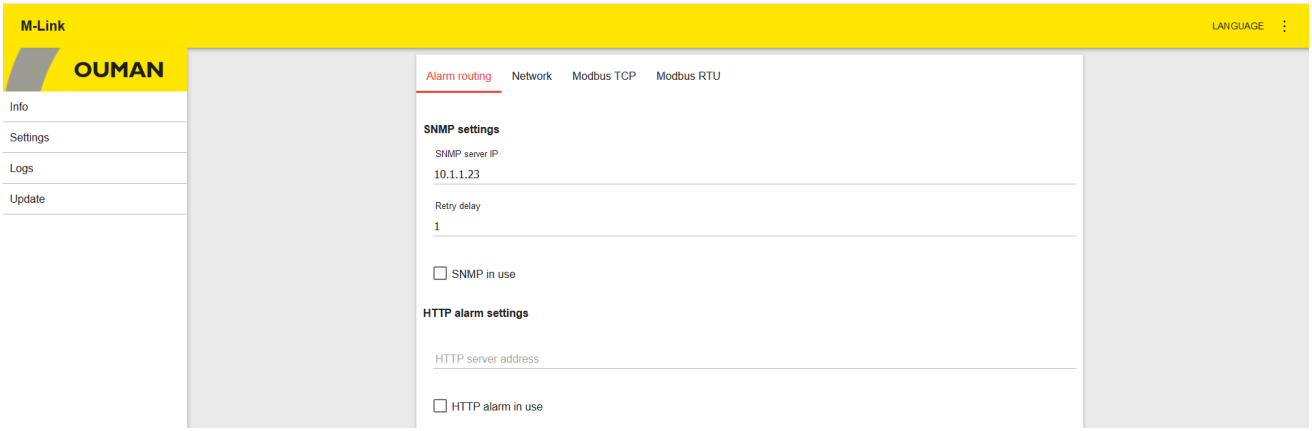
Info



The Info view shows all information on M-Link and the Ouman controller connected to the M-Link via the C connector

Setting	Description
M-Link	
Extension bus in use	Information on the status of device connection of the M-Link-compatible device connected to Oulink's C connector.
Time NTP sync in use	You can choose whether the clock will be synchronised with the time server. When this selection is made, the clock of the Ouman device connected in the C connector will also be updated.
NTP server	The time server to which the time is synchronised.
2nd NTP server	Secondary time server, used if connection to the primary time server is lost.
Current time	The device reads the time from the server. The time and calendar details of the controller connected to M-Link via a C connector will also be updated from the server.
Time zone UTC offset	The current time zone. Finland's time zone is +2:00.
DST in use	If you select "DST in use", the device will automatically switch between winter time and daylight saving time according to the calendar.
Controller	Ouman device connected to an Ouman device via a C connector
Controller version	Device platform version of the Ouman device
Controller application version	Software version of the control application of the Ouman device

Settings



Alarm routing:

The SNMP function can be used for alarm transfers between Ouman devices and the control room. The SNMP function can be used for sending information on the activation, elimination and resetting of alarms to the desired server using the SNMP protocol.

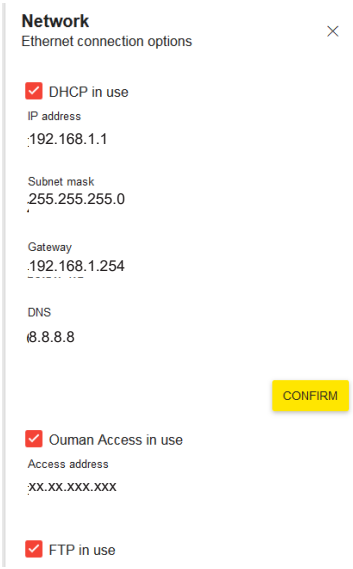
Setting	Factory setting	Description
SNMP server IP	10.1.1.23	The IP address of the destination server where the message is sent. Ounet's IP address 10.1.1.23 is the default.
Retry delay	5 min	If the alarm is not acknowledged from the server, the alarm message will be resent after the delay that is set.
SNMP in use		This selection enables/disables the entire SNMP function.

From the M-link device, information about alarm can also be transmitted using the HTTP protocol.

Setting	Factory setting	Description
HTTP server address		The IP address of the destination server where the message is sent.
HTTP alarm in use		This selection activates the sending of alerts via HTTP messages.

Please note: If Access connection is used, M-Link's Access IP address or name (mxxxxxxxx**.ouman.net) must also be set at Ounet as the local IP address.**

Network



There are two alternative ways to set the M-Link device IP address and network settings:
1. IP address is retrieved via DHCP function.
2. IP address is set manually.

Alternative 1. Setting the IP address via DHCP function:

This requires that network has DHCP service that assigns an IP address for M-Link.

1. Select "DHCP in use" .
2. Select "Confirm".
3. Wait approximately one minute.
4. Select ↻. If the IP settings changes, the new IP settings have been successfully received. If the IP settings do not change, make sure the connections are correct and that the network has a DHCP server.
5. If you select "Ouman Access in use", M-Link retrieves the Access IP address

FTP in use: With FTP enabled, you can download the template file to Ounet directly from the device (see page 4).

Alternative 2: Setting the IP address manually:

1. You can deactivate the function at "DHCP in use". (If the DHCP function is on, the manual changes will be bypassed at IP address , Subnet mask, Gateway address and Name server address).
2. Ask the network administrator for the network settings and enter the desired settings.
3. Select "Confirm".

Access service requirements

1. LAN is routed via Internet
The Access service operates on the Internet so the Access service is not available if the device is not connected to the Internet. The Access device examines the availability of Internet connection by sending a Ping packet to the Internet server at 3-minute intervals. The network must allow the ICMP outwards from any port and the receipt of the reply message to the same port.

2. The VPN protocol used by Access service outwards is not blocked
The Access service is based on the VPN connection which the Access device creates to the Access server.
The network must allow the UDP outwards from any port to the port 1194 and the receipt of the reply message to this port.

3. Time service protocol outwards is not blocked
The Access service works only when the clock in the Access device shows the correct time. The clock is set to the correct time from the network using the NTP protocol.
The network must allow the UDP outwards from any port to the port 123 and the receipt of the reply message to this port.

Modbus TCP

Modbus TCP/IP settings are used to change the Modbus TCP server settings. The Modbus TCP/IP interface can be used for communication with Modbus/RTU slave devices connected to the device.

Setting	Factory setting	Description (see figure, page 5)
Gateway port 1 (First port of device that is connected to C-Serial)	503	A M-Link-compatible device can be connected to M-Link's C connector as a master device. The M-Link-compatible device may have one or more RTU buses. The port setting of Modbus master 1 bus is specified here. The Port 1 setting determines the TCP/IP port serving as the gateway to the Modbus RTU bus of the M-Link- compatible device.
Gateway port 2 (Second port of device that is connected to C-Serial)	504	The M-Link-compatible device may have several RTU buses. The port setting of Modbus master 2 bus is specified here. The Port 2 setting determines the TCP/IP port serving as the gateway to the Modbus RTU bus of the M-Link- compatible device (for example, an Ouflex M device may have two RTU buses in use (A1, B1 and A2, B2)
Gateway port 3 (Internal registers of M-LINK)	505	M-Link's internal register details are read via this port.
Port 4 (Internal registers of device that is connected to C-Serial)	502	Port 4 is reserved for the internal communication of a M-Link-compatible device connected to M-Link. Information from the Modbus register of a M-Link-compatible device connected to M-Link is read/written via this port.
Port 5 (Port for devices that has connected to modbus RTU)	506	M-Link's own port to the RTU bus (strip terminals 5 (A) and 4 (B). If the port value is 0, port connection is not open.
Slave address for internal registers	1	When a M-Link-compatible device (Ouflex M, Ouflex M BA, S203, C203, H23) is connected to M-Link via the C connector as a slave device, the address of the device is set here.
Maximum number of connections	20	The server load can be changed by changing this setting. The setting determines the maximum number of allowed simultaneous connections from different IP addresses to the server.
Size of requests buffer	50	Buffer for TCP requests.
Idle timeout before connections close	300	This determines the time after which inactive connections are disconnected from the server. Value 0 means that idle timeout is not in use.
Allowed client address	0.0.0.0	The data security of the system can be improved by activating the allowed client address function. If the value is 0.0.0.0, connections from any IP address to the server are enabled. When you specify a certain connection address, only contacts from the specified IP address are allowed.
↻		Refresh view.

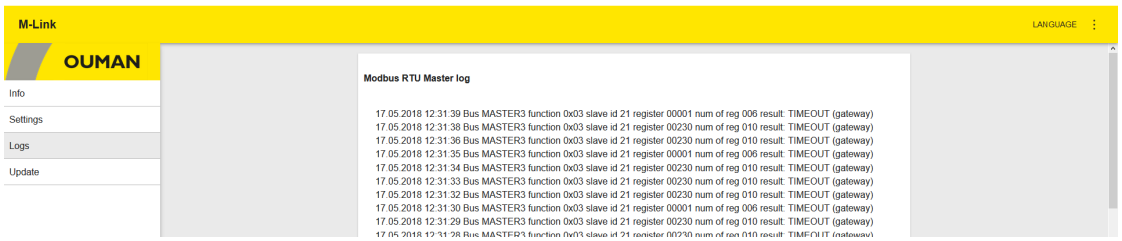
Modbus RTU

M-LINK has a free TCP/RTU gateway. You can read the measurement point data of any RTU slave device via Ounet. You can also add bus devices to M-LINK.

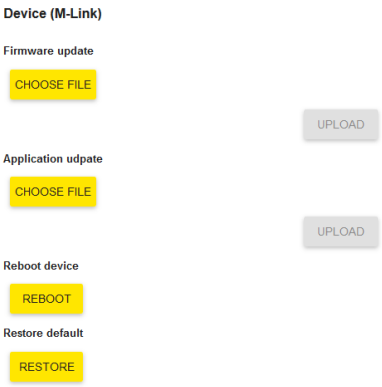
Setting	Factory setting	Description
Modbus master settings		These settings are in use when "Master" is selected as the function of the M-Link device
Timeout	1000 ms	Modbus master timeout
Min delay between packets	100 ms	Minimum delay between packets. If a device in the bus is unstable, bus traffic can be restored by increasing the delay between packets.
Timeouts to fault state	5	This setting determines the number of unanswered requests made to a slave device before changing the state of the device to fault state. A signal strength alarm is raised when the incoming delay time has passed while the fault state was active.
↻		Refresh view.
Modbus RTU slave settings		
Function in use		The M-Link device can be on the bus either as a master device or as a slave device. Configuring M-Link as a slave requires OuflexTool programming. In this case, master-points from the third party device are read by means of M-Link to Ounet.
Slave address for internal registers	1	
Serial port (A1,B1) settings		
Port baudrate	9600	Speed of traffic in the bus. The devices connected to the same bus must have the same traffic speed (baud rate). The default rate is 9600 bauds, but it can be changed.
Data bits	8	Number of data bits in the bus. The devices connected to the same bus must have the same Data bits value.
Parity	None	Parity of the bus. None = parity is not taken into account. Set the same parity as here for all devices in the bus.
Stop bits	1	Number of stop bits in the bus. The devices connected to the same serial port must have the same Stop bits setting.

Logs

When you click the "Update log", 50 latest descriptions of bus communication errors are updated to the screen. Errors may occur in gateway traffic or communication of the Master device. The log shows a time stamp indicating the time the error message was received, the function it concerns, the slave device register the error is present in, how many items of register data the register contains, and where the error shows up.



Update

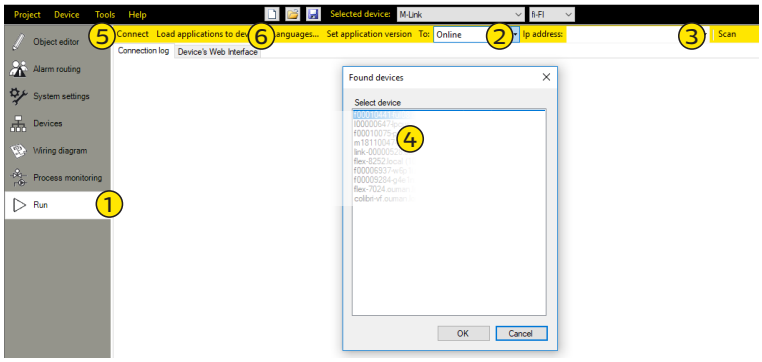


In the Update tab, you can perform updates of the M-Link device and the device connected to M-Link's C connector and restore factory settings. The password can also be changed in the Update tab.

The devices can also be updated using the Ouflex BA Tool.

Remote update of the controller using the OuflexTool

Make the following selections: ① "Run" → ② To: Online → ③ scan→ ④ Select the address → ⑤ "Connect" → ⑥ "Load applications to device"



The tool allows specifying whether the firmware is also updated in conjunction with the application update. The selection is made at "System settings" →  Additional system settings: Downloading files/ Device firmware file. If you select "True", the firmware is updated in conjunction with the application update.

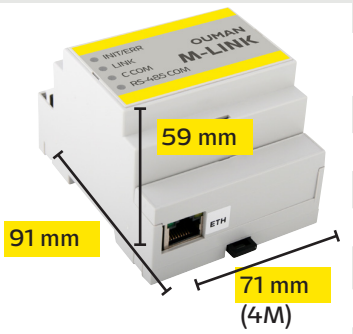
Setting	Description
Device (M-Link)	
Firmware update	Updating the firmware of M-Link device. An img file is downloaded to the device
Application update	Update of M-Link's control application: Select the compressed zip folder and then select "Upload". The M-Link can unzip the compressed folder. Aplication can be updated also online using the Ouflex-Tool tool.
Reboot device	Rebooting of the M-Link device
Restore default	Restore factory settings.
Controller	This is a controller connected to the C connector of the M-Link device.
Firmware update Application update Reboot controller Restore default	**Remote update of the controller** requires that the controller has a memory card in place and the controller platform is v. 1.2.3 or later. H23 controllers have memory card readers starting from version 2.0.0 which is why older H23 devices cannot be remotely updated via M-Link. The devices with an Ouflex C platform can be updated starting from version 4.1.1. When performing the update, you can decide whether the controller settings are kept (Keep set values) or are factory settings restored (Clear set values). You can also cancel the update (Cancel updating).
Change password	You can change the password of the M-Link device. Username = service, and the password (pwd) is shown in the label at the end of the M-Link device
Current password	Enter the current password in the "Current password" field.
New password	Enter the new password in the "New password" field.
Confirm password	Re-enter the new password
Change	The new password is activated when you click on "Change password".

Examples of use

- Introduces Access connections to Ouman's and third parties' devices, enables connection to Ounet
- Third-party devices can be brought up to the Ounet
- Allows connecting Modbus RTU devices over a Modbus TCP/IP network, and vice versa
- Different bus point transfers can be made from one device to the next, for example, reading the outdoor temperature to the EH-203 and the EH-105 via the RTU bus
- Use of I/O cards over a TCP / IP network
- Update of C- and M-based devices, and remote downloading of software

M-LINK Technical information

Casing	PC/ABS
Mounting	DIN rail
Dimensions	71 mm (4M) x 91 mm x 59 mm
Weight	100 g
Operating temperature	0 ... +50 °C.
Storage temperature	-20 ... +70 °C.
Protection class	IP 20
Ethernet connection	10/100 Mb/s Ethernet-connection (RJ-45)
Serial connections	RS-232, RS-485 Modbus- RTU
Operating voltage	16-30 VDC /1.4 W or 24 VAC (-20% ... +25%) / 3.6 VA
Ethernet protocols	Modbus TCP, HTTP, SNMP and FTP
Approvals - EMC Interference tolerance - EMC Interference emissions	 EN 61000-6-1 EN 61000-6-3
System dependency	Can be connected to Ounet. Modbus TCP/IP support
Warranty	2 years
Manufacturer	Ouman Oy



We reserve the right to make changes to our products without a special notice.